Irish Neonatal Research and The Neonatal Society Joint Meeting Programme 2018

Date: Thursday 28th and Friday 29 June

Venue: Tercentenary Hall, Trinity College Dublin

Trinity Biomedical Sciences Institute, 152-160 Pearse Street, Dublin 2

Thursday 28th June 2018	
10.50-11.00	**Welcome**
11.00-13.00	**Session 1 – Chairpersons: Prof. Afif El-Khuffash & Prof. Eleanor Molloy**
11.00-11.15	**Home Oxygen Referral Audit In Premature Neonates Born In UMHL** **M Abu Bakar**, University Maternity Hospital, Limerick (UMHL)
11.15-11.30	**Management of neonatal chylothorax: Twenty years' experience in a single tertiary Neonatal Unit** **H Sharp,** University College London
11.30-11.45	**Cord blood lymphocyte count as a potential screening tool for severe combined immunodeficiency (SCID)** **J Timon**, NUI Galway
11.45-12.00	**3D Scanning as a minimally invasive measuring technique for neonatal anthropometry** **E Andrews,** University Hospital, Southampton
12.00-13.00	***Keynote Lecture:*** ***Introduced by Prof. James Boardman*** ***Neuroimaging of the emergence of cognition and its potential clinical applications*** **Prof. Rhodri Cusack, Thomas Mitchell Professor of Cognitive Neuroscience, Trinity College Dublin**
13.00-14.00	**Lunch/Meet the Sponsors/Posters**
14.00-15.30	**Session 2: Chairpersons: Prof. Gene Dempsey & Dr Chris Gale**
14.00-14.15	**Colonisation and late-onset sepsis due to Gram-negative bacteria in hospitalized neonates: the NeoHIEC study** **C Kortsalioudaki**, University College London
14.15-14.30	**Indicators for lumbar puncture in well-looking neonates; evidence from a national questionnaire-based survey** **S Fareed,** University Hospital Limerick
14.30-14.45	**Intestinal microbiome development in stable preterm infants: a longitudinal study** **R Hutchinson**, Kings College London
14.45-15.00	**Sex differences in innate immune function in neonates** **E Molloy,** Trinity College Dublin
15.00-15.15	**T-cell proliferation response in neonates at birth and at 3 weeks of age: preliminary results of the NAMFISIN study** **G Toldi,** Birmingham Women's Hospital

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Thursday 28th June 2018	
15.15-15.30	**Chronobiology in Neonatal Encephalopathy** **T Strickland,** Trinity College Dublin
15.30-16.00	**Tea/Coffee/Meet the Sponsors/Posters**
16.00-17.00	***THE DAVID HARVEY LECTURE: Introduced by Prof. Neena Modi*** ***The Future of the National Health Service in England and implications on the rest of the UK?*** **Prof Allyson Pollock, Consultant in Public Health Medicine and the Director of the Institute of Health and Society, Newcastle University**
17.00	**Day 1 Meeting Close**
18.30	**Drinks followed by Conference Dinner – Royal College of Surgeons in Ireland**
19.00	**Conference Dinner – Royal College of Surgeons in Ireland**

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Friday 29th June 2018	
08.30-09.00	**Registration/Tea/Coffee/Meet the Sponsors/Posters**
09.00-10.45	**Session 3: Chairpersons: Prof. Jan Miletin and Dr Karen Luyt**
09.00-09.15	**Corpus callosal area is associated with cognitive but not motor abilities in school-aged children without cerebral palsy cooled for neonatal encephalopathy** **G Geary,** University of Bristol
09.15.09.30	**A data-driven metric of atypical brain development in preterm birth** **P Galdi,** University of Edinburgh
09.30-09.45	**The predictive value of cerebral MR imaging for later neurodevelopment in newborns who have undergone therapeutic hypothermia for hypoxic-ischaemic encephalopathy in clinical practice** **P Tharmapoopathy**, Royal London Hospital
09.45-10.00	**Cytokine production pattern of T lymphocytes in neonatal arterial ischaemic stroke during the first month of life – a case series** **G Toldi,** Birmingham Women's Hospital
10.00-10.15	**Survey of sedation, respiratory support and parental contact practices during therapeutic hypothermia for hypoxic-ischaemic encephalopathy** **E Jordan,** Gloucestershire Royal Hospital
10.15-10.30	**Altered innate immunity in neonatal encephalopathy** **E Molloy,** Trinity College Dublin
10.30-10.45	**Genes associated with neuropsychiatric disease increase vulnerability to abnormal deep grey matter development** **H Cullen,** King's College London
10.45-11.15	**Tea/Coffee/Meet the Sponsors /Posters**
11.15-13.15	**Session 4: Chairpersons: Prof. Helen Budge and Dr Mike Boyle**
11.15-11.30	**Noise exposure in NICU and during neonatal transport: effects and effectiveness of noise protection** **N Aminudin,** Rotunda Hospital, Dublin
11.30-11.45	**Early diastolic dysfunction and respiratory morbidity in premature infants: an observational study** **N Bussmann**, Rotunda Hospital, Dublin
11.45-12.00	**Right ventricular and pulmonary vascular coupling is influenced by left ventricular diastolic function in premature infants** **N Bussmann,** Rotunda Hospital, Dublin
12.00-12.15	**Breathing and crying by newly-born preterm infants in an era of delayed cord clamping** **M Murphy,** National Maternity Hospital, Dublin
12.15-13.15	**Keynote Lecture: Introduced by Prof. James Boardman** ***Pulse oximetry screening for critical congenital heart defects: a long journey, are we there yet?*** **Prof. Andrew Ewer, University of Birmingham, UK**
13.00-14.00	**Lunch and Meet the Sponsors and Posters**

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Friday 29th June 2018	
14.15-15.45	**Session 5: Chairperson: Prof. Howard Clark**
14.15-14.55	**Young Investigator's Prize Lecture** ***Necrotising enterocolitis: addressing uncertainties using population approaches and big data*** **Dr Cheryl Battersby, Imperial College London**
14.55	**Prizegiving for Best Oral Presenation by a Trainee**
15.00-15.30	**Tea/Coffee/Meet the Sponsors/Posters**
15.30-16.30	**The Peter Tizard Lecture - Introduced by: Prof James Boardman** ***Data Science: the cornerstone of medical discovery*** **Professor Andrew Morris, Professor of Medicine** **Director, Health Data Research UK, Vice-Principal Data Science, University of Edinburgh**
16.30	**Close of Meeting**

PROFESSOR RHODRI CUSACK, Thomas Mitchell Professor of Cognitive Neuroscience, School of Psychology & TCIN

After reading physics at Pembroke College, Cambridge, he received a PhD in psychology from the University of Birmingham. He was then a postdoctoral fellow and subsequently group leader at the MRC Cognition and Brain Sciences Unit in Cambridge, and then an Associate Professor at the Brain and Mind Institute of the University of Western Ontario.

Research Interests

We study the brain development of infants in their first year, a period in which many cognitive functions develop remarkably quickly. We also study how perinatal brain injury affects development and how some infants manage to be so resilient. Our goal is to use neuroimaging to predict the functional consequences of brain injury at an earlier age, as current behavioural and neurological tools are poor predictors of later impairments, and the standard-of-care is often to "wait-and-see" what problems emerge during childhood. This places stress on parents, and precludes earlier more effective interventions.

We use a diverse set of neuroimaging methods. With magnetic resonance imaging (MRI) we study brain networks (using diffusion-weighted imaging, functional connectivity) and the developing responses to what an infant sees and hears (using functional MRI). We also study infant behaviour and have pioneered ways to do large scale testing online. We develop many new tools that bring together computational models of cognition with new neuroimaging techniques, to answer the many fascinating and important questions concerning the origin of our minds.

His research has been funded by the IRC, MRC, Wellcome Trust, BBSRC, EPSRC, CIHR, and NSERC, and he recently received the prestigious ERC Advanced Grant. He has 99 peer-reviewed publications.

PROFESSOR ANDREW EWER

Andrew Ewer is Professor of Neonatal Medicine at the University of Birmingham and Honorary Consultant Neonatologist at Birmingham Women's Hospital.

He qualified from Birmingham UK and trained in Paediatrics and Neonatology in Birmingham (UK), Sheffield (UK) and Melbourne (Australia).
He was awarded MD in 1998.

Led the HTA funded PulseOx study between 2007 and 2011 investigating test accuracy, health economics and acceptability of pulse oximetry screening. He has published widely on pulse oximetry screening including 3 systematic reviews (2007 [ADCFN] 2012 [Lancet] and 2018 [Cochrane library]

He advised the USA SACHDNC committee on prior to the introduction screening for Critical Congenital Heart Defects in Jan 2011
He has worked with NIPE/NSC UK since 2011 and was clinical lead for the UK Pulse oximetry screening pilot study in 2015.

He is a senior member of European Workgroup on pulse oximetry screening and published a European consensus statement in 2017. In the last five years he has given over 30 overseas lectures across five continents and advised numerous organisations and countries regarding introduction of screening. He is Director of Research and Development at BWH, a Divisional Lead for West Midlands Clinical Research network and a member of various NIHR Trail Steering and Data Monitoring Committees. He is an Associate Editor for Archives of Disease in Childhood Fetal and Neonatal Edition.

PROFSSOR ANDREW MORRIS CBE MSc MD FRCP (Edin, Glas) FRSE FMedSci
Professor of Medicine
Director of Health Data Research UK
Vice Principal, Data Science
University of Edinburgh

Since August 2017 **ANDREW MORRIS** has been the inaugural Director of Health Data Research UK, the multi-funder UK Institute for health and biomedical informatics research that will capitalise on the UK's renowned data resources and research strengths to transform lives through health data science. He is seconded from his position as Professor of Medicine, and Vice Principal of Data Science at the University of Edinburgh, having taken up position in August 2014. Prior to this Andrew was Dean of Medicine at the University of Dundee.

Andrew was Chief Scientist at the Scottish Government Health Directorate (2012-2017) and has served and chaired numerous national and international grant committees and Governmental bodies.

Andrew was awarded a CBE (Commander of the Most Excellent Order of the British Empire) in the 2018 New Year's Honour's List.

His research interests span informatics and chronic diseases. He has published over 300 original papers and has attracted over £50million in grant funding.

PROFESSOR ALLYSON POLLOCK

Prof Allyson Pollock is director of the Institute of Health & Society at Newcastle University. A public health physician, she is a leading authority on the fundamental principles of universal health systems, marketisation and public private partnerships, and international trade law and health. Her current research is around access to medicines, pharmaceutical regulation, and public health; and child and sports injury. Her book *NHS plc: the privatisation of our health care* was published by Verso, and she is currently working on a book *An Anthem for the NHS*.

Title (Upper case)

HOME OXYGEN REFERRAL AUDIT IN PREMATURE NEONATES BORN IN UMHL FROM FEB 2016 TO FEB 2018

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 Muhammad Abu Bakar, Dr Ghulam Raza, Dr Aisha Ijaz, Dr Niazy Al Assaf, Dr Rizwan Khan

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Institution(s) Department Of Neonatology,University Maternity Hospital Limerick, Ireland

Introduction: Bronchopulmonary dysplasia (BPD) has been a challenging condition for neonatologists. Despite many other advances in neonatology, this is a disease for which we have made little progress (1). The primary risk factor, prematurity, is not in dispute and is quite consistent with the first report of BPD by a young Stanford radiologist (2). Prematurely born infants who had BPD may require supplementary oxygen at home for many months (3). It is observed that very few premature babies were discharged on home oxygen from University Maternity Hospital Limerick in last two years. There is no set standard practice under which home oxygen referral happens in UMHL. Most of the referrals used to be done two to three weeks before expected date of baby's discharge if the baby was failed to achieve self ventilation at room air. Doctors used to complete the referral form and attach in the chart as an evidence of referral process.

Objectives:

The objective of this study is to determine the number of premature babies born in UMHL who were discharged on home oxygen over two years period, so undue home oxygen referral and allocation of resources can be prevented. Further to find out average gestation age at which babies were self ventilating at room air.

Methods: Retrospective data of 38 babies equal to or less than 29 weeks of gestation was collected who were born in UMHL from February 2016 to February 2018. Charts were pulled from medical records after getting list of babies from admission book under gestation mentioned above. Different variables were studied including Gestation at birth, Birth weight, Date of admission, Date of discharge, Gestation for self ventilation at room air, Gestation of home oxygen referral and gestation at discharge. Further to this, management of Chronic Lung Disease in the form of steroids and diuretics treatment along with management of patent ductus arteriosus and number of required blood transfusions were also looked upon.

Results: This study showed total 38 babies born in UMHL from February 2016 to February 2018, equal to or less than 29 weeks of gestation. 26%(n=10) babies were excluded from the study including 21%(n=8) babies died, 3%(n=1) chart missing and 3%(n=1) baby lost follow up. In remaining 28 babies, out of which 71%(n=20) were born in the gestation range of 26 to 28 weeks and 70%(n=19) were between birth weight of 750 grams to 1250 grams. 59%(n=16) babies were self ventilating at room air between 31 to 35 weeks of gestation and only 11%(n=3) were self ventilated at room air over 41 weeks of corrected gestational age. 70%(n=19) babies were discharged home within two to four weeks of achieving self ventilation at room air. 29 %(n=8) of the babies didn't need any intervention (Diuretics, Steroids, PDA management, Blood transfusion) during their stay in NICU while 29%(n=8) needed just one intervention among the list mentioned above. 43%(n=12) of the babies needed two or more interventions to achieve self ventilation at room air during their stay in the hospital. This study showed that 4%(n=1) babies were not able to wean off from oxygen over two years period. This baby was discharged home at 42 weeks of corrected gestation age after 14 days of sending home oxygen referral.

Conclusions: It is concluded from this study that only one baby out of total 28 was discharged on home oxygen over two years period and home oxygen referral was sent two weeks before discharge. Further, most of the babies were able to achieve self ventilation at room air between 31st to 35th weeks of gestation while other took little longer to achieve the same.

1) Colby L. Day, Rita M. Ryan. Bronchopulmonary dysplasia: new becomes old again! Pediatric Research 2017;81:210–213

2) Northway WH Jr, Rosan RC, Porter DY. Pulmonary disease following respiratory therapy of hyaline-membrane disease. Bronchopulmonary dysplasia. N Engl J Med 1967;276:357–68

3) Greenough A, Long-term respiratory consequences of premature birth at less than 32 weeks of gestation, Early Human Development 2013 Oct;89 Suppl 2:S25-7

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: Yes

Title (Upper case)

MANAGEMENT OF NEONATAL CHYLOTHORAX: TWENTY YEARS EXPERIENCE IN A SINGLE TERTIARY NEONATAL UNIT

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

Harriet Sharp, Christina Kortsalioudaki, Mark Sellwood, Giles Kendall

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Institution(s)

Academic Neonatology, Institute for Women's Health, University College London
Neonatal Unit, University College Hospital, London

Introduction *(include hypothesis)*

Neonatal chylothorax (NC) is a rather rare but life-threatening condition characterised by the accumulation of chyle in the pleural space. It is associated with significant morbidity and mortality. Therefore, it requires timely diagnosis and treatment.Currently its natural course is not well described and there are no standardised, approved guidelines for its management. This study aimed to review the underlying aetiology, clinical course, management and outcomes of neonates with NC.

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

We conducted a retrospective review of case notes of all neonates with NC admitted to a tertiary level neonatal unit over the period 1997-2017.

Results

Twenty-five NC cases were identified, of which 14 were spontaneous, 5 had a genetic cause and 6 were iatrogenic. Fourteen cases were diagnosed antenatally of which 6/14 underwent antenatal pleural drainage. All cases required pleural drainage postnatally for 25.4 (16-36) days. On average, neonates with NC were ventilated for 9 (0-197) days after birth. Median length of hospital stay was 62 (12-251) days, with median time to full enteral feeds to be 37 (6-118). Seventeen neonates were trialled on breast-milk; however, in all cases this was stopped due to recurrence or worsening of chylothorax. At discharge, twenty neonates required a medium chain triglyceride (MCT) formula. Octreotide was used in 11/25 infants with persistent NC. For 5 of them it was successful in reducing chest-drain output, however 4 were equivocal and 2 resistant to treatment. Surgery for chylothorax was required in 2 cases in our cohort. Three neonates died.

Conclusions

Neonates with NC require prolonged periods of intensive-care and hospitalisation. Early introduction of EBM was unsuccessful with the vast majority of neonates being discharged on MCT. Octreotide administration had varied success. We believe this to be of value when counselling parents and planning appropriate care.

References *(include acknowledgement here if appropriate)*

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: Christina Kortsalioudaki

Title (Upper case)

CORD BLOOD LYMPHOCYTE COUNT AS A POTENTIAL SCREENING TOOL FOR SEVERE COMBINED IMMUNODEFICIENCY

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

Timon, J, [1], Wrafter, A. [2], Gilmore, R. [2], Moylett, E. [1]

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Institution(s)

[1] Academic Department of Paediatrics, NUI Galway [2] Department of Haematology UHG

Introduction *(include hypothesis)*

SCID is a rare inherited disease of the immune system commonly characterised by lymphopenia at birth. The condition is typically fatal unless corrected. The aim of our study was to investigate a useful cut-off absolute lymphocyte value (cord blood sample) as a potential screening tool for SCID; a secondary aim was to evaluate the feasibility of cord sampling as a screening method for SCID.

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

All healthy term infants delivered during an 8-week study period were viable for inclusion. Consent was obtained as an 'opt-out' during antenatal visits or at onset of labour. A full blood count was performed on each cord blood sample focusing on a lower absolute lymphocyte limit of 2 x 10^9 as a predictor for possible SCID. The study was approved by the Clinical Research Ethics Committee.

Results

Over the 8-week period, there were approximately 360 births in UCHG with 324 of these fitting our inclusion criteria, despite this cord samples were obtained from only 133 healthy term newborns. 26 of these samples were clotted; therefore 107 samples were fully analysed. We report a mean lymphocyte value at birth of 5.51 x10^9L (SD, 1.787; range, 0.9-11.7), neutrophils a mean of 6.98x10^9L (SD, 2.67; range, 2.9-14.4) and platelets a mean of 276.36x10^9L (SD, 65.2; range, 39-430). One newborn had a lymphocyte count below our cut off point (0.9 x10^9), this child was followed up and values normalized within the first few weeks of life.

Conclusions

Cord samples are easy to obtain however many missed opportunities would negate this approach for a national screening approach. Normative data for full blood count values were generated. A lower white cell count of 1.5 would be acceptable for SCID screening purposes.

References *(include acknowledgement here if appropriate)*

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

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: Dr. Edina Moylett

Title (Upper case)

3D SCANNING AS A MINIMALLY INVASIVE MEASURING TECHNIQUE FOR NEONATAL ANTHROPOMETRY

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

Edward T Andrews MRCPCH[1], James J Ashton MRCPCH[2,3], Freya Pearson FRCPCH[1], R Mark Beattie FRCPCH[2,4], Mark J Johnson[1,4] PhD

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Institution(s)

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Introduction *(include hypothesis)*

Measurement of length and head circumference (HC) in addition to weight is vital in assessing the nutritional status of preterm infants. Current anthropometry represents an interruption to preterm infants and may not be possible in unstable infants. Hand-held 3D scanning has the potential to perform bedside anthropometry (length and HC) in a less invasive manner. We aimed to evaluate the feasibility and performance of 3D scanning as a 'non-touch' measuring technique for routine anthropometry.

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

Preterm infants born before 30 weeks gestation were recruited from a single neonatal unit. HC and length were measured both manually and by a handheld 3D scanner at recruitment and weekly until discharge. The two methods were compared using the Bland-Altman method and linear regression.
This study received ethics approval from an NHS Research Ethics Committee (Oxford A, ref 14/SC/1275).

Results

17 infants had scan images taken over a 4-month period (87 separate length and 67 HC scan measures with manually taken reference measures). The mean (95%CI) difference between manual and scanner HC measurements was 0.18cm (-0.06 to 0.42cm), the mean percentage difference with all values expressed as positive was 3.16% (2.33% to 4.00%). The mean difference for length measures was 0.27cm (0.03 to 0.54cm) the mean for length percentage difference with all values expressed as positive was 3.24% (2.69 to 3.79%). Bland-Altman plots showed reasonable agreement between the two methods. Linear regression demonstrated a high correlation between scanner and manual measurements of HC (r=0.96, Figure 1a) and length (r= 0.96, Figure 1b).

Figure 1a

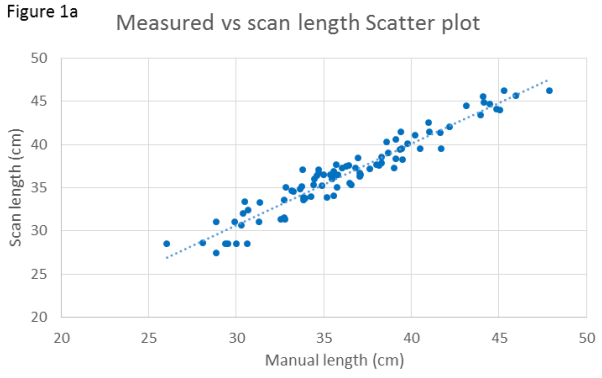
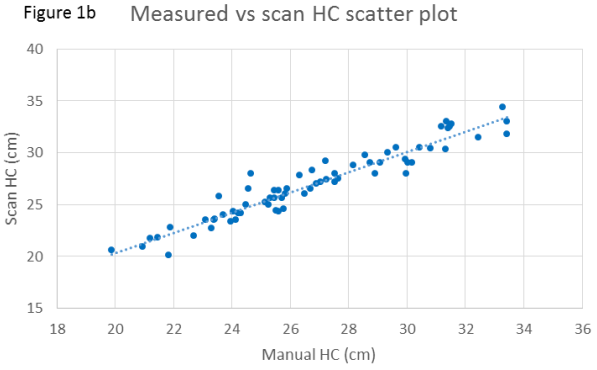


Figure 1b



Conclusions

These data show a high correlation between measurements gathered from 3D scan images and standard anthropometry. This suggests that 3D scanning could represent a feasible, accurate and practical way of monitoring the growth of preterm infants with minimal handling and without interruption to developmental care.

References *(include acknowledgement here if appropriate)*

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

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: Dr Mark Johnson

Title (Upper case)

COLONISATION AND LATE-ONSET SEPSIS (LOS) DUE TO GRAM-NEGATIVE BACTERIA (GNB) IN HOSPITALISED NEONATES-THE NeoHIEC STUDY

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

C. KORTSALIOUDAKI [1], E. GALIZA [1], P.T HEATH [1] (On behalf of the NeoHIEC Study consortium, UK)

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Institution(s)

[1]St George's, University of London, Institute for Infection and Immunity, London, United Kingdom

Introduction *(include hypothesis)*

LOS due to GNB is an important cause of morbidity and mortality in neonates. Multi-resistant Gram-negative bacteria (MRGNB) colonisation, infections and outbreaks are of growing concern in neonatal units (NNUs) across the UK and globally. To develop strategies to control and to prevent these infections the NeoHIEC Study (13/LO/0897) was undertaken in the South-London (SL) neonatal network. It aimed to describe colonisation with GNB in hospitalised neonates and to identify possible association with bacteraemia.

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

Between October 2013-May 2014 peri-anal swabs were collected from neonates in 8/10 SL NNUs (2 NICU, 5 LNU, 1 SCU), stored and analysed in batches. All identified GNB were subjected to antibiotic susceptibility using the BSAC methodology. MRGNB were defined as isolates resistant to ≥3 antibiotic classes. Participating NNUs submitted details of invasive infection episodes to the neonIN (***www.neonin.org.uk,*** 05/Q0806/34+5) database. A point prevalence survey on antibiotic-prescribing was also conducted monthly in each NNU.

Results

1851 samples were collected from which 1341 GNB were isolated. The majority of these GNB isolates (1318,98%) were *Enterobacteriaceae (Klebsiella* sp (40%), *E. Coli* (28%), *Enterobacter* sp (21%)). 20% were MRGNB and 17% ESBL-positive. Overall resistance for the colonisation isolates was: co-amoxiclav (38%), gentamicin (3%), 3rd generation cephalosporins (11%), carbapenems (5%). The proportion of MGRNB in the NICUs (combined) was double that of the LNUs (combined) (22 vs 12%, $p<0.001$). There were 29 episodes of GNB bacteraemia with overall incidence of GNB sepsis to be 9.9/1000 NNU-admissions. *E. coli* was the most frequent pathogen (38%), followed by *Klebsiella* sp (35%). Median-age to colonisation with GNB was 28 (IQR:16-66) vs 17 (IQR:12-40) days for bacteraemia. Analysis of the antibiotic resistance data for both colonisation and invasive episodes revealed that routine screening for colonisation does not accurately predict the antibiotic resistance profile for invasive pathogens.

Conclusions

Hospitalised neonates are frequently colonised with *Enterobacteriaceae*. Colonisation rates with MRGNB are moderate and correlate with the NNU level of care. Routine screening for colonisation may not be a useful strategy for targeting empiric antibiotic therapy for GNB.

References *(include acknowledgement here if appropriate)*

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 Judith Meek-Neonatologist UCLH

Title (Upper case)

INDICATORS OF LUMBAR PUNCTURE IN WELL LOOKING NEONATES WITH EVIDENCE FROM NATIONAL QUESTIONNAIRE BASED SURVEY

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 sheik fareed, Dr Faiza Yasin, Dr Rizwan Khan

Corresponding author e-mail address:	Sheikdr@yahoo.com

Institution(s)

Department of Paediatrics, University Hospital Limerick - Limerick

Introduction *(include hypothesis)*

The incidence of early onset neonatal bacterial meningitis (EONM) was estimated to be approximately 0.3 per 1000 live births. Sign of EONM in term infants typically present by first 6 hrs and the majority presents within the first 24hr of life. Diagnostic investigations varies widely. However rationale to do lumbar puncture in well looking neonates with raised CRP varies widely

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

To perform a national survey via questionnaire to all paediatric consultant & neonatologist in Republic of Ireland. Questionnaire consists of questions regarding indication of lumbar puncture in well looking neonates with raised CRP and what level of CRP is indicative for Lumbar puncture.

Results

97 questionnaires were sent. Response rate was 50%. 54% were from general Paediatric consultants, 30% from Neonatologist, 4% from Neurologist and 12% were unmentioned.
56 % will do lumbar puncture (LP) in well looking child with CRP >20. 35% will make decision of LP with clinical assessment of the neonates alone. In case of Clinical condition and elevated CRP, 33% will always do LP as compared to 50% who sometimes do LP and look for other blood markers. In case of positive blood culture and +/- positive blood PCR 56% will do the LP in stable neonates. According to survey 75% of the LP decisions were made by clinicians without considering any international guidelines.

Conclusions

The decision to perform a lumbar puncture in neonate with suspected EONM remains unclear. In the high risk & healthy appearing babies, the data suggest that likelihood of meningitis is extremely low. Most clinicians employ CRP as a complementary indicator to clinical decision rather than sole determinant of lumbar puncture in otherwise well babies. However many clinicians do use it sometimes to gear the decision. Absolute solution can only be yielded after outcome of lumbar puncture justifies the role of CRP, Guidelines through national consensus & neonatal clinical advisory group are recommended.

References *(include acknowledgement here if appropriate)*

1: http://adc.bmj.com/content/99/Suppl_1/A172.2
2: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2082975

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:

Title (Upper case)

INTESTINAL MICROBIOME DEVELOPMENT IN STABLE PRETERM INFANTS: A LONGITUDINAL STUDY

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

Hutchinson R[1,4], Wade WG[2], Millar M[3], Wong K[1], Wilks M[3], Stacey F[4], Costeloe K[1], Fleming P[1,4]

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Institution(s)

1. Blizard Institute, Queen Mary University of London; 2. Centre for Host-Microbiome Interactions, King's College London; 3. Department of infection, Barts NHS Trust; 4. Neonatal Intensive Care Unit, Homerton University Hospital NHS Foundation Trust

Introduction *(include hypothesis)*

It has been suggested that dysbiosis of the preterm gut is implicated in the pathogenesis of necrotising enterocolitis (NEC) and late-onset sepsis (LOS)[1,2]. Existing studies of the preterm gut microbiome are frequently limited by low sampling frequency, a short assessment period, and/or failure to account for the presence of possible microbiome modulators. We hypothesise that longitudinal study of the microbiome of individual subjects, controlling for these factors, may elicit important unrecognised patterns of microbiome development.

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

This research was nested in a study investigating microbial colonisation in preterm infants born <32/40 GA - funded by Barts Charity, and received ethical approval from London (Chelsea) REC. A subset of 'stable' infants was identified (*i.e.* no episodes of LOS/NEC; only one antibiotic course restricted to the immediate postnatal period; and >75% of samples obtained when not on antibiotics). We aimed to obtain stools on a daily basis from birth up to 12 weeks of age, corrected GA of 37 weeks, or discharge. Bacterial DNA was extracted from these samples, and community profiling was performed on the V4 region of the 16S rRNA gene using Illumina MiSeq.

Results

14 subjects (median GA 31w, median BW 1279g, 13 born by caesarean section) were identified as meeting the inclusion criteria. A median of 18 samples/subject were obtained, over a median of 38 days (samples were skewed to a later age, as stool frequency increased). After an initial period of instability, where no consistency in colonisation was noted within the cohort, samples were rapidly dominated by *Enterobacteriaceae*, with all subjects producing early samples with >80% abundance. Thereafter, *Enterobacteriaceae* proportions generally diminished to ~50%, as other facultative and obligate anaerobes increased in abundance. An exception to this was the only subject in the cohort born prematurely secondary to chorioamnionitis and delivered vaginally, who maintained high proportions (>90%) of *Enterobacteriaceae*. A variety of facultative/obligate anaerobic families were seen to dominate in individual subjects (*e.g. Bacteroidaceae*, *Veillonellaceae*, *Bifidobacteriaceae*, *Enterococcaceae*), and community composition remained largely consistent over time within subjects.

Conclusions

This study corroborates previous data demonstrating early dominance of *Enterobacteriaceae* in the preterm gut. However, it also demonstrates a subsequent colonisation pattern with a variety of anaerobic taxa, which has not been previously explicitly described.

References *(include acknowledgement here if appropriate)*

1. Neu J, Walker WA. Necrotizing Enterocolitis. New England Journal of Medicine 2011; 364: 255-264
2. Lin PW, Stoll BJ. Necrotising enterocolitis. The Lancet; 368: 1271-1283

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 Paul Fleming

Title (Upper case)

SEX DIFFERENCES IN INNATE IMMUNE FUNCTION IN NEONATES

Authors

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Institution(s)

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Introduction *(include hypothesis)*

Neonatal sepsis remains a major cause of morbidity and mortality and research suggests that male neonates are at higher risk of sepsis than females and have poorer outcomes following episodes of sepsis. Females neonates are known to have a more robust immune response to infective stimuli than males (1) and steroid hormones such as estrogen are thought to affect the innate immune response (2). We hypothesise that males and female infants have differing innate immune responses and that these responses may be altered by the effect of steroid hormones. This study compared the expression of CD11b and TLR2 on the surface of granulocytes in male and female infants at term before and after endotoxin (LPS) and estrogen exposure.

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

Peripheral blood was taken from healthy neonates on the postnatal wards during routine phlebotomy (5 female, 7 male). Samples were treated with endotoxin (LPS; 10ng/mL) and 17-β estradiol (E2; 10^{-8}M), alone and in combination. Samples were then stained with monoclonal antibodies specific for CD11b and TLR2 and analysed by flow cytometry. Granulocytes were identified based on light scattering properties and CD66b expression. Granulocyte activation was quantified by analysis of CD11b and TLR2 expression. Results were analysed using GraphPad Prism. Ethical approval was provided by the Coombe Women and Infants University Hospital and this project is funded by the National Children's Research Centre, Dublin.

Results

No significant differences were noted in CD11b or TLR2 expression between male and female neonates at baseline. Male infants were found to be more responsive to endotoxin than females as they had a significant increase in CD11b following LPS exposure (p 0.0156), a difference not present in the female population (p >0.05). CD11b and TLR2 expression did not vary following E2 treatment

Conclusions

CD11b and TLR2 expression did not differ between males and females at baseline. CD11b expression increased significantly following endotoxin exposure in males but not in females. Our findings support the theory that innate immune response differs by gender and this may have important implications for future research and should be considered in study design.

References *(include acknowledgement here if appropriate)*

1. O'Driscoll DN, Greene CM, Molloy EJ. Expert review of clinical immunology. 2017;13(11):1061-71.
2. Giannoni E, Guignard L, Knaup Reymond M, et al. Infection and immunity. 2011;79(7):2690-8.

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

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: Eleanor Molloy

Title (Upper case)

T CELL PROLIFERATION RESPONSE IN NEONATES AT BIRTH AND AT 3 WEEKS OF AGE – PRELIMINARY RESULTS OF THE NAMFISIN STUDY

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

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Introduction *(include hypothesis)*

Sepsis is responsible for up to 30% of global neonatal mortality. Although neonatal infections present an enormous global burden for healthcare, the only treatment option currently available is antibiotic therapy. Very little is known about the normal function of the neonatal immune system and this knowledge is critical for the identification of potential factors that might be amenable to medical support during periods of infection. We hypothesized that the feto-maternal immunological symbiosis requires adaptation of not only the maternal, but also the fetal immune system, which might itself be partially regulated by maternal factors.

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

We enrolled 8 women with healthy, uncomplicated pregnancies undergoing an elective Caesarean section. Maternal peripheral blood was taken before the section and cord blood samples were collected. A peripheral blood sample was also collected from neonates at three weeks of age. T cells were isolated from the samples and mixed lymphocyte reactions were performed over five days (maternal versus cord blood or neonatal cells and cord blood or neonatal versus maternal cells). Proliferation was measured by flow cytometry in the CD3, CD4 and CD8 subsets.

Results

An increased rate of proliferation was observed in maternal cells when incubated with neonatal cells compared to cord blood cells, most pronounced in the CD4 subset (CD3 cells: 2.85% vs 24.40%, CD4 cells: 2.75% vs 24.85%, CD8 cells: 0.55% vs 12.1%). On the contrary, proliferation of cord blood/neonatal cells was reduced at three weeks of age compared to birth, most pronounced in the CD8 subset (CD3 cells: 19.35% vs 8.5%, CD4 cells: 23.7% vs 14.65%. CD8 cells: 16.65% vs 0.75%).

Conclusions

The pregnancy-induced maternal immunosuppression towards fetal antigens appears to be diminished by three weeks post delivery (although it is not completely resolved). Surprisingly, neonatal T cells demonstrate decreased proliferation in the presence of maternal antigens three weeks after delivery compared to at birth. This is in line with the increased susceptibility to infection in the neonatal period, but does not confirm the notion that maternal factors induce neonatal immunosuppression or that the pregnancy-specific immunosuppression is extended into the fetal immune system.

References *(include acknowledgement here if appropriate)*

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 A K Ewer

Title (Upper case)

CHRONOBIOLOGY IN NEONATAL 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)*

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Institution(s)

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Introduction *(include hypothesis)*

In Neonatal Encephalopathy (NE) – a complex and devastating brain condition mediated by systemic inflammation - the earlier acquisition of a normal sleep-wake cycle is associated with better outcomes. The immune system demonstrates functional changes with time of day and the disruption of circadian rhythms has been linked to inflammatory disorders. Further understanding of chronobiology in NE has important implications for future therapeutic targets. Hypothesis; To evaluate the expression of circadian genes in NE at baseline and following endotoxin (LPS) stimulation in comparison to healthy term controls (TCs), and to correlate the circadian rhythm with the infants outcome; survival and neuroimaging

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

Quantitative RT PCR analysis of BMAL, CLOCK, CRY and REV-ERB β in NEs (n=12) was compared to TCs (n=8) at baseline and in response to LPS stimulation. Inflammatory phenotype was measured via serum ELISA analysis. Ethical Approval and Parental Consent were obtained. The Research was funded by the Health Research Board.

Results

BMAL, CLOCK and REV-ERB β were increased in NE day 1 (1.7, 1.2 and 1.7 fold) and on day 3 (1.8, 1.4 and 1.3 fold) at baseline compared to TCs. CLOCK and REV-ERB β were significantly downregulated in response to LPS stimulation in NE on day 1, while BMAL, CLOCK and REV-ERB β were significantly downregulated on day 3 (all $p<0.05$). Pro inflammatory IL-2 was negatively correlated with BMAL in NE, and positively correlated with CLOCK , CRY & Reverb B. Pro Inflammatory IL-1 Beta was positively correlated with CLOCK. Pro inflammatory IFN-y and IL-6 were positively correlated with REV-Erb β. Hypoxia mediator EPO was positively correlated with CRY. There were no neonatal deaths in the cohort. There were no differences in the chronobiology in patients with normal in comparison to abnormal neuroimaging.

Title (Upper case)

Conclusions

Circadian genes are highly expressed in NE at baseline and are downregulated in response to LPS stimulation. This trend may help to explain the altered innate immunity observed in NE. Manipulation of the chronobiology in NE may represent a novel therapeutic opportunity.

References *(include acknowledgement here if appropriate)*

Check box if presenting author is a trainee: basic science trainee x☐ 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 Eleanor Molloy

Title (Upper case)

CORPUS CALLOSAL AREA IS ASSOCIATED WITH COGNITIVE BUT NOT MOTOR ABILITIES IN SCHOOL-AGED CHILDREN WITHOUT CEREBRAL PALSY COOLED FOR NEONATAL 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)*

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Introduction *(include hypothesis)*

Infants cooled for neonatal encephalopathy (NE) with normal neurodevelopment scores at 2 years may have cognitive and motor impairments at school-age despite the absence of cerebral palsy (CP).[1] The corpus callosum (CC) carries transcallosal fibres connecting different cortical regions and we postulate that its size may be a marker for motor and cognitive function. Our objective was to compare the surface area of the CC between cooled children aged 6-8 years and controls, and determine associations with motor and cognitive scores.

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

In a case-control study, 23 cases aged 6-8 years, cooled for NE and without CP, and 20 age, sex and social class matched controls in main stream schools underwent psychometric (WISC-IV), motor (Movement Assessment Battery for Children, MABC-2) and brain MRI assessments. The CC and the cross-sectional supratentorial brain surface area were measured by an assessor blinded to case-control status from the mid-sagittal T1 mprage image. The CC was segmented into 3 equal parts: frontal, mid and occipital. The mid segment was further subdivided into anterior 1/3rd and posterior 2/3rd, as the posterior 2/3rd carries motor fibers.

Results

All cases had a normally appearing CC on neonatal MRI. No focal lesions were seen on the childhood MRI. Cases, compared to controls, had significantly smaller total CC (mean difference (MD):-0.48 (95% CI-0.05,-0.91)), frontal(MD:-0.22 (95%CI:-0.001,-0.436)), occipital(MD:-0.24 (95%CI:-0.045,-0.436)) and anterior 1/3rd of mid CC segment areas (MD:-0.07 (95% CI:-0.018,-0.12)), but a comparable posterior 2/3^{rds} of the mid CC and cross-sectional supra-tentorial brain area. Anterior 1/3rd of mid CC was significantly smaller in cases than controls independent of cross-sectional supratentorial brain area (β=-0.07cm^2(95%CI:-0.11,-0.02). In multiple linear regression total CC area was significantly associated with verbal comprehension (β:8.1), processing speed (β:8.05) and full scale-IQ (β:6.46); and occipital CC area with working memory (β:14.4) independent of supra-tentorial brain area and case-control status. CC areas were not associated with motor scores.

Conclusions

In school-aged children cooled for NE who did not have CP, the anterior 1/3rd of the mid CC segment was smaller than in controls. The CC area was associated with cognitive but not motor abilities suggesting that the development of the CC influenced cognitive function.

References *(include acknowledgement here if appropriate)*

1. Lee-Kelland R, et al. Neonatal Society, London, 2017.

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

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: Ela Chakkarapani

Title (Upper case)

A DATA-DRIVEN METRIC OF ATYPICAL BRAIN DEVELOPMENT IN PRETERM BIRTH

Authors

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Introduction *(include hypothesis)*

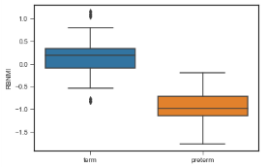
Multimodal MRI captures information about brain macro- and micro-structure, which can be combined in morphometric similarity networks to derive a detailed "fingerprint" of the anatomical properties of individual brains (1). We aimed to test the hypotheses that these fingerprints can be used to derive a data-driven metric of brain maturation, the Relative Brain Network Maturation Index (RBNMI), and that RBNMI differs between preterm infants at term equivalent age and term infants.

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

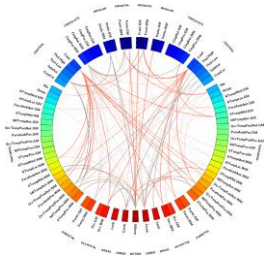
We combined data from different imaging sequences (diffusion and structural MRI) to extract multiple properties from cortical and sub-cortical brain regions (e.g., regional volumes, diffusion tensor-derived metrics, neurite orientation dispersion and density imaging features) which were used to construct individual morphometric similarity networks (1). A regression model was trained to predict postmenstrual age (PMA) at the time of scanning from inter-regional connections. We then derived the relative brain network maturation index (RBNMI) by measuring the difference between apparent (i.e., predicted) and actual age (2). This approach was validated on data from the Theirworld Edinburgh Birth Cohort (TEBC) and the developing Human Connectome Project (dHCP) (PMA range: 37-45 weeks). Ethical approval for use of TEBC from NRES was obtained.

Results

The best performing model in the age prediction task was based on the following features: regional volume, the ratio of T1-weighted and T2-weighted signal intensity, fractional anisotropy, axial and radial diffusivity, intracellular volume fraction, orientation dispersion index and isotropic volume fraction. The model consistently predicted preterm infants to be younger than their actual age (the box plots on the left depict the distribution of the RBNMI in the term and preterm populations).



The connections involved in age prediction (shown in the chord diagram on the right) were predominantly located in fronto-temporal and subcortical regions, posterior cingulate cortex, brain stem and cerebellum.



Conclusions

Morphometric similarity networks combined information from multiple image features to detect dysmaturity in the developing brain. The RBNMI offers a data driven and tractable metric for quantifying atypical brain development associated with preterm birth.

References *(include acknowledgement here if appropriate)*

References: (1) Seidlitz, J., et al., *Neuron* 97.1 (2018): 231-247; (2) Brown, C. J., et al., *Proceedings of MICCAI2016* (2017): 84-91. **Acknowledgement:** Part of these results were obtained using data made available from the *Developing Human Connectome Project* funded by the European Research Council under the European Union's Seventh Framework Programme (FP/2007-2013) / ERC Grant Agreement no. 319456.

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: James Boardman

Title

THE PREDICTIVE VALUE OF CEREBRAL MR IMAGING FOR LATER NEURODEVELOPMENT IN NEWBORNS WHO HAVE UNDERGONE THERAPEUTIC HYPOTHERMIA FOR HYPOXIC-ISCHAEMIC ENCEPHALOPATHY IN CLINICAL PRACTICE

Authors

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Institution(s)

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Introduction *(include hypothesis)*

Cerebral MRI findings have been shown to be predictive of later neurodevelopmental outcomes in newborns with hypoxic-ischaemic encephalopathy (HIE) in the pre-therapeutic hypothermia (TH) era. Studies have shown that babies who have undergone TH have fewer lesions on cerebral MRI, and if lesions are present, they are predictive of outcome (1). *Hypothesis:* Cerebral MRI findings are predictive of later neurodevelopmental outcomes in newborns with HIE after TH in clinical practice

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

A prospective cohort of term newborns recruited from four centres between 2014 - 2015 who were cooled for HIE and had cerebral MRI performed were studied after informed consent from the families. Cooled newborns had cerebral MR images independently rated by two experts (OK, JE). MR images for each baby were rated for: basal ganglia and thalamus (BGT), posterior limb of the internal capsule (PLIC) and white matter (WM). The children were followed up with later neurodevelopmental outcome. An unfavourable neurodevelopmental outcome was defined as Bayley score of < 85 for either cognition or motor composite scores, cerebral palsy or death. This study had local research and ethics approval (REC 13/LO/17380, Bromley NRES).

Results

Of 83 babies recruited, 75 had cerebral MRI and were eligible for study. Twenty-two (27%) babies had cerebral MRI predictive of unfavourable outcome. Neurodevelopment outcomes were available for 61/75 (81%) babies. On multiple regression, the BGT abnormalities were most predictive for motor (p=0.002), cognition (p=0.013) and language (p=0.039) outcomes. In our cohort, this method of rating cerebral MRI was highly predictive neurodevelopmental outcome (sensitivity= 94%, specificity=95%, PPV=89% and NPV=98%) - See Table for details.

MRI Outcome	Neurodevelopmental Outcome		
	Adverse outcome	**Normal outcome**	**Total (number)**
Group 1 (unfavourable)	17 (true positive)	2 (false positive)	19
Group 2 (favourable)	1 (false negative)	41 (true negative)	42
	18 = $T_{disease}$	43 = $T_{non\ disease}$	Total = 61

of

Conclusions

In this clinical cohort outside of the hypothermia trials, cerebral MRI appears to be a good predictor of outcomes in term infants with HIE after TH. BGT abnormality remains important in predicting outcomes. Our data suggests that cerebral MRI is a good surrogate of later outcome for research and for counselling families.

References *(include acknowledgement here if appropriate)*

(1) Rutherford et al. Lancet Neurology 2010

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 Divyen Shah

Title (Upper case)

CYTOKINE PRODUCTION PATTERN OF T LYMPHOCYTES IN NEONATAL ARTERIAL ISCHEMIC STROKE DURING THE FIRST MONTH OF LIFE – A CASE SERIES

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

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Introduction *(include hypothesis)*

The perinatal period carries the highest risk for stroke in childhood, however the pathophysiology is poorly understood. A new pathophysiological model describes the development of neonatal arterial ischemic stroke (NAIS) as the combined result of prenatal inflammation and hypoxic–ischemic insult. Neuroinflammation and a systemic inflammatory response are also important features of NAIS. Identifying key players of the inflammatory system is in the limelight of current research.

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

We present four NAIS cases, in whom detailed analysis of intracellular and plasma cytokine levels are available from the first month of life. All neonates were admitted for cooling with the initial diagnosis of hypoxic-ischemic encephalopathy (HIE), however, early MRI examination revealed NAIS. Blood samples were collected between 3-6 h of life, at 24 h, 72 h, 1 week and 1 month of life. Peripheral blood mononuclear cells were assessed with flow cytometry and plasma cytokine levels were measured as described earlier [1]. Pooled data from the cohort of 4 NAIS patients were compared to infants with HIE.

Results

At 6 and 72 h of age the prevalence of IL10+ CD8+ lymphocytes remained lower in NAIS. At 6 h CD8+ lymphocytes produced more IL-17 in NAIS than in HIE. At 72 h CD8+ cells produced more IL-6 in severe HIE than in NAIS, but IL-6 production remained elevated in CD8 cells at 1 month in NAIS, while it decreased in HIE. At 1 week the prevalence of TGFβ+ lymphocytes prone to enter the CNS was elevated in NAIS. On the other hand, by 1 month of age the prevalence of TGFβ+ CD4+ lymphocytes decreased in NAIS compared to HIE. At 72 h we found elevated plasma levels of IL-5, MCP-1 and IL-17 in NAIS. By 1 month, plasma levels of IL-4, IL-12 and IL-17 decreased in NAIS but remained elevated in HIE.

Conclusions

Differences in the cytokine network are present between NAIS and HIE. CD8 lymphocytes appear to shift towards the pro-inflammatory direction in NAIS. The inflammatory response appears to be more pronounced at 72 h in NAIS but decreases faster, reaching lower plasma levels of inflammatory markers at 1 month.

References *(include acknowledgement here if appropriate)*

[1] Bajnok A et al. Distinct cytokine patterns may regulate the severity of neonatal asphyxia - an observational study. J Neuroinflammation 2017,14:244.

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 A K Ewer

Title (Upper case)

SURVEY OF SEDATION, RESPIRATORY SUPPORT AND PARENTAL CONTACT PRACTICES DURING THERAPEUTIC HYPOTHERMIA FOR HYPOXIC–ISCAHEMIC 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)*

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Introduction *(include hypothesis)*

Babies who underwent Therapeutic Hypothermia (TH) in the TOBY trial for Hypoxic Ischaemic Encephalopathy (HIE) routinely received full intensive care including mechanical ventilation, analgesia and sedation. Since TH became standard treatment, the practice of intensive care is unknown. Lack of parental contact during TH is reported to affect parent-infant bonding.[2] Our survey aims to evaluate current sedation, respiratory support and parental contact practices for neonates undergoing TH for HIE in UK neonatal units.

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

We designed a questionnaire enquiring (1) whether parents are allowed to cuddle the babies during cooling or rewarming (2) whether babies are ventilated or commenced on CPAP (3) whether sedation and analgesia were routinely used and (4) what weaning strategies were used for ventilation and analgesia / sedation. An email was sent with an attached word document of the survey to neonatal network leads. We contacted the network again if there was no response in two weeks. Descriptive statistics are provided.

Results

Twenty-seven responses were received 27/57(47%). Of the 20 UK neonatal networks; a response was received from at least one unit from within14 of those networks.
Only 4/27 (14%) routinely intubated regardless of respiratory status and 3 of those would not consider extubating during TH. 23/27 (85%) would consider CPAP as a form of respiratory support.
20/27 (74%) routinely use sedation, the remainder would do so dependent on patient distress. 22/27 (81%) would consider weaning sedation during TH. All units use morphine as their sedation drug of choice.
With respect to parental contact, 26/27 (96%) units did not allow 'cuddles', citing risk of line/probe/tube displacement and temperature instability as their main concerns, followed by the severity of the clinical situation, patient distress, and staff capacity. Only one unit allow cuddles to encourage bonding and noted no adverse affects.

Conclusions

There is significant variation in the current practice of intensive care during therapeutic hypothermia compared to the TOBY trial. The vast majority of the units surveyed individualise respiratory support and sedation based on the infant's clinical status. Most units were concerned about the safety of parental cuddles during cooling.

References *(include acknowledgement here if appropriate)*

1. Azzopardi D,et al. N Engl J Med 2009;361:1349-58. **2.** Thyagarajan B et al. J Maternal Fetal Neonatal Med 2017;11:1-7.

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 Ela Chakkarapani

Title (Upper case)

ALTERED INNATE IMMUNITY IN NEONATAL 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)*

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Introduction *(include hypothesis)*

Neonatal Encephalopathy (NE) is a devastating clinical condition mediated in part by systemic inflammation. Evaluation of this process is key in understanding the inflammatory response and informing the development of predictive biomarkers and immunomodulatory adjunctive therapies to therapeutic hypothermia. **Hypothesis** To evaluate innate immune responses at baseline and post-LPS stimulation in NE compared to healthy controls.

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

Inflammasome gene expression, serum cytokines and neutrophil surface markers were analysed in whole blood from NE (n=28) and control infants (n=16) via RT-PCR, ELISA and flow cytometry. Results were correlated with neuroimaging. Ethical Approval and Parental Consent were obtained. The Research was funded by the Health Research Board.

Results

NLRP3 and IL-1β gene expression was upregulated at baseline in NEs and augmented post-LPS ($p<0.05$). However, NE demonstrated lower IL-1β and higher IL-1ra cytokine release following LPS compared to controls - suggesting a reciprocal anti-inflammatory response. IFN-γ, IL-6, TNF- α were higher in controls while TNF- β and VEGF were significantly higher ($p<0.05$) in NE at baseline and post-LPS. Neutrophil cell-surface marker (CD11b/TLR4) expression was reduced in NE versus controls. Higher TNF-β in NE was associated with abnormal neuroimaging.

Conclusions

Inflammation is altered in NE compared to controls at baseline and in response to LPS. Selective inhibition of systemic inflammation may represent a therapeutic target in NE.

References *(include acknowledgement here if appropriate)*

Check box if presenting author is a trainee: basic science trainee x☐ 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: Prof Eleanor Molloy

Title (Upper case)

GENES ASSOCIATED WITH NEUROPSYCHIATRIC DISEASE INCREASE VULNERABILITY TO ABNORMAL DEEP GREY MATTER DEVELOPMENT

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

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Introduction *(include hypothesis)*

Brain injury in preterm infants is not completely explained by clinical variables, however genome-wide studies have largely failed to uncover genetic vulnerabilities, probably because of underpowered studies and highly variable outcome measures. We hypothesised that inherited vulnerability is polygenic and that genes conferring risk for neuropsychiatric disease would be associated with the characteristic endophenotype of abnormal deep grey matter development.

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

We combined Magnetic Resonance Imaging (MRI) and genome-wide single nucleotide polymorphism (SNP) data from 194 infants, born before 33 weeks of gestation, to test whether the characteristic deep grey matter abnormalities seen in preterm infants are associated with polygenic risk for psychiatric illness. Summary statistics from a meta-analysis of SNP data for five psychiatric disorders (Smoller et al., 2013) were used to compute individual polygenic risk scores (PRS). The variance explained by the PRS in the relative volumes of four deep grey matter structures (caudate nucleus, thalamus, subthalamic nucleus and lentiform nucleus) was estimated using linear regression both for the full, mixed-ancestral, cohort (European, Asian and African) and a subsample of European infants.

Results

For the full, mixed-ancestry cohort the psychiatric PRS was negatively associated with lentiform nuclear volume (β=-0.24, p=8x10^{-4}, R^2 = 0.057) and showed a modest negative association with subthalamic nuclear volume (β=-0.18, p=0.01, R^2 = 0.032) that did not survive multiple-testing correction. In the sub-sample of European infants, the psychiatric PRS was negatively associated with lentiform nuclear volume (β=-0.24, p=8x10$^{-3,}$ R^2 = 0.056) and subthalamic nuclear volume (β=-0.26, p=3x10^{-3}, R^2=0.069). No association was found between the psychiatric PRS and caudate or thalamic volume for either the full mixed-ancestral sample or the sub-sample of European infants.

Conclusions

Genes associated with neuropsychiatric disease increase vulnerability to abnormal deep grey matter development in the perinatal period. This may allow discovery of biologic mechanisms for abnormal brain development in preterm infants.

References *(include acknowledgement here if appropriate)*

Smoller, J.W., 2013. Identification of risk loci with shared effects on five major psychiatric disorders: A genome-wide analysis. The Lancet, 381(9875), pp.1371–1379.

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: David Edwards

Title (Upper case)

NOISE EXPOSURE IN NICU AND DURING NEONATAL TRANSPORT: EFFECTS AND EFFECTIVENESS OF NOISE PROTECTION

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

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Introduction

Noise is a hazard, and exposes sick neonates to potential hearing loss, autonomic disturbance and behavioural changes. Safe environmental sound pressure levels (SPL) should not exceed 45 dB (decibel) in neonatal ICUs (NICU). (1, 2) Noise reduction strategies are not routinely used. This study looked at SPLs in NICU and transport situations with mannequins and the effects of noise levels on real patients during inter-hospital transfer.

Methods

For mannequin studies, a 4-channel sound level meter was connected to 3 microphones, measuring simultaneous continuous SPL in decibel-A (dBA) from the patient ear, inside and outside the incubator, and then repeated with the use of noise-protective-ear-muffs (NPEM) and active-noise-cancelling-headphones (ANC). Similar methods were used for patient studies, with additional pulse oximetry recording. Data were analysed using specialist software and SPSS v.24®.

Results

Noise levels quantified in dBA were represented as peak SPL (Lpeak) and total sound energy (Leq). **In the NICU**, mean Lpeak was 59.5 (at ear), 66.7 (incubator) and 73.8 (outside incubator) and the mean Leq was 44.1 (at ear), 52.8 (incubator) and 58.9 (outside incubator). During transport, mean Lpeak was 69.4 (at ear), 76.6 (incubator) and 83.1 (outside incubator) and mean Leq was 53.3 (at ear), 61.4 (incubator) and 66.2 (outside incubator). Mean (SD) environmental SPLs (dBA) were 84.4 (6.9), 76.1(8.6) in the incubator and 72.2(7.7) at the infant ear. 80.8% of external noise was transmitted to the infant ear in the NICU simulation, reducing to 78.1% with NPEM and 74.8% with ANC protection. **During transport**, similar reductions were seen: 87.1% of environmental SPL at the ear, reducing to 72.1% with ANC, but with an unexpected increase when NPEM were used ($p<0.05$). 10% of real patient recording time showed SPL >80, which is considered harmful. There was no clinical significant difference in oxygen saturations with SPL>80. However, heart rate was significantly higher (139 vs. 148, $p<0.001$).

Conclusions

SPLs detected at the neonatal ear in the NICU and during transport exceed recommended safe levels. 10% of SPLs recorded exceed 80 dBA, and these episodes were associated with a raised heart rate. Active noise cancelling equipment reduces SPL exposure for neonates during transfer. Further studies are required.

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1. Etzel, R; Balk, S; Bearer, C; Hendrick, J; Schell L. AMERICAN ACADEMY OF PEDIATRICS Noise: A Hazard for the Fetus and Newborn (Committee on Environmental Health 1996-1997). Pediatrics. 1997;100(4):724–7
2. Aly HA, Ahmed AM. Effect of Noise on Neonatal Vital Data and Behavior in NICU. Clin Med Diagnostics.

Presenting author is a clinical trainee
Researchers declare no conflict of interest.

Senior author supporting presentation on day of meeting**: Professor Naomi McCallion/ Dr. Jan Franta**

Title (Upper case)

EARLY DIASTOLIC DYSFUNCTION AND RESPIRATORY MORBIDITY IN PREMATURE INFANTS: AN OBSERVATIONAL STUDY

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

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Introduction *(include hypothesis)*

The relationship between diastolic function assessed over the first 12 hours following birth and early respiratory morbidity remains unexplored. We hypothesise that diastolic dysfunction measured over the first 12 hours of age is associated with the need for ventilation in preterm infants.

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

In this retrospective observational study of infants less than 32 weeks gestation, all infants underwent a comprehensive echocardiography assessment within 12 hours after birth. Tissue Doppler imaging was used to measure left ventricular (LV), septal and right ventricular (RV) s`, e`, and a` velocities. Measurements were compared between invasively ventilated infants and those on continuous positive pressure ventilation (CPAP) and between infants with and without pulmonary haemorrhage (PH).

Results

183 infants were included. 96 infants were ventilated at the time of the echocardiogram. Ventilated infants have lower LV e` (3.4 ± 1.0 vs. 4.1 ± 1.5 cm/s, p<0.01) compared to infant on CPAP. A higher LV e` remained independently associated with a lower risk for invasive ventilation when adjusting for important confounders (LV e` adjusted OR 0.62, 95% CI 0.45 – 0.87, p<0.01). Infants with PH (n=11) had a lower LV e` (2.9 ± 1.2 vs. 3.8 ± 1.3 cm, p=0.04) when compared to infants without PH. This remained significant when adjusting for confounders (LV e` adjusted OR 0.64, 95% CI 0.46 – 0.90, p<0.001).

Conclusions

Left ventricular diastolic function in premature infants may play an important role in the evolution of respiratory morbidity as manifest by the need for invasive ventilation and pulmonary haemorrhage.

References *(include acknowledgement here if appropriate)*

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

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Senior author supporting presentation on day of meeting: Professor EL Khuffash.

Title (Upper case)

RIGHT VENTRICULAR AND PULMONARY VASCULAR COUPLING IS INFUENCED BY LEFT VENTRICULAR DIASTOLIC FUNCTION IN PREMATURE 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)*

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Introduction *(include hypothesis)*

Reduced left ventricular (LV) diastolic function can exert significant load to the right ventricle (RV) that can affect RV–pulmonary vascular (PV) coupling. RV-PV can be assessed with the RV length–force relationship (tricuspid annular plane systolic excursion [TAPSE] to pulmonary artery acceleration time [PAAT] ratio). We aimed to determine the correlation between TAPSE:PAAT and LV diastolic function measured using tissue Doppler imaging (TDI) on Day 1 and its relationship with pulmonary haemorrhage.

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

A prospective study of 162 infants with a mean ± SD gestation & birthweight of 26.6±1.5 weeks & 938±241 grams. TAPSE:PAAT, LV and septal e` and a` waves were measured on Day 1. PAAT was adjusted for heart rate variability by RV ejection time (PAAT:RVET). Correlation between diastolic indices and TAPSE:PAAT was performed. Receiver operating characteristic (ROC) curve was constructed for pulmonary haemorrhage prediction.

Results

There was a significant positive correlation between TAPSE:PAAT and TAPSE:(PAAT:RVET) with TDI indices of LV diastolic function (Figure). This relationship remained significant when adjusting for gestation and RV length (all $p<0.01$). TAPSE:(PAAT:RVET) was lower in infants who developed pulmonary haemorrhage (n=11, 7%): 11 [6–19] vs. 18 [14–23], p=0.02. For detection of pulmonary haemorrhage, a TAPSE:(PAAT:RVET) > 15 on Day 1 resulted in a sensitivity of 77% and a specificity of 67% with an area under ROC curve of 0.77 (0.59-0.95, 95% CI, p=0.02).

Conclusions

Those findings may have important clinical implications in understanding the role of left heart diseases with the evolution of pulmonary haemorrhage and RV-PV coupling in these infants

References *(include acknowledgement here if appropriate)*

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

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Senior author supporting presentation on day of meeting: Professor EL Khuffash

Title (Upper case)

BREATHING AND CRYING BY NEWLY BORN PRETERM INFANTS IN AN ERA OF DELAYED CORD CLAMPING

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

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Introduction *(include hypothesis)*

The majority of newly born preterm infants breathe and cry after immediate cord clamping.[1] Guidelines now recommend delayed cord clamping (DCC) for at least 30 seconds for infants who do not require immediate resuscitation.[2] We wished to study the breathing and crying by extremely preterm infants after cord clamping in an era of DCC.

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

We reviewed video recordings of infants born < 28 weeks' gestational age (GA) or with a birth weight (BW) < 1000g at our tertiary maternity hospital with ethical approval and parental consent. We recorded the time after birth at which the infant arrived to the resuscitaire, and whether the infant had an audible cry and/or visible breathing before respiratory support was given.

Results

We reviewed videos of 35 infants [mean (SD) GA 27 (1.5) weeks, BW 890 (200) g]. Infants arrived to the resuscitaire at a median (IQR) 80 (64, 85) seconds of life. Six (17%) infants arrived before or at 30s [median (IQR) 28 (18, 30) s]; 4 had an audible cry and breathed, while the other 2 breathed without crying. Twenty-nine (83%) infants arrived after 30s [median (IQR) 81 (79, 87) s]; 20 had an audible cry and breathed while a further 6 breathed without crying. Respiratory support was given by mask to all 35 infants. Five (14%) infants were intubated in the delivery room, 2/6 infants who arrived before 30s and 3/29 infants who arrived after 30s.

Conclusions

The majority of extremely preterm infants breathed and cried after DCC.

References *(include acknowledgement here if appropriate)*

1. O'Donnell CP KC, Davis PG, Morley CJ. Crying and breathing by extremely preterm infants immediately after birth. *The Journal of pediatrics.* 2010;156(5):846-847.

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

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Title (Upper case)

ARTHROGRYPOSIS MULTIPLEX: THE FIRST IRISH CASE OF A NEK9 MUTATION.

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

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Introduction ***(include hypothesis)***

We describe a case of arthrogryposis multiplex congenita in a male infant born prematurely, we outline the multidisciplinary investigations required to delineate the underlying cause in such cases. Arthrogryposis multiplex is a highly heterogeneous disorder[1]. Recurrence risks vary and so accurate diagnosis is important[1]. A newly identified lethal mutation associated with arthrogryposis, a recessive NEK9 mutation, has recently been described in a UK based Irish Traveller family population. This mutation has been shown to cause defects in the cell cycle including reduced proliferation and reduced cell cycle progression[1]. A thorough pedigree analysis in this case we describe was important to help target appropriate genetic testing.

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

Baby R was born prematurely by spontaneous vaginal delivery (SVD) at 27+5 weeks gestational age. Mother was a 24 year old G3P2 and both parents are Irish Travellers. Antenatal ultrasound scans (USS) revealed arthrogryposis and cardiac views showed an abnormal 4-chamber view, with query large pulmonary artery. Amniocentesis revealed a normal male karyotype. Baby R was in poor condition at birth, required extensive resuscitation including endotracheal intubation which proved challenging due to a short neck and flexion contracture of his neck. The following features were also found on clinical examination: minimal movement of limbs, marked contractures, joint pterygia, flexion contracture of neck, fused microphthalmia, overlapping fingers, rocker bottom feet, talipes equinovarus, large ventral hernia with body wall oedema, and prominence of the thoracic spine. Apgars were 3 at 1 minute, 3 at 5 minutes, 3 at 10 minutes and 4 at 15 minutes. Maximal intensive care was required to achieve normoxia and haemodynamic stability. Baby R had severe pulmonary hypertension, severe hypoplasia of the pulmonary branch arteries, and multiple VSDs.

Results

Geneticist consultation advised on specific athrogryphotic conditions prevalent in the Travelling population. Baby R's phenotype, radiology and a detailed pedigree history revealed a high possibility of an autosomal recessive condition due to NEK9 mutation. Serial family meetings with updates on Baby R's continuing critical status and significant anomalies resulted in the decision to withdraw care. A normal male karyotype was described by the cytogenetics lab as well as a normal microarray CGH. Definitive results from targeted molecular genetic testing have r reported evidence for the NEK9 mutation.

Conclusions

Identifying the aetiology of an arthrogryposis multiplex can be a challenge[1]. This case highlights the importance of multidisciplinary investigations including pedigree analysis in order to aid diagnosis.

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

J.G. Hall. European Journal of Medical Genetics. 57 (2014), pp. 464-472. J.P. Casey et al. Human Molecular Genetics, 25 (2016), pp. 1824-1835.

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 Pamela O'Connor

Title (Upper case)

THE ROLE OF BIOMARKERS IN IDENTIFYING HYPOXIC ISCHAEMIC ENCEPHALOPATHY IN NEONATES AND PREDICTING LONG TERM NEURODEVELOPMENTAL OUTCOMES – A LITERATURE 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)*

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Introduction *(include hypothesis)*

Currently, identification of Hypoxic Ischaemic Encephalopathy (HIE) relies on clinical signs and imaging[1]. These modalities have limitations, prompting the need for specific biomarkers elevated in HIE. This literature review aims to:

- Review recent work on biomarkers associated with HIE
- Determine which biomarkers predict neurodevelopmental outcome

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

A systematic review was conducted using articles from: Pubmed, Embase, Medline, Web of Science, ScienceDirect
Search terms included: Hypoxic ischaemic encephalopathy, predictors of outcome, biomarkers and HIE, cord blood biomarkers and HIE.
Inclusion criteria: Studies from 2010 - present.
Exclusion criteria: Studies performed on animal subjects.

Results

Searches revealed 6 neuronal tissue specific markers; Glial fibrillary acidic protein (GFAP), Ubiquitin carboxyl-terminal esterase L1 (UCHL1), Neuronal specific enolase (NSE) and S100β, Lactate and Lactate Dehydrogenase (LDH) raised in HIE. Serum UCHL1 was significantly higher in the earlier stages post birth (6-24 hours)[2,3]. GFAP levels do not raise until a later stage post birth, with higher levels correlating with poor neurodevelopmental outcome[4-7]. Umbilical cord blood biomarker levels demonstrated little correlation with neurodevelopmental outcome, suggesting biomarkers do not raise immediately after birth[7,8].
S100B also increases with severe presentations of HIE and correlates with poor neurodevelopmental outcome[9-12]. The only significant relationship between NSE and neurodevelopmental outcome was measured at 24 hours post birth[13].
LDH is a strong predictor of neurodevelopmental outcome. Elevated serum lactate levels also correlate with poor neurodevelopmental outcome[14,15].

Conclusions

UCHL1, GFAP and S100B increase in the presence of HIE. They correlate with severity of HIE and poor neurodevelopmental outcome. LDH levels may also be a useful outcome predictor.

References *(include acknowledgement here if appropriate)*

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

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Senior author supporting presentation on day of meeting:

Title (Upper case)

THE SICK BUT NOT SEPTIC NEONATE – METABOLIC CRISIS PRESENTING IN THE EARLY NEONATAL PERIOD

Authors

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National Centre for Inherited Metabolic Disorders, Childrens' University Hospital, Temple Street, Dublin 1.

Introduction *(include hypothesis)*

Metabolic crisis in the neonatal period is an infrequently encountered, but potentially devastating presentation of an inborn error of metabolism. Due to the rarity of these disorders, diagnosis may be delayed. Furthermore, presentation may closely mimic neonatal sepsis, a much more frequently encountered condition. We describe the case of a neonate who presented at day nine with non-specific symptoms and signs. Careful evaluation of biochemical abnormalities led to a timely diagnosis of a rare, potentially life threatening metabolic disorder – Argininosuccinic Aciduria.

Clinical Case

A nine day old female infant presented with three days of poor feeding, lethargy and reduced urine output. Examination identified hypothermia (34.5C), tachypnoea, and a decreased level of consciousness. She was the first child of non-consanguineous Irish parents, with no family history of metabolic disorders. She was delivered at term by spontaneous vaginal delivery, following an uncomplicated pregnancy. There were no septic risk factors or concerns at discharge on day 3. Blood glucose and inflammatory markers were normal. She was fluid resuscitated and commenced on broad-spectrum antibiotics. Despite treatment, she deteriorated. Venous blood gas showed respiratory alkalosis (pH 7.458, pCO2 3.92, HCO3 20.8, BE -2.4, lactate 1.0) prompting further investigation. Serum ammonia was 562. Retrospective review of investigations identified an unrecordable urea (<0.4mmol/L), and a diagnosis of urea cycle defect was considered. She was referred to the National Centre for Inherited Metabolic Disorders, and transferred to a tertiary intensive care unit for specialty input. Intravenous sodium benzoate, sodium phenylbutyrate and L-arginine were administered, alongside 10% dextrose. Further investigation revealed elevated glutamine of 2213µmol/L (0-960), citrulline 565µmol/L (0-63), and argininosuccinate 1014µmol/L, consistent with a diagnosis of argininosuccinic aciduria, subsequently confirmed on molecular genetic testing. She was discharged on oral sodium phenylbutyrate, sodium benzoate and L-arginine, with an appropriate dietary plan. To date, there is no evidence of neurological sequelae, likely attributable to prompt diagnosis and treatment.

Conclusions

Argininosuccinic aciduria is a rare, autosomal recessive disorder of urea cycle metabolism caused by deficiency of argininosuccinic lyase. Clinical and biochemical manifestations depend on the severity of enzyme deficiency. In the neonatal variant, it typically presents with hyperammonaemia, encephalopathy and respiratory alkalosis. This case highlights the importance of considering inborn errors of metabolism in the assessment of a sick neonate.

References

1. https://wwww.orpha.net/consor/cgi-bin/OCExp.php?Lng=GB&Expert=23. 2. Kolker S, et al. *J Inherit Metab Dis.* 2015;38:1041-58. 3. Baruteau et al. *J Inherit Metab Dis.* 2017. 40(3): 357-368.

Check box if presenting author is a 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: YES

Senior author supporting presentation on day of meeting:

Title (Upper case)

THE DAWN OF MANDATED REPORTING - AN AUDIT OF REPORTING INFANTS OF DRUG DEPENDENT WOMEN ATTENDING THE COOMBE HOSPITAL

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

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Institution(s)

Our Lady Children's Hospital Crumlin Dublin 12 & The Coombe Women and Infants Hospital Dublin 8.

Introduction *(include hypothesis)*

On the eve of the introduction of mandated child protection reporting in Ireland the current reporting rates within a vulnerable sub-population was audited.

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

The audit involved a retrospective chart review of both medical and social work records over a 10 month period from 01/01/2017 to 31/10/2017. Women identified as drug dependent during their pregnancy were included in the study. The audit collected data on the number of cases reported to Tusla, The Child and Family Agency for reasons of child protection or welfare concerns. The audit also collected data on formal interagency meetings held and follow up communication from Tusla following discharge. Finally the audit explored some social demographic details of this subgroup.

Results

31 drug dependent women delivered in The Coombe during the study period. 30 live births and 1 IUD at term.
1 women detoxed off all substances during her pregnancy.
Tusla was formally notified of all cases where mother was actively drug using at delivery.
17 babies had positive urinalysis and 7 required pharmacotherapy for neonatal abstinence syndrome.
Compared to the general hospital population as reported in the annual report this group were more likely to be homeless, to be multiparous, to deliver pre-term, be low birth weight and have prolonged inpatient stays.

Conclusions

On the eve of legislation for mandated reporting all cases of child protection and welfare concern in the population of drug dependent women were already being notified to the statutory agency Tusla. This population were often homeless and had increased vulnerability having been born pre-term and low birth weight. Despite these concerns 2 babies were lost to routine follow up at the time of the study.

References *(include acknowledgement here if appropriate)*

1

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

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Senior author supporting presentation on day of meeting: Dr Elinor Jenkins

Title (Upper case)

EARLY FEEDING IN PRETERM AND VERY LOW BIRTH WEIGHT (VLBW) INFANTS - WHY THE DELAY?

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Institution(s)

National Maternity Hospital, Holles Street, Dublin 2.

Introduction *(include hypothesis)*

Adequate nutrition is essential for the optimal growth and health of VLBW infants[1]. Guidelines recommend early initiation of feeds[1] using maternal milk (MM). It has been shown that infants who receive MM within 24hrs of birth establish feeds earlier, have enhanced feed tolerance, reduced risk of parenteral nutrition complications and Necrotizing Enterocolitis, and shorter lengths of hospital stay[2,3,4]. Despite this evidence, there remain delays in initiating enteral nutrition for VLBW infants. The aim of our study was to explore the reasons for such delays.

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

This was a retrospective cohort study of all infants born <32 weeks' gestation or <1500g in the National Maternity Hospital, Ireland during 2017. Data on birth weight and gestation, day and type of milk for first enteral feed, reasons for delays initiating feeds (>24hr) and time to full feeds were collected.

Results

One hundred and fifteen babies were included (median gestation: 29 (IQR: 27-30) weeks, median birthweight: 1185 (IQR: 950-1380) grams. Seventy-seven (67%) did not receive breastmilk within 24hrs of birth. The reasons for delay were: MM unavailable (n: 70/77 [91%]), bilious aspirates (n: 5/77 [6.5%]), pneumothoraces (n: 4/77 [5%]), Persistent Pulmonary Hypertension (PPHN) (n: 3/77 [4%]). `Unavailability of MM was the sole reason in 66/77 (86%) cases. The first feed was given within 24 hours of birth in 38/115 (33%) cases. Donor breastmilk was used for the first feed in 3 cases (2.6%). Mean time to full feeds was 9 days (SD: 2.9) if feeds started day 1.

Conclusions

Non-availability of maternal milk was the single most predominant reason in our unit for a delay in initiating feeding (>24hours). Attention needs to be given to address availability of MM for preterm VLBW infants.

References *(include acknowledgement here if appropriate):*

1. Dutta Set al. Nutrients. 2015;7:423–442. 2. McClure RJ, et al ADCFN 2000**82**:F29–F33 3. Berseth CL J Pediatr 1992;**120**:947–953. 4. Okada Yet al J Pediatr Surg 1998;**33**:16–19.

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:

Title (Upper case)

MECONIUM ILEUS IN IRISH NEWBORNS: SYNONYMOUS WITH CYSTIC FIBROSIS

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

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Institution(s)

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Introduction *(include hypothesis)*

Meconium Ileus (MI) is the presenting feature of CF in approximately 10-15% of cases. This report outlines the clinical presentation, imaging and management of two neonates with MI and subsequent diagnosis of Cystic Fibrosis (CF).

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

A retrospective chart review was performed to evaluate the clinical course of two neonates with MI.

Results

Case 1 and 2 presented clinically with signs of abdominal obstruction. Subsequent laparotomies confirmed MI. MI is strongly associated with CF and CF is the most common genetically inherited disease in Ireland. Genetic testing was positive for a homozygous Δ F508 mutation in both case 1 and 2, securing a diagnosis of MI secondary to CF.

Conclusions

Our cases highlight that all infants born in Ireland with MI should be considered as CF positive until proven otherwise.

References *(include acknowledgement here if appropriate)*

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. O'Donovan

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