September 23rd, 2023 08:00 - 09:00

POSTER WALK – BRAIN 5

ID 259. Characterization of endogenous haptoglobin and hemoglobin (total heme) levels in plasma and CSF in preterm rabbit pups with or without intraventricular hemorrhage

Doctor Amanda Kristiansson[1], Helena Karlsson[1], Suvi Vallius[2], Niklas Ortenlöf[2], Claes Ekström[1], Kirsten Guse[3,4], Sandra Mena Perez[3,4], Thomas Gentinetta[3,4], Prof. David Ley[1], Dr Magnus Gram[1]

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Background

Intraventricular hemorrhage (IVH) is characterized by vessel rupture and a rapid accumulation of blood within the ventricles. Subsequent hemolysis leads to the release of extracellular hemoglobin (Hb) into the cerebrospinal fluid (CSF). Hb and its metabolites initiate cytotoxic, oxidative, pro–inflammatory, and apoptotic pathways resulting in tissue damage. Therefore, the Hb–scavenger haptoglobin (Hp) constitute a potential treatment in IVH. Here, we investigated the endogenous levels of rabbit Hp in adults and preterm pups, and Hb (total heme) in preterm pups with or without IVH to investigate if it corresponds to IVH in preterm infants, i.e., increased Hb and low levels of Hp.

Methods

Rabbit pups were delivered prematurely by cesarean section at embryonal day 29 (Term = 31–32 days of gestation). IVH was induced by intraperitoneal injection of glycerol and confirmed by high–frequency ultrasound at 24 hours of age. Plasma and CSF were collected from does, and at sacrifice from pups (non–IVH 0–144 hours and IVH 24–96 hours). Rabbit Hp and total heme were analyzed.

Results

At birth, preterm rabbit pups had significantly lower levels of Hp in plasma compared to adults. The levels significantly increased from 0 to 144 hours of age but did not reach adult levels. In the CSF, the opposite trend was seen, with pups having significantly higher Hp levels than adults at birth and decreasing levels up to 144 hours, where levels no longer differed. Comparing Hp levels between IVH and non–IVH, pups with IVH displayed significantly higher Hp levels in plasma, but lower in CSF. The total heme levels, assumed to correspond predominantly to Hb, in plasma and CSF were increased in pups with IVH, although not significantly in the CSF.

Conclusion

The decrease of Hp in CSF of IVH–pups suggests that Hp might be utilized faster in bleeding animals. Moreover, the increased levels of Hp in plasma might be a compensatory mechanism to counteract the toxicity of the bleeding in the brain. Taken together, this might suggest a role for Hp as a treatment of IVH and that the preterm rabbit pup model of IVH can be used to evaluate the therapeutic effect.

This study was funded by CSL Behring. KG, SMP, TG are employees of CSL Behring.

ID 721. Single nucleotide vitamin D receptor polymorphisms (FokI, BsmI, ApaI, and TaqI) in the pathogenesis of prematurity complications

Katarzyna Kosik, **Professor Dawid Szpecht**[1], Dr Grazyna Kurzawinska, Prof Marta Szymankiewicz, Prof Jan Mazela, Prof Agnieszka Seremak–Mrozikiewicz

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Background: The vitamin D receptor (VDR), coded by the VDR gene, plays a pivotal role in executing cellular functions when bound by the active form of vitamin D. Gene polymorphisms in this receptor have been increasingly associated with a heightened state of vulnerability to certain diseases. However, limited data is available concerning the role of VDR gene polymorphisms in preterm infant complications.

Methods: The study comprises a population of 114 premature infants born within 22+6 to 32+0 weeks of gestation, between the years 2014 and 2019. All infants were hospitalized at the Department of Neonatology, Clinical Hospital of Gynecology and Obstetrics at Poznan University of Medical Sciences in Poznan, Poland. Homogenic consistency was maintained as a result of all infants being of Caucasian origin. Excluded were neonates born after 32+0 weeks of pregnancy, multiple pregnancy births, infants with chromosomal abnormalities, TORCH infections (rubella, herpes, cytomegalovirus, toxoplasmosis, etc.) and infants without antenatal steroid therapy. We analyze four single nucleotide VDR polymorphisms (rs2228570 (FokI), rs1544410 (BsmI), rs797532 (ApaI), rs731236 (TaqI)) for their association with respiratory distress syndrome (RDS), intraventricular hemorrhage (IVH), bronchopulmonary dysplasia (BPD), necrotizing enterocolitis (NEC) and retinopathy of prematurity (ROP).

Results: Analysis showed higher prevalence of BPD in premature infants with the genotype CC ApaI (rs7975232) gene polymorphism [OR 3.845 (1.065—14.82); p=0.038]. Furthermore, the study revealed that BPD and NEC were approximately two times more likely to occur in infants with the allele C of ApaI (rs7975232) [respectively: OR 2.111 (1.075—4.242), p=0.028; and OR 2.129 (1.169—3.912), p<0.05]. No other significant associations were found with the rest of the polymorphisms.

Conclusions: Exploring genetic variations in the vitamin D physiological pathway of functioning may broaden the current understanding of genetic susceptibility to preterm complications. The genotype CC of ApaI (rs7975232) VDR gene polymorphism was associated with a 3.8 times increase in likelihood of developing BPD in preterm infants. Furthermore, infants with the allele C of Apa I (rs7975232) were twice as likely to develop BPD and NEC. Including VDR polymorphisms in future genetic assessments of preterm complications is advised.

None declared

ID 56. Repetitive neonatal procedural pain affects corticosterone response after mild acute stress in adult female but not in male rats

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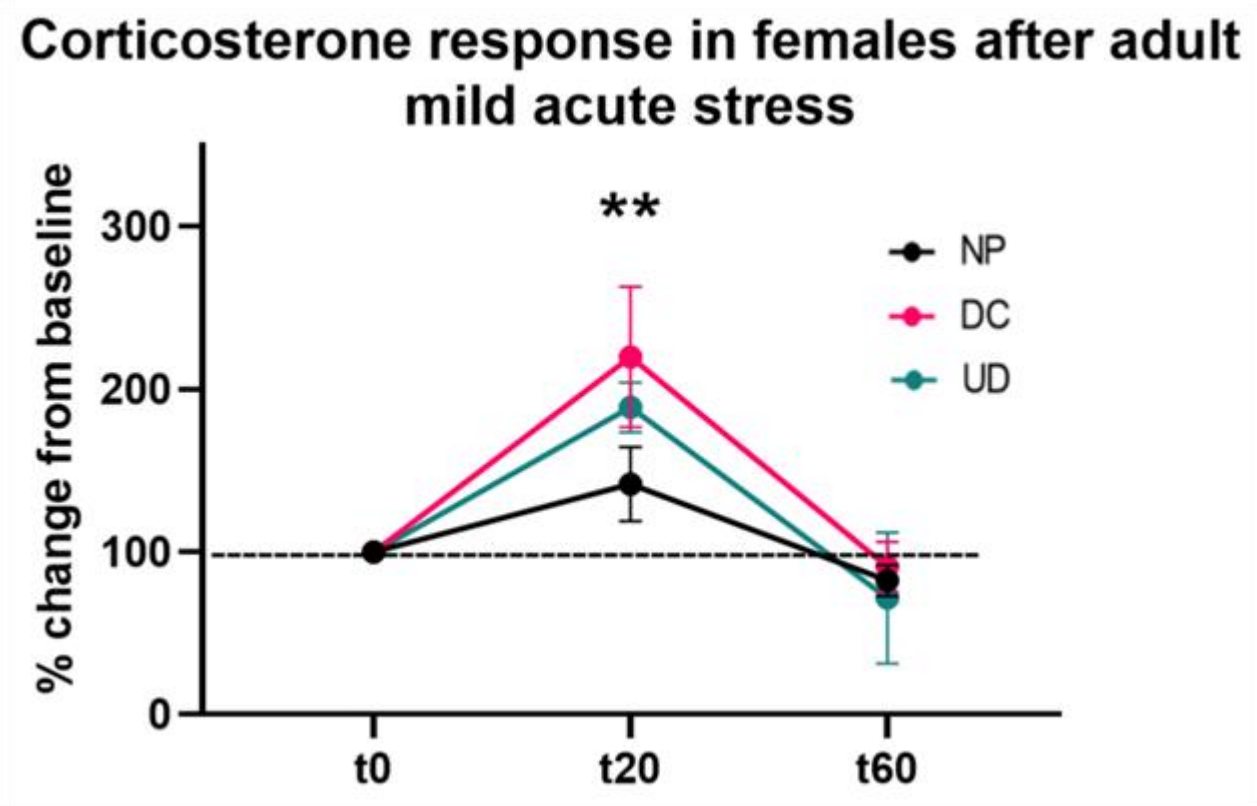
Exposure to repetitive neonatal pain in the neonatal intensive care unit (NICU) is not only stressful, but also has effects lasting past NICU hospitalization such as increased post–operative pain following a “second hit” in adulthood. As both the nociceptive system and the hypothalamus–pituitary–adrenal (HPA) axis are affected by early life experiences, repetitive neonatal procedural pain may affect the HPA axis. To this end, this study investigated the effects of repetitive neonatal procedural pain on corticosterone reactivity, as marker of the HPA axis, after adult mild acute stress and whether mild acute stress may act as a “second hit” on nociception.

Neonatal rats were either needle pricked four times a day (NP), shortly separated from the dam (DC) or left undisturbed (UD) between postnatal P0 and P7. At eight weeks, the young adult rats were subjected to a mild acute stress (mouse cage stress test, MCST) and plasma was collected before (t0), immediately after (t20) and 40 minutes after (t60). Corticosterone levels were quantitatively analyzed using an Enzyme–linked Immunosorbent Assay (ELISA). Following the MCST, animals mechanical sensitivity was measured with von Frey filament.

Our results show that although neonatal condition did not affect adult baseline corticosterone levels, only adult females previously exposed to repetitive neonatal procedural pain showed a reduced increase in corticosterone levels compared to

control (Figure 1). Furthermore, mild acute stress as a "second hit" did not affect adult mechanical sensitivity, independently from neonatal condition.

Ultimately, our results reveal that females exposed to repetitive neonatal procedural pain develop a reduced corticosterone response after mild acute stress in young adulthood. Furthermore, as mild acute stress has limited effect on nociception in adults, the question remains if a more severe stress event is needed to trigger and affect nociception.



None declared

ID 828. Inflammatory Markers and White Matter Integrity in Extremely and Very Preterm Infants

Mrs Filipa Solano[1], drs Malin Overmars[2], drs Els Janson[1], mrs Chiara Santucci[1], dr Jeroen Dudink[1], prof. dr. Frank van Bel[1], dr. Maria Luisa Tataranno[1], dr. Niek van der Aa[1], dr. Cora Nijboer[3], dr. Saskia Haitjema[2], prof.dr. Manon Benders[1]
[1]Department of Neonatology, Wilhelmina Children's Hospital, University Medical Center Utrecht, Utrecht University, Utrecht, Netherlands, [2]Central Diagnostic Laboratory, University Medical Center Utrecht, Utrecht University, Utrecht , Netherlands, [3]Department for Developmental Origins of Disease, University Medical Center, Utrecht Brain Center and Wilhelmina Children's Hospital, Utrecht University, Utrecht, Netherlands

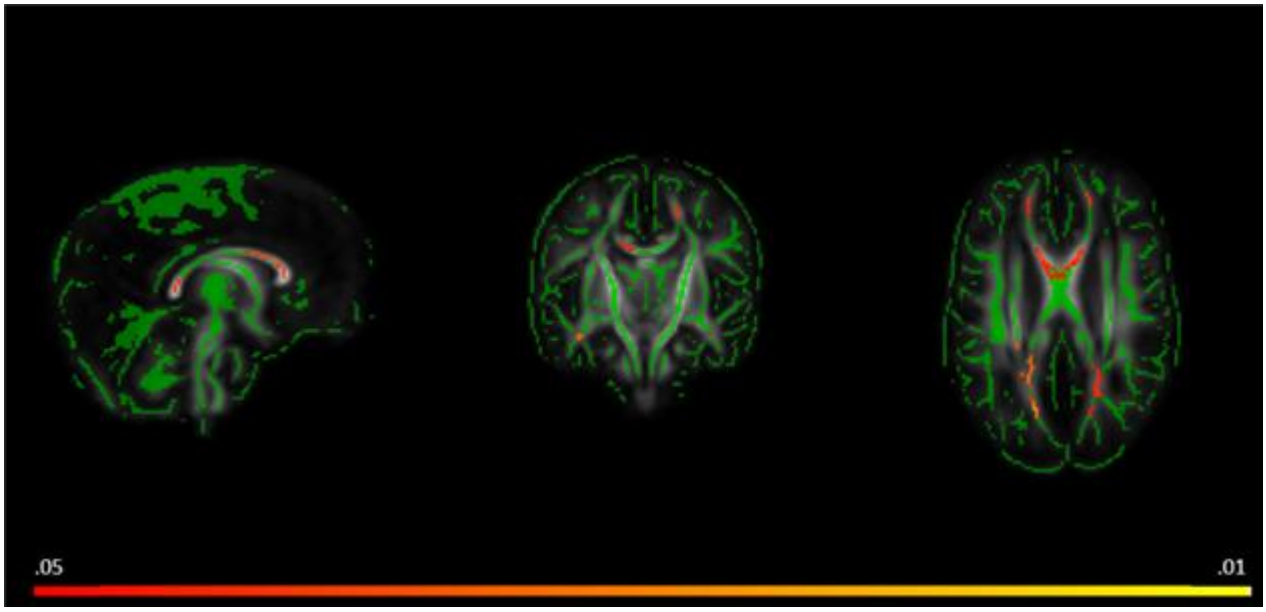
Background:
Inflammation is one of the main risk factors for the development of cerebral white matter (WM) injury in extremely preterm infants. The primary aim of this study was to evaluate associations between standard blood markers (inflammation/hematology) and WM integrity at term-equivalent age (TEA) in preterm infants. The secondary aim was to evaluate associations between inflammatory complications and WM integrity at TEA.

Methods:
A cohort of infants born before 30 weeks of gestation (N = 99) was used for retrospective explorative analyses. Blood samples were collected at various intervals within the first 30 days after birth during admission, based on the clinical condition. Multiple blood markers were assessed, including the C-reactive protein (CRP), the absolute count of red blood cells, white blood cells, and platelets, as well as specific parameters within these groups, including neutrophils, lymphocytes, and hematocrits.

The area under the curve (AUC) over the initial 30 days after birth was calculated per parameter.
Information on the following inflammatory clinical complications was collected: necrotizing enterocolitis, bronchopulmonary dysplasia, sepsis, duration of mechanical ventilation, and number of blood transfusions. MRI, including diffusion tensor imaging (DTI) was performed at TEA. DTI scans were analysed using Tract Based Spatial Statistics (TBSS) on fractional anisotropy (FA) maps, controlling for gestational age, age at time of scan, and birthweight Z–score.

Results:
The AUCs of the CRP, red blood cell (RBC) count, hemoglobin, hematocrit, and an increased number of blood transfusions were negatively correlated with FA values ($P < .05$) in multiple WM tracts (Figure 1). The other blood parameters and inflammatory comorbidities were not significantly associated with FA, although there was a trend towards a negative association for necrotizing enterocolitis.

Conclusion:
In our cohort of preterm infants, consequences of early inflammatory diseases were negatively associated with WM integrity at TEA. The number of blood transfusions, and higher hemoglobin/RBC related to adverse white matter integrity need further investigation. This study adds evidence to the interplay between early inflammation and the affected white matter integrity, and understanding this pathophysiology may pave the way for future neuroprotective intervention.



AUC for RBC count during the initial 30 days was negatively associated with FA. Significant voxels are red–yellow (colour–bar shows the P <.05) and the mean FA skeleton is green.

AUC for RBC count during the initial 30 days was negatively associated with FA. Significant voxels are red–yellow (colour–bar shows the P <.05) and the mean FA skeleton is green.

None declared.

ID 308. Disruptions in network brain dynamics in children born extremely preterm

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Background

The brain is not frozen in place but is a dynamic, constantly moving object. Accordingly, its networks are not static, they emerge and unfold temporally in response to internal and external stimuli. In this context, a healthy brain operates close to a point of non–equilibrium reflecting higher irreversibility in brain dynamics. This characteristic is fundamental in the brain so that, it can respond flexibly and rapidly to stimuli. Reduced irreversibility in the brain activity has been associated to impairments in the cognitive and behavioral domains. The impact of extreme prematurity on the level of the temporal irreversibility in the brain activity is unknown. We aimed to quantify the level of irreversibility in the resting brain in a group of extremely preterm children (EPT) and term controls.

Methods

We employed a thermodynamics framework on functional MRI to quantify the irreversibility of the brain across the whole–brain functional network and within eight resting–state networks (default mode network–DMN, limbic, motor, visual, dorsal attention network–DAN, salience and fronto–parietal). The framework computes a time–shifted correlation analysis to quantify the irreversibility of brain signals. Our

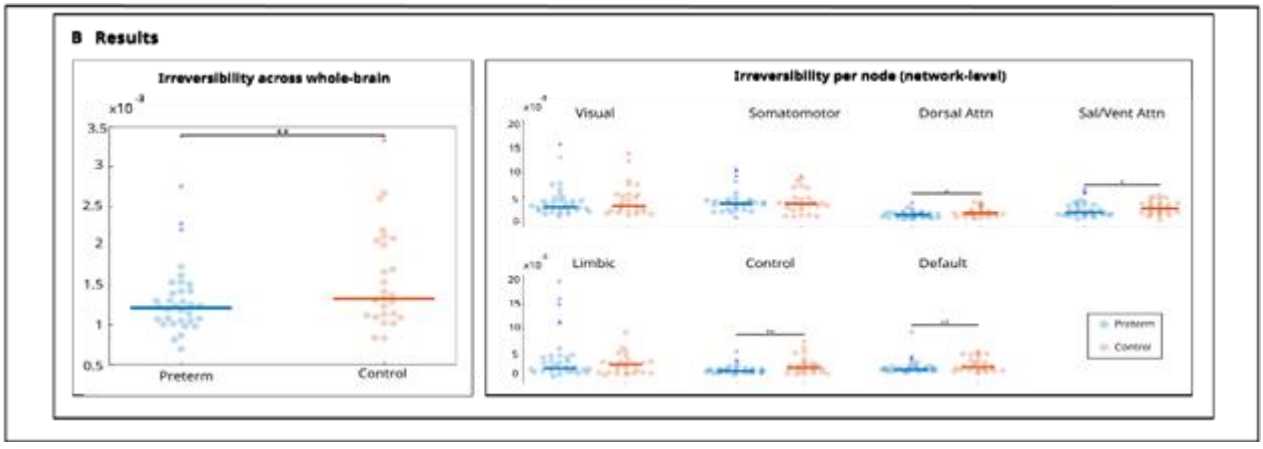
investigation focused on a cohort of 10–year–old children, including 33 EPT children (born below 27 weeks of gestation) and 26 controls scanned during resting.

Results

Compared to the control group, the resting brain activity in EPT children is characterized by a reduction in the temporal irreversibility at the global level of the entire brain, and at network level comprising mainly the DMN, DAN, salience and fronto–parietal networks. The sensory–motor networks remained similar between groups. (Figure A).

Conclusion

Extremely preterm birth is characterized by reduced irreversibility in the brain dynamics that affects mainly higher order networks. This finding may have a key role in related cognitive difficulties described in this population. Identifying disruptions in specific resting–state network dynamics in children born preterm can allow for developing interventions to reverse brain disorders.



Irreversibility at whole–brain and network level between extremely preterm and term children

Irreversibility at whole–brain and network level between extremely preterm and term children

Non declared

ID 275. ESTABLISHMENT OF AN EEG HYPERSCANNING PARADIGM TO INVESTIGATE MATERNAL-NEWBORN NEURAL DYNAMICS DURING SKIN-TO-SKIN AND STROKING TOUCH IN THE FIRST DAYS OF LIFE

Miss Grace Kromm[1], Ms Kelle Pammenter[2], Ms Andrea Edwards[2], Mr Mohammed Adnan Azam[3], Dr Victoria Leong[4,5], Prof Topun Austin[2,5]

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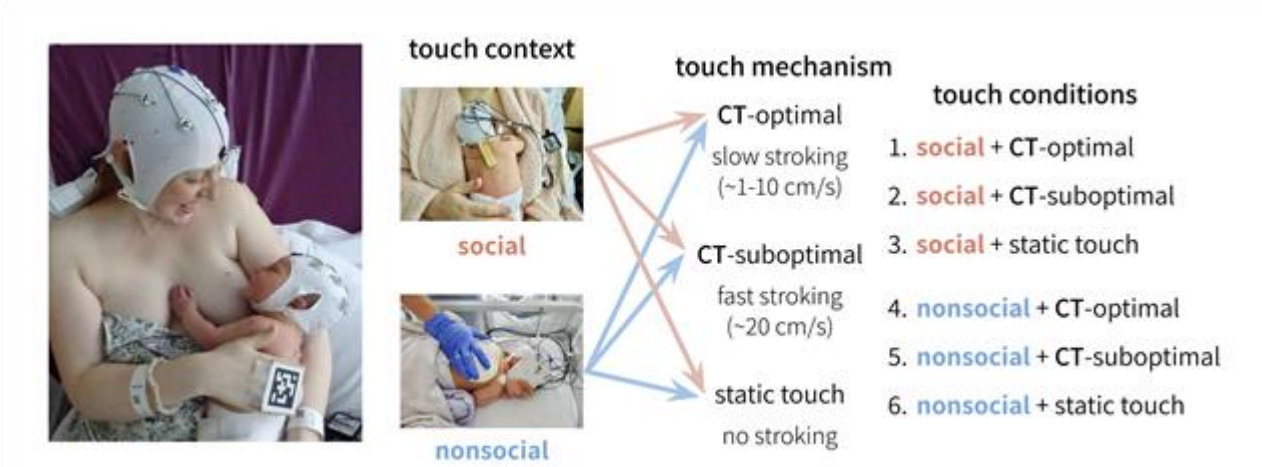
Background: Affectionate touch is one of the most fundamental aspects of the human experience, beginning at the start of life. The sensory pathway for affectionate touch is anatomically segregated, primarily transmitted by unmyelinated, slow–conducting C–tactile (CT) afferents optimally activated by gentle stroking at 1–10 cm/s. In the neonatal period, skin–to–skin and stroking touch tune long–term somatosensory development, autonomic reactivity, social cognition, and bonding; however, neonatal neural processing of CT–targeted touch is not yet well understood.

Methods: This work is part of the Brain Activation in Mother and BabY (BAMBY) study, which aims to interrogate the neural underpinnings of touch–mediated maternal–newborn interaction by recording simultaneous or “hyperscanning” electroencephalography (EEG). For the present submission, we aimed to establish an EEG hyperscanning paradigm at the neonatal cotside across CT–targeted and non–CT–targeted touch. Our paradigm compares neural dynamics across touch context and touch mechanism in a 2x3 factorial design (see Figure; images shared with

consent). Touch conditions are of 3–minute duration with alternating 3–minute periods of rest.

Results: We applied EEG hyperscanning to study 29 term–born newborns and 29 mothers. Paradigm refinement was undertaken with 14 dyads, and the full study was undertaken with 15 dyads. Refinement involved adjustment of paradigm design/length and development of a stroking speed–tracking algorithm. Within the 15 dyads recruited to the full study, 13 infants tolerated at least one touch condition (7 male, 6 female; average 39+1 weeks gestation, 3 days old). Stroking speed (M±SD) was 5.1±2.4 cm/s for social + CT–optimal touch (n=12), 20.3±5.2 cm/s for social + CT–suboptimal touch (n=11), 3.4±1.6 cm/s for nonsocial + CT–optimal touch (n=6), and 18.2±7.2 cm/s for nonsocial + CT–suboptimal touch (n=6). Recruitment to BAMBY and additional analyses are ongoing.

Conclusion: We have established an EEG hyperscanning paradigm at the neonatal cotside across types of gentle touch that differentially activate the CT afferent pathway. Pilot analyses of maternal–newborn neural synchronicity and newborn neural processing of CT–targeted and non–CT–targeted touch are underway. We hope these results will help elucidate the role of CT afferents in early bonding and brain development as well as help characterise the beginnings of the mother–child inter–brain network.



EEG hyperscanning paradigm at the neonatal cotside (LiveAmp amplifiers with actiCAP electrodes, Brain Products). Stroking speed on baby's back is measured using an open–source QR marker (ArUco) and custom algorithm.

EEG hyperscanning paradigm at the neonatal cotside (LiveAmp amplifiers with actiCAP electrodes, Brain Products). Stroking speed on baby's back is measured using an open–source QR marker (ArUco) and custom algorithm.

None declared

ID 733. NEUROSURGICAL MANAGEMENT AND OUTCOME OF FETAL PHVD: A SINGLE CENTER EXPERIENCE AT GASLINI CHILDREN'S HOSPITAL

Doctor Samuele Caruggi[1,2], Doctor Marcella Battaglini[1,2], Doctor Alessandro Parodi[1,2], Doctor Gianluca Piatelli[3], Doctor Alessandro Consales[3], Doctor Mariasavina Severino[4], Doctor Andrea Rossi[4], Doctor Dario Paladini[5], Professor Luca Antonio Ramenghi[1,2]
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BACKGROUND
Post-hemorrhagic ventricular dilatation (PHVD) is a ventricular dilatation due to the intraventricular bleeding (IVH) and impaired reabsorption of the cerebrospinal fluid (CSF) that typically affects very preterm babies below 32 weeks of Gestational Age (GA). PHVD may occur also during fetal life, more rarely than in preterm babies. Fetal PHVD represents a totally unexpected diagnosis during routine fetal scan. The neurosurgical treatment of postnatal PHVD has been recently regulated and optimized by recent papers (de Vries, Arch Dis Child Fetal Neonatal, 2019). Little is known about optimal management of prenatal PHVD. Our aim is to describe the neurosurgical outcomes of a cohort of infants who developed fetal PHVD treated at our center.

METHODS

A retrospective research of fetal IVH cases admitted at "Gaslini Children's Hospital" NICU after birth over an 11-year period was conducted. Inclusion criteria were a prenatal diagnosis of IVH, either by ultrasound (US) or magnetic resonance (MR). We compared the fetal PHVD cohort management with an in-house cohort of preterm infants who developed PHVD after birth (Parodi, Acta Paediatrica, 2021). Ventricular Index (VI), according to Levene measurements was measured for each fetal PHVD after birth..

RESULTS

We identified 28 cases of fetal IVH. Grade I/II IVH, grade III IVH and periventricular infarction were respectively 17.8%, 25% and 57.1%. PHVD was found in 23 cases (82.1%). Median GA at fetal diagnosis was 32+3 weeks. Median GA at birth was 34+1 weeks. Twelve patients were delivered preterm on purpose because of progressive PHVD. Neurosurgical treatment was performed in 14 patients. Median GA at neurosurgical treatment was 34+3 weeks. Nine patients (64%) required a permanent ventriculoperitoneal shunt (VPS). The comparison of fetal and postnatal PHVD is shown in Table 1.

CONCLUSION

This fetal PHVD population is one of the largest single center based. Diagnosis and treatment occurred later than in postnatal PHVD despite 12 babies were delivered deliberately preterm. Ventricular dilatation at diagnosis was higher in fetal PHVD compared to postnatal PHVD. Fetal PHVD more often required a VPS placement than postnatal PHVD. Timing of neurosurgical treatment remains crucial, but anticipating birth for earlier neurosurgical remains a challenging decision.

	FETAL PHVD	POSTNATAL PHVD
Median Age at PHVD Diagnosis (weeks)	32+3	30+1
Pre-Surgical VI 97°centile excess mean (mm) Left Side Right Side	 7,8 6,9	 5,2 5,2
Median Age at EVD Placement (weeks)	34+3	30+6
Total VPS Placement (percentage)	64	40

Table1: Fetal PHVD and postnatal PHVD comparison (EVD, external ventricular drainage; PHVD: post-haemorragic ventricular dilatation; VI, Ventricular index; VPS, Ventriculo-peritoneal shunt)

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Table1: Fetal PHVD and postnatal PHVD comparison (EVD, external ventricular drainage; PHVD: post–haemorragic ventricular dilatation; VI, Ventricular index; VPS, Ventriculo–peritoneal shunt)

None declared

ID 346. Socio-Emotional Consequences of Prematurity during Adolescence

Doctor Francesco Dianori[1], Doctor Alessandra Cecchi[2], Professor Carlo Dani[3]
[1]Università degli studi di Firenze, Firenze, Italy, [2]AOU Careggi, Firenze, Italy,
[3]Università degli studi di Firenze, AOU Careggi, Firenze, Italy

Introduction:
Preterm birth is associated with high frequency of cognitive impairment, learning disorders, as well as behavioral and relational difficulties, that may persist throughout the lifespan. Therefore, at our center a protected discharge and follow–up program has been established for these patients, with the aim of continuing care through a multidisciplinary approach.

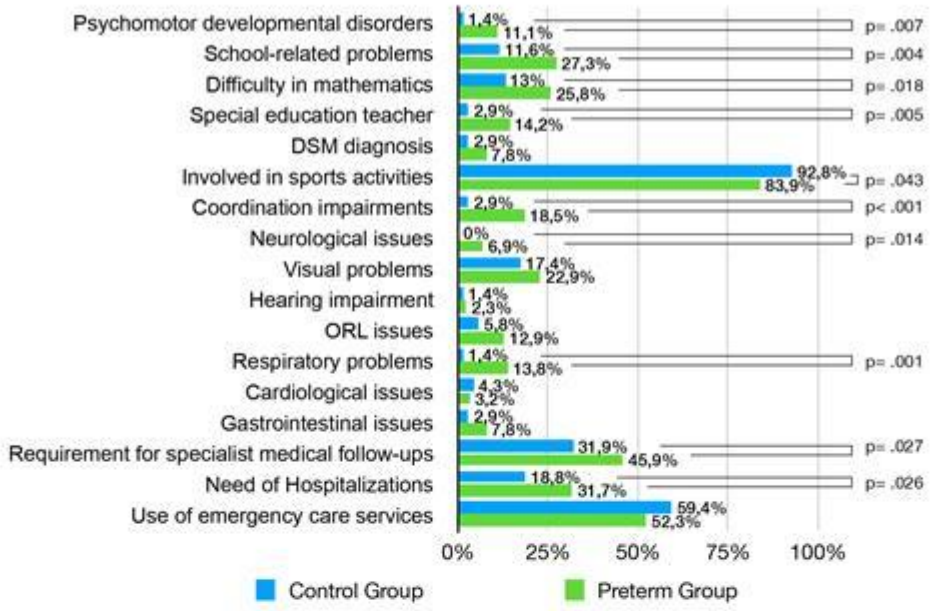
Method:
The purpose of this study was to evaluate the impact of prematurity on daily life perceived by parents of preterm infants discharged from our center between 2010 and 2015 and included in our follow–up program, now 6–12 years old. We developed a questionnaire that collected the patient's medical history, followed by the Strength and Difficulties Questionnaire. The surveys have been digitized through Google Forms and sent via email. Moreover, similar data were collected in a sample of similar age as control group.

Results:
Out of the 405 questionnaires distributed, 278 responses were received, with 219 from the preterm group and 69 from controls. Preterm infants had a gestational age of 29.6 ± 2.7 weeks and birth weight of 1165 ± 334 g. The sequelae most strongly associated with prematurity were: delayed neurodevelopmental growth (11.8% vs 1.4%,

p=0.007) with reported subsequent learning difficulties and the needed for special education teacher, as well as neurological impairment, particularly coordination skills (18.5% vs 2.9%, p<0.001). Respiratory disorders (13.8% vs 1.4%, p=0.001) were also frequently reported.
The areas of daily life most compromised were the ability to relate to peers (p= 0.005), resulting in loneliness and seeking attention from parents, even to avoid bullying, which was reported by 29.2% and 18.8%. Finally, parents of preterm infants reported a lower quality of life due to their child's health status (p=0.021), with a particular emphasis on challenges related to their child's schooling. All the complications mentioned appear to be directly correlated with the degree of prematurity.

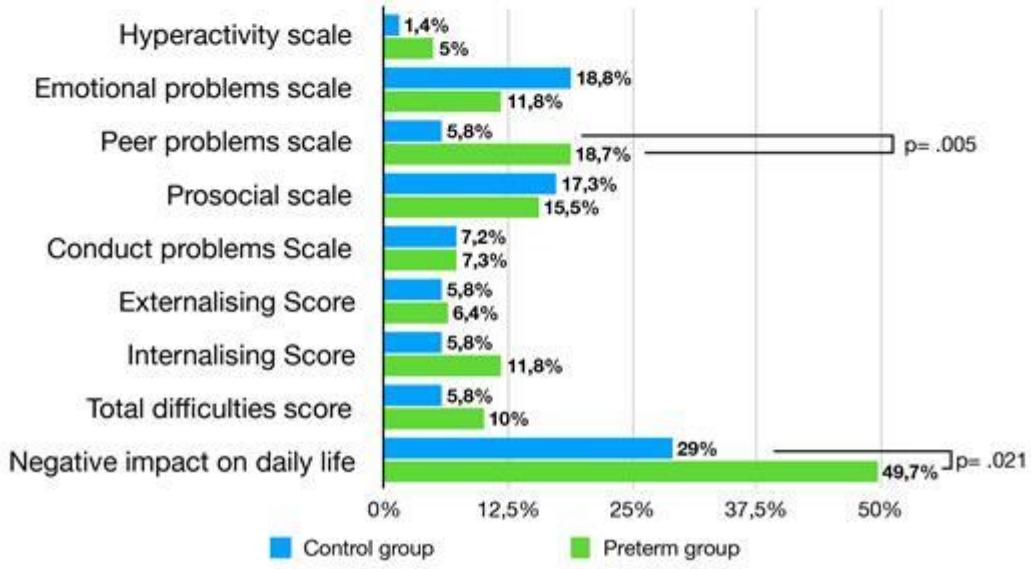
Conclusions:
Our study confirms that the consequences of prematurity are not limited to the immediate post-discharge period but accompany patients and their families at least until adolescence. Extending follow-up could provide real help for these families, especially in the early detection of disorders during the growth period.

Health Profile



Strengths and Difficulties Questionnaire (SDQ): 4-17 years

percentages of children with pathological scores



None declared

ID 81. PHYSIOLOGIC AND BEHAVIORAL EFFECTS OF MUSIC THERAPY AMONG PRETERM INFANTS AT A TERTIARY LEVEL NEONATAL INTENSIVE CARE UNIT IN THE PHILIPPINES: A PHASE 1 RANDOMIZED CONTROLLED TRIAL

Doctor Juliene Laurice Ganaden[1], Doctor Maria Theresa Zubiri[1], Doctor Navid Roodaki[1]

[1]ILOCOS TRAINING AND REGIONAL MEDICAL CENTER, SAN FERNANDO CITY, PHILIPPINES

BACKGROUND AND OBJECTIVE: Prematurity is a global problem accounting for 28% of neonatal mortality. Preterm infants stay in the NICU are exposed to inevitable noises which can have deleterious effects. Research such as this, focuses on non–invasive methods that could be used as an adjunct in the management of infants which includes the use of music.

METHODS: This is a single–blind randomized controlled trial done in a Level III Neonatal Intensive Care Unit (NICU) in the Philippines. Newborn (<36 weeks) were randomly allocated to intervention (lullaby group) or control group. Lullaby music was played inside the incubator at a volume of 50–60 dB in the experimental group. No music played in the control group. Physiologic parameters were recorded including heart rate, respiratory rate, oxygen saturation, temperature and behavior states before, during and after the intervention. Inflammatory markers such as C–reactive protein and Procalcitonin were measured on days 1,3 and 5 of life.

RESULTS: Total of 72 preterm infants equally divided into 2 groups were included with no drop out. Significant difference was noted on the cardiac rate and respiratory rate on day 2 (p = <0.001), and in the CRP and Procalcitonin level of the control group and treatment group (p = <0.001) on day 3 and 5.

CONCLUSION: This study demonstrated the effects of Music therapy in the heart rate and respiratory rate. Furthermore, it also showed the potential effects of music in the inflammatory markers (procalcitonin and CRP) and Behavioral response of preterm infants.

Table 4: Neonatal Behavioral Assessment Score of preterm infants included in the study compared between groups.

Parameters	Treatment		Control		*t(40)*	*p value*
	M	*SD*	*M*	*SD*		
Cluster and Behavioral Items						
• Habituation	32.94	2.86	30.47	3.58	3.23	0.002
• Social Interactive Organization	58.94	2.04	57.67	2.21	2.54	0.013
• Motor System	40.56	3.22	39.58	2.05	1.52	0.133
• State Organization	33.44	1.57	31.61	1.18	5.59	<0.001
• State Regulation	33.83	1.02	32.50	1.76	3.92	<0.001
• Autonomic System	25.08	1.02	23.52	1.42	5.32	<0.001
• Reflexes	15.91	0.93	14.83	0.84	5.15	<0.001

Neonatal Behavior al Assessment Score of preterm infants included in the study compared between groups.

Neonatal Behavior al Assessment Score of preterm infants included in the study compared between groups.

NONE DECLARED

ID 152. A Quality Improvement Initiative to Reduce Incidence of Severe Brain Injury in Preterm Infants <30 weeks' gestation.

Doctor Mahmoud Montasser[1], Ms Joanne Gallagher[1], Ms Michelle Brooks[1], Ms Gill Currie[1]

[1]University Hospital Wishaw, Glasgow, United Kingdom

Background: Intraventricular haemorrhage (IVH), which usually happens within first 72 hours of life, is the most common form of brain injury and a significant cause of morbidity and mortality in preterm infants. There is a growing evidence that minimizing abrupt variation of in the cerebral circulation during this critical time helps to dramatically reduce incidence of severe IVH.

Methods: The model of PDSA cycles was implemented to adopt tests of change which incorporated; maintaining infant in midline supine position with 20 degrees head up bed tilt by using special positioner aids; avoiding prone position; multi person care to maintain position; clustering all procedures to coincide with care; flushing and aspirating all central lines over at least 30 seconds. Skin to skin contact with parents and positive touch was encouraged and supported throughout project. Our SMART aim was "Within one year of implementation of an evidence based neuroprotective care bundle for infants < 30 weeks gestation, a 30% reduction in significant (grade 3 & 4) IVHs and cystic Periventricular Leukomalacia (cPVL) will be achieved".

Results: Data were collected from electronic patients records.

•Process Measure: 48/51 (94%) documented bundle in situ in first 24 hr.

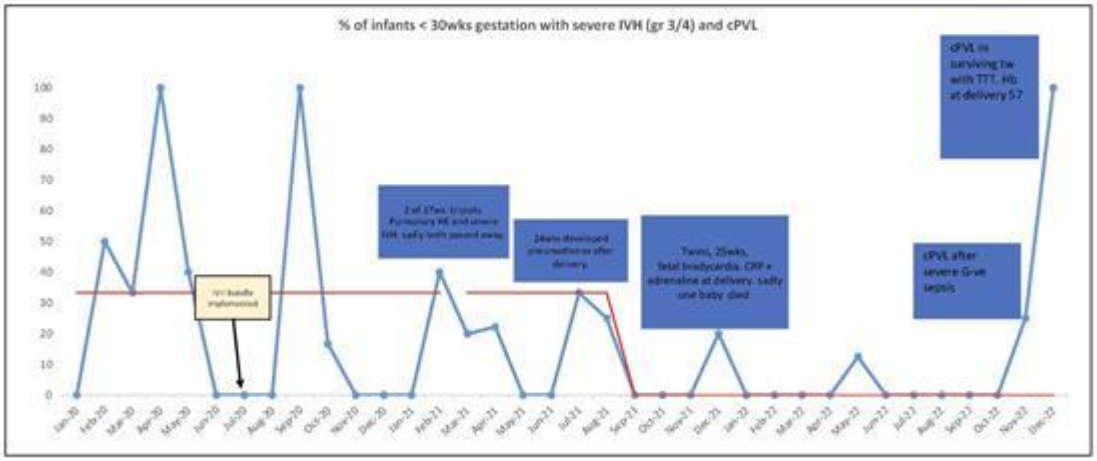
•Outcome Measure: severe IVH/cPVL in <30 wk infants reduced from 24% in 2020 to 17% in 2021 which represented 30% reduction.

•Balancing Measures: There was no incidence of skin breakdown.

Subsequently, in 2022 we had zero cases of severe IVH and only 3 cases of cPVL out of 38 babies received the bundle (8%). Our run chart median has come down from 32 to Zero.

Conclusion: Application of the Neuroprotective Care Bundle Interventions in addition to pre-existing neuroprotective measures have successfully demonstrated a reduction in the incidence of severe IVH +/or cPVL in infants born at <30 weeks' gestation which will have a great impact on short term and long term neurodevelopmental outcome of those tiny babies.

Run Chart for < 30 weeks gestation till end of 2022



None declared

ID 479. Executive functions assessment in very preterm children at school age: A clinical and experimental battery

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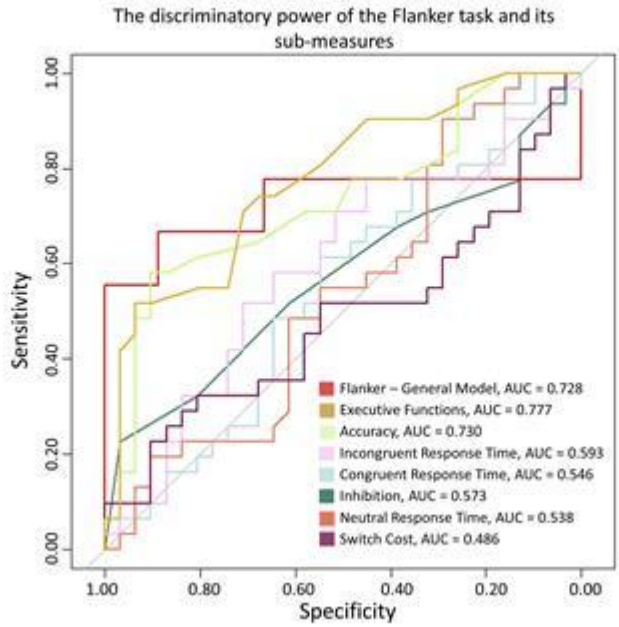
Background: While the survival rate of very preterm (VPT) infants has increased in the last decades, they are still at risk of developing long-term neurodevelopmental impairments, especially regarding self-regulatory abilities, and goal-directed behaviours. These skills rely on executive functions (EFs), an umbrella term encompassing the core capacities for inhibition, shifting, and memorizing. Comprehensive tests exist but are time-consuming and therefore not suitable for all paediatric neuropsychological assessments. The Flanker task is an experimental game-like computer-based task that has the advantage to last less than ten minutes while giving multiple EFs measures.

Methods: We examined the validity of the Flanker task in thirty-one VPT children aged 8-10 years during their clinical assessment including cognitive tests and parental questionnaires. A matching control group of term-born children was available.

Results: First, we found that VPT children performed in the high norm for most clinical tests (i.e., WISC-V, BRIEF, and NEPSY) except for the CPT-3 where they were slower and made more omission errors, which could indicate inattentiveness. Second, the Flanker task scores were correlated with standardized clinical testing. Finally, compared to children born full term, those born VPT showed poorer performance in the global EFs measure and lower accuracy in the Flanker task which showed good discrimination.

Conclusion: These findings suggest that this child-friendly version of the Flanker task demonstrated a reasonable sensitivity in capturing executive functioning with good discrimination of mild difficulties and thus might be used in lieu of clinical tests during neuropsychological assessments or be suitable as a screening test. Moreover, while VPT schoolchildren globally display normal intelligence, subtle difficulties that seem to relate to EFs are observed.



ROC curves of the General Model of the Flanker task and of each sub-measures conducted to test the discrimination of very preterm and term children.

ROC curves of the General Model of the Flanker task and of each sub-measures conducted to test the discrimination of very preterm and term children.

None declared

ID 417. EARLY PREDICTORS OF NEURODEVELOPMENT IN VERY PRETERM INFANTS AT SIX MONTHS: ROLE OF THE HAMMERSMITH NEUROLOGICAL EXAMINATION AND THE GENERAL MOVEMENTS ASSESSMENT

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BACKGROUND: Preterm newborns face a high risk of neurodevelopmental impairment. Early longitudinal monitoring of motor development appears crucial for the timely identification of deviations from the reference path, the prediction of possible impairment in psychomotor development, and the implementation of effective interventions. While most studies have focused on neurodevelopmental outcomes at 24 months corrected age (CA), we aimed to evaluate whether prenatal and postnatal clinical variables and early tools for infant motor assessment would predict impaired cognitive, motor, and language development at 6 months CA.

METHODS: Fifty-seven preterm infants (gestational age < 32 weeks and/or birth weight < 1500 g), born between November 2020 and July 2022, were consecutively recruited. General Movements Assessment (GMA) and Hammersmith Neurological Neonatal and Infants Examination (HNNE/HINE) were performed at term-equivalent age (TEA) and at 3 months CA. HINE and Bayley Scales for Infant and Toddler Development (BSID-III) were administered at 6 months CA. A BSID-III score ⩽79 was

used to define developmental impairment in each subscale (motor, cognitive, and language). A regression model was built to examine variables predicting neurodevelopmental impairment at 6 months CA.

RESULTS: In univariate analysis, head circumference growth, early-onset sepsis, GM features, at both TEA and 3 months CA, and HINE at 3 months CA were associated with motor impairment assessed with the BSID-III at 6 months CA. In multivariate analysis, GM trajectory over time maintained a borderline significance (p=0.057) in predicting motor impairment. In addition, cognitive and motor BSID-III scores were significantly related to each other (p<0.001) and to the HINE global score (p<0.001 for the cognitive score; p=0.002 for the motor score) at 6 months CA. GM's anomalies at 3 months CA were also associated with HINE scores (total and subscores) at 6 months CA.

CONCLUSIONS: GMA and HNNE/HINE offer a valuable tool to monitor and predict early motor development in preterm infants, as soon as 6 months CA, tailoring the need for a personalized follow-up and (re-)habilitation treatment. Future research on larger samples is needed to examine which combination of clinical variables and tools would more accurately predict neurodevelopmental impairment in each domain (cognitive, language, and motor).

None declared