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MONTREAL
CHILDREN'S
HOSPITAL
(MUHC)

NICU RESEARCH STUDIES

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DR. GUILHERME SANT'ANNA
CBC NEWS - MONTREAL 2022

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CDH ECHO STUDY

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Montreal Children's
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Project Title: Exploratory Observational Prospective Study in Neonatal and Pediatric Congenital Diaphragmatic Hernia

Type of study: Multicentric Observational Prospective Study

Investigators: Dr. Gabriel Altit (MUHC) & External PIs

Clinical Research Coordinator: Daniela Villegas M
(email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Congenital diaphragmatic hernia is marked by a diaphragmatic defect leading to abdominal organs herniating in the thoracic cavity during fetal/neonatal life. Compression from herniated viscera leads to severe pulmonary hypoplasia, abnormal pulmonary vasculature, and cardiac under-development. Patients with congenital diaphragmatic hernia are at high risk for mortality with 25% of neonatal death, usually secondary to severe post-natal pulmonary hypertension, right ventricle dysfunction, and decreased left ventricle volume/performance. Management of congenital diaphragmatic hernia focused on addressing the high pulmonary vascular resistances and resultant pulmonary hypertension.

Aim of the study: The overarching aim of this research project is to better describe the prevalence and severity of cardiac dysfunction and pulmonary hypertension for the congenital diaphragmatic hernia populations using a prospective study design during a 3-year period.

Summary of intervention: Patients included in this study will have a cardiac ultrasound at specific time points as well as during outpatient clinic for congenital diaphragmatic hernia.

Inclusion criteria:

- Congenital diaphragmatic hernia patients admitted to the MCH-NICU or followed at the MCH congenital diaphragmatic hernia clinic.

Exclusion criteria:

- Prematurity < 36 weeks.
- Diagnosis at > 7 days of life.
- Bilateral Congenital diaphragmatic hernia.
- Congenital cardiac defect (excluding a patent ductus arteriosus (PDA), atrial septal defect (ASD) or ventricular septal defect (VSD)).
- Major congenital anomaly/genetic syndrome.

More information:

<https://www.neocardiolab.com/research-recherche/ongoing-research-projects-projets-de-recherches-en-cours#h.6bwbymfqra9w>



DOPAMINE VS NOREPINEPHRINE

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Project Title: Dopamine vs. Norepinephrine for Hypotension in Very Preterm Infants with Late-onset Sepsis: A National Comparative Effectiveness Research (CER) Project

Type of study: National comparative effectiveness research (CER) study

Investigators: Dr. Gabriel Altit (MUHC), Dr. Marc Beltempo (MUHC) & External PIs

Clinical Research Coordinator: Daniela Villegas M (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Fluid-unresponsive hypotension needing cardiotropic drug treatment is a serious consequential complication in very preterm neonates (gestational age ≤ 32 weeks) with suspected late-onset sepsis (LOS), defined for this study as culture-positive or negative bloodstream infection or necrotizing enterocolitis (NEC) occurring >48 hours of age. In Canada, ~ 250 very preterm neonates receive cardiotropic drugs for LOS related fluid-unresponsive hypotension every year. Of these, $\sim 35\text{--}40\%$ die. Although the underlying pathophysiology is predominantly vasodilatory shock, unlike for adult patients, there is little evidence to inform practice.

Aim of the study: To compare the relative effectiveness and safety of pharmacologically equivalent dosages of dopamine versus norepinephrine for primary pharmacotherapy for fluid-unresponsive hypotension in preterm infants born ≤ 32 weeks gestational age with suspected LOS.

Summary of intervention: The attending team will determine the adequacy of circulation and need to initiate, escalate, as well as patient's readiness to wean and/or discontinue treatments. However, all patients deemed circulatory insufficient will receive fluid therapy either Dopamine or Norepinephrine (minimum 10–20 cc/kg).

Inclusion criteria:

- Infants born GA ≤ 32 weeks and > 48 hours of life.
- Infants receiving primary vasopressor therapy with Dopamine or Norepinephrine in the context of suspected late-onset sepsis or NEC with systemic hypotension.

Exclusion criteria:

- Infants with known chromosomal or genetic anomalies.
- Infants receiving primary therapy with agents other than Dopamine or Norepinephrine.

More information:

<https://www.neocardiolab.com/research-recherche/dopamine-vs-norepinephrine-cer-study>



Sinai
Health

Mount Sinai Hospital
Joseph & Wolf Lebovic Health Complex



FETAL BRAIN GROWTH

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Project Title: Fetal Brain Growth: Effects of Antenatal Corticosteroids on Fetal and Neonatal Brain Development – a pilot study

Type of study: Observational Prospective Study

Investigators: Dr. Jarred Garfinkle (MUHC) Dr. Anne-Maude Morency (MUHC) & External PIs

Clinical Research Coordinator: Daniela Villegas M (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: In Canada, 30,000 infants are born preterm (less than 37 weeks of gestation) each year, which represents 7–8% of live births. Many more infants are exposed to threatened preterm labor (TPTL) and antenatal corticosteroids (ACS), which are given for fetal lung maturation but are ultimately born at term. There is compelling evidence that the brain of the fetus exposed to TPTL and ACS deviates from its normal developmental trajectory. Indeed, children exposed to TPTL and ACS who are ultimately born at term are at higher risk for neurodevelopmental challenges. The impact of TPTL and ACS on fetal brain development thus merits further investigation.

Aim of the study: The overall objective is to explore the feasibility of measuring fetal and neonatal brain growth using 2D and 3D ultrasound in fetuses exposed to TPTL and ACS compared to non-exposed fetuses.

Summary of intervention: Patients with singleton pregnancies on our site with repeated ultrasound measurements every 4 weeks will be evaluated for fetal brain development. The exposed group is defined as patients with a dual exposure of TPTL and ACS. The non-exposed group will be composed of patients who did not have TPTL and ACS. Therefore, patients will have a maximum of 5 additional visits (4 that will occur prenatally and 1 postnatal visit).

Inclusion criteria:

Exposed group – TPL and ACS:

- 22–34 weeks and 6 days gestation at time of recruitment.
- Threatened preterm labor (TPTL)
- Administration of a partial or full course of ACS.
- Admission to the MUHC–RVH birthing center or the antenatal floor (D6S).
- Delivery planned at the MUHC–RVH or an institution around the Greater Montreal Area.

Inclusion criteria (non-exposed group):

- At or prior to 22 weeks gestation at time of recruitment.
- Delivery planned at the MUHC–RVH.

Exclusion criteria:

For both groups

- Major congenital anomalies, suspected fetal syndrome or genetic disease, or intra-uterine fetal growth restriction.
- Significant maternal disease which may cause preterm delivery or fetal growth restriction (e.g., severe infection, uncontrolled hypertension or diabetes).
- Patients who received more than one course of ACS prior to enrollment.
- Patients on any oral or other systemic corticosteroids, with the exception of inhaled corticosteroids.
- BMI over 35.

More information: Clinical trial link tbc.

RESET-PDA

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Project Title: Redefining the Significance and Treatment threshold for PDA in preterm neonates (RESET-PDA)

Type of study: Multicentric Observational Prospective Study

Investigators: Dr. Gabriel Altit (MUHC) & External PIs

Clinical Research Coordinator: Daniela Villegas M (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Prior studies on the reliability of targeted neonatal echocardiography (TNE) in extremely low gestational age neonates (ELGANs) with a patent ductus arteriosus (PDA) have been limited to a single-center setup and an evaluation of pre-defined images by a small set of study observers. To facilitate large multicenter prospective studies, the reliability of collecting comprehensive TNE measures across centers needs to be established.

Aim of the study: To investigate the interobserver reliability of echocardiography measures of PDA size/shunt volume, left ventricular (LV) function and dimensions among TNE-Neonatologists.

Summary of intervention: Four distinct, clinically relevant, and pragmatic postnatal age specific prediction models will be developed using the main study outcome, based on age of PDA evaluation after birth: (1) 1-3 days, (2) 4-7 days, (3) 8-14 days and (4) 15-28 days. Postnatal-age specific models provide a more homogeneous population for modelling and may be more applicable to clinical practice. For each model detailed clinical and imaging data from echocardiography evaluations, which identify a PDA and occur in the respective timeframe will be abstracted and included in the model.



Inclusion criteria:

- GA \leq 27 weeks + 6 days at birth.
- Echo with PDA diameter \geq 1.50 mm in the first 28 days after birth.

Exclusion criteria:

- Major congenital anomaly/genetic syndrome.
- Structural congenital heart disease other than small VSD (< 2 mm) or secundum ASD (irrespective of size).

More information:

<https://www.neocardiolab.com/research-recherche/reset-pda-study-protocol>



THE DREAM: PILOT PROJECT

Project Title: Detection of CardioRespiratory Events using Acoustic Monitoring in Preterm Infants on Continuous Positive Airway Pressure (DREAM)

Type of study: Multicentric Observational Prospective Study

Investigators : Dr. Wissam Shalish, Dr. Robert Kearney & Dr. Guilherme Sant'Anna & External PIs

Clinical Research Coordinator: Lydia Tao & Shasha Lv. (email: lydia.tao@muhc.mcgill.ca)

Background: In current practice, neonatal intensive care units (NICUs) around the world rely on information provided by the patient's bedside monitor to detect, describe, and manage cardiorespiratory events. The monitor captures heart rate, respiration and oxygen saturation through electrocardiography (ECG), transthoracic impedance and pulse oximetry, respectively.

Aim of the study: To describe the relationship between respiratory acoustics and airflow, and determine the reliability of respiratory acoustic monitoring at detecting breathing sounds in preterm infants.

Summary of intervention: Patients included in the DREAM study will be monitored and their vital signals measurements will be acquired using different devices by the research team for different durations, depending on the group.

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CENTRE DE
RECHERCHE



Ann & Robert H. Lurie
Children's Hospital of Chicago

Inclusion criteria:

- Infants with gestational age <32+0 weeks.
- Postmenstrual age between 28+0 and 36+6 weeks. (Different for each 3 groups of the study, for more information contact CRC).

Exclusion criteria:

- Infants with known major congenital anomalies.
- Infants with known congenital heart disorders, neuromuscular disease, diaphragmatic paralysis or a diagnosed phrenic nerve injury, history of esophageal perforation in the 7 days preceding, history of pneumothorax requiring chest tube insertion in the 7 days preceding the study.

More information:

<https://clinicaltrials.gov/ct2/show/NCT05196646>



THE GWS- PRAGMATIQ STUDY

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Project Title: Rapid whole-genome sequencing in acute care neonates and infants

Type of study: Multicentric Observational Prospective Study

Investigators : Jean-Baptiste Rivière (MUHC) & extrernal PIs

Genetics counselor: Frédéric Coulombe
(frederic.coulombe@muhc.mcgill.ca)

Background: Rare genetic disorders (RGD) and congenital malformations indicating a possible genetic syndrome affect 1-2% of live births and are the leading cause of hospitalization and death in infants in Canada. Among children admitted to neonatal or pediatric intensive care units (NICU/PICU), those with a suspected genetic disorder have a higher risk of both mortality and prolonged hospital stay. Making a genetic diagnosis in the newborn period or in the following months is especially important because RGD can evolve rapidly at this early stage of life and precise diagnosis can have critical implications for an infant or child's health for his entire life. However, there are 5,000 to 8,000 rare genetic conditions and the presentation of newborns and infants is frequently non-specific or differs from that observed in older patients, making a precise diagnosis of a RGD difficult or impossible.

Aim of the study: The ultimate objective of the proposed project is to offer, within the next three years, rapid clinical genome-wide sequencing (GWS) to all critically-ill newborns and infants who may benefit from this test in Quebec.

Summary of intervention: Once genetics consultation is requested and parents agree to the whole-genome sequencing, one blood draw from the infant and at least one from the parents will be obtained.

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RECHERCHE



Inclusion criteria:

- <18 years-old admitted in one of the four pediatric university health centers in Quebec (CHUM, CHUQ, CHUSJ or MUHC).
- Patient suspected for a rare genetic disease after evaluation by a Medical Geneticist.
- At least one of the patient's parents is available for blood sampling.

Exclusion criteria:

- A conventional genetic analysis (microarray, small gene panel, single-gene testing or an alternative test) is expected to provide diagnosis.
- Patient is admitted for a reason not expected to be linked to the suspected genetic disease.

THE HI/LO TRIAL

Project Title: Does the Use of Higher Versus Lower Oxygen Concentration Improve Neurodevelopmental Outcomes at 18–24 Months in Very Low Birthweight Infants?

Type of study: Cluster crossover design unmasked randomized controlled trial (RCT)

Investigators: Dr. François Olivier (MUHC), Dr. Marc Beltempo (MUHC) & External PIs

Clinical Research Coordinator: Daniela Villegas M. (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Oxygen is a vital element in the care of preterm infants and has been given more often than any other drug over the past 80 years. Despite this, we know very little about how much or how little oxygen is safe for preterm infants, particularly at birth. The minutes following birth are unique in that it is the only time during life when it is normal to have oxygen saturation (SpO₂) values as low as 30%, which then increases over the next 7–10 min to values of 85%–95%. The use of supplementary oxygen may be crucial, but also potentially detrimental to premature infants at birth. High oxygen levels may lead to organ damage through oxidative stress, while low oxygen levels may lead to increased mortality.

Aim of the study: To determine if initiating resuscitation with a higher oxygen concentration of 60% compared to that of lower concentration of 30% increase or decrease the incidence of composite outcomes of either i) all cause in-hospital mortality or ii) severe neonatal morbidities (including either severe brain injury or BPD or severe retinopathy of prematurity) at 18–24 months.

Summary of intervention: The initial steps of resuscitation will be carried out as per standard of care with an initial oxygen concentration of 30% or 60% depending upon the randomization sequence at the time of your baby's birth. The oxygen concentration is then adjusted to reach the established targets of saturation for the first 10 minutes of life.

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Inclusion criteria:

- Infants with gestational age between 23 0/7 to 28 6/7 weeks.
- Infants designated to receive full resuscitation.
- No known major congenital or chromosomal malformation.

Exclusion criteria:

- Infants born outside of study center.

More information:

<https://www.hilotrial.org/>



THE NEURO-NQI PILOT PROJECT

Project Title: The NeuroNQI Pilot study: Effects of a Nurturing and Quiet Intervention (NeuroN-QI) on Preterm Infants' Neurodevelopment and Maternal Stress and Anxiety

Type of study: A Pilot Randomized Clinical Trial

Persons Responsible: Dr. Gabriel Altit (MUHC) and Dr. Marylin Aita (Sainte-Justine Hospital)

Clinical Research Coordinator: Daniela Villegas M. (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: The current state of knowledge reveals that the development of the brain of preterm babies is influenced by specific neonatal experiences during hospitalization, such as environmental sensory stimulation (light and noise), as well as proximity to mothers. However, there is a lack of evidence regarding the benefits that could be associated with the combination of care interventions to improve the health outcomes of preterm infants and their mothers, and in particular the development of the brain of infants during their hospitalization in the neonatal unit.

Aim of the study: To assess the feasibility and acceptability of a developmental care intervention including periods of nurturing between mothers and their infant (skin-to-skin contact/ Kangaroo care and auditory stimulation) to promote physical and emotional proximity and a quiet period (controlled light and noise levels and olfactory stimulation in incubators) and to estimate the effect of this intervention on infants' neurodevelopment as well as on maternal stress and anxiety.

Summary of intervention: Acquire light and noise measurements while kangaroo care is being done by the mother by using a photometer and a sonometer respectively.

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Inclusion criteria:

- Infants born between 26 and 31 6/7 weeks.

Exclusion criteria:

- Birth defects or genetic disorders.
- An intraventricular hemorrhage >grade II.
- Receive analgesics or paralyzing agents.

Mothers exclusion criteria:

- <18 years of age, have a physical condition that does not allow kangaroo care, alcohol misuse, chose formula or mixed feeding; do not speak, read or write French or English.

More information:

<https://www.neocardiolab.com/research-recherche/neuron-qi-project>



THE PREM STUDY

Project Title: Pulmonary vascular disease and cardiac performance in extreme preterm infants: A prospective cross-sectional study

Type of study: Multicentric prospective observational study.

Persons Responsible: Dr. Gabriel Altit (MUHC) & External PI's

Clinical Research Coordinator: Daniela Villegas M. (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Bronchopulmonary dysplasia (BPD) is a pulmonary disease afflicting up to 68% of premature newborns. It is characterized by alveolar paucity, pulmonary fibrosis and abnormal pulmonary vasculature. It is associated with increased mortality and poor long-term respiratory and neuro-developmental outcomes. A recent report described an increase in BPD rates. BPD is strongly associated with pulmonary hypertension (PH). PH leads to cardiac dysfunction, which translates into poor endurance, failure to thrive and/or death.

Aim of the study: To attest the left/right ventricular function by speckle tracking echocardiography. Followed by the assessment of pulmonary pressures by echocardiography during growth, 2D left ventricular function by regular echocardiography parameters, 3D left and right ventricular performance, as well as, 3D LV rotational mechanics.

Summary of intervention: To perform an echocardiogram at the first week of life, a second echocardiogram at the CGA of 36 weeks and 40 weeks.

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Inclusion criteria:

- Infants born at <29 weeks' gestational age admitted to the NICU of participating centers or followed at MCH clinic after admission in the NICU for prematurity <29 weeks.

Exclusion criteria:

- Congenital heart disease (except an atrial or ventricular septal defect (VSD), or a PDA).
- Congenital severe lung or airway malformation (choanal atresia, trachea-esophageal fistula or congenital pulmonary airway malformation) and/or genetic disorder (Trisomy 21).
- Babies born from twin-twin transfusion syndrome pregnancies will be recruited and the variable about the pregnancy will be collected.

More information:

<https://www.neocardiolab.com/research-recherche/ongoing-research-projects-projets-de-recherches-en-cours#h.yeb13lxfniup>



THE PURPOSE STUDY

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Project Title: PurPOSE Study – Point of Care
Ultrasound in Congenital Diaphragmatic Hernia:
Predicting Outcomes and Success of Extubation

Type of study: Prospective observational study.
Persons Responsible: Dr. Gabriel Altit (MUHC) Other
MUHC Collaborators, & External PIs
Clinical Research Coordinator: Daniela Villegas M.
(email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Children with congenital diaphragmatic hernias are more likely to have been born with organs displaced in the chest leading to the need for certain surgical interventions or close monitoring. It is known that some of these children are born with heart and lung problems. We believe that chest ultrasound (with images from the lung and the heart), an imaging modality that is done without radiation, may already predict those babies that may have more complications or more problems before discharge from the hospital. Due to this hypothesis, we aim to assess if chest ultrasound on the first day of life and just before extubation may help better predict those that will have major issues as well as predict the successful extubation.

Aim of the study: To analyze chest ultrasound of the lung and the heart in order to better understand the impact of CDH after birth, and before extubation.

Summary of intervention: Ultrasound of the chest will be done on the first day of birth, as well as repeated in the hours prior to the planned extubation.

Inclusion criteria:

- Males and females less than 24 hours of life.
- Diagnosis of CDH (prenatally diagnosed).
- Gestational age ≥ 34 weeks.

Exclusion criteria:

- Prematurity (< 34 weeks).
- Bilateral CDH.
- Postnatal diagnosis / outborn infants.
- Cyanotic congenital heart disease or complex non-cyanotic defects (excluding a patent ductus arteriosus (PDA), atrial septal defect (ASD) or ventricular septal defect (VSD)).
- Major congenital anomaly (such as brain or airway/lung malformation) or prenatally known genetic syndrome.
- Infants unable to recruit prior to cannulation on ECMO.

More information:

<https://www.neocardiolab.com/research-recherche/ongoing-research-projects-projets-de-recherches-en-cours#h.vj39ehkxolkt>



THE SANE-03 THE SILDENAFIL STUDY

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Project Title: Treatment of Neonatal Encephalopathy with Oral Sildenafil Suspension to Repair Brain Injury Secondary to Birth Asphyxia: A Phase 2 study

Type of study: Randomized, double-blind, placebo-controlled clinical trial

Persons Responsible: Dr. Pia Wintermark

Clinical Research Coordinator: Joseph Zepeda
(Email: joseph.zepeda@affiliate.mcgill.ca)

Background: The phase II study will be a double-blind, randomized placebo-controlled trial that will be started at the Montreal Children's Hospital and will be extended to other sites. Neonates will be randomized to receive either (1) sildenafil (experimental group) or (2) placebo (control group) twice a day for seven days (from day 2 of life to day 9 of life). The allocation ratio for the study will be 2:1, to allow for the assessment of the efficacy of sildenafil with a larger number of neonates. We will explore the change in the severity of brain injury determined by MRI between days 2, 10 and 30 of life. We will compare the MRI scores of brain injury severity on days 10 and 30 of life with baseline (day 2 of life) using the Wilcoxon signed-rank test. We will follow these babies at 18 and 36 months.

Aim of the study:

Primary Objective:

-Determine if sildenafil decreases brain injury

Secondary objectives:

- Further assess safety of sildenafil
- Determine if sildenafil improves cardiopulmonary hemodynamics
- Determine if sildenafil improves neurodevelopmental outcome
- Determine if sildenafil decreases neuroinflammation.

Summary of intervention: Neonates will be randomized to receive either sildenafil (experimental group) or placebo (control group) twice a day for seven days.

Inclusion criteria:

Male and female neonates meeting the criteria for induced hypothermia:

- Gestational age ≥ 36 weeks and birth weight ≥ 1800 g.
- Evidence of fetal distress, i.e., history of an acute perinatal event.
- Cord pH ≤ 7.0 or base deficit ≤ -16 mEq/L.
- Evidence of neonatal distress, such as an Apgar score ≤ 5 at 10 minutes, postnatal blood gas pH obtained within the first hour of life ≤ 7.0 or base deficit ≤ -16 mEq/L, or a continued need for ventilation initiated at birth and continued for at least 10 minutes.
- Evidence of moderate to severe neonatal encephalopathy by an abnormal neurological exam and/or an amplitude-integrated electroencephalogram (aEEG).
- They will receive whole-body cooling to an esophageal temperature of 33.5°C , initiated within the first 6 hours of life, continued for 72 hours, and then they will be slowly rewarmed using standard protocol.
- Evidence of brain injury on a brain magnetic resonance imaging (MRI) performed on day 2 of life.

Exclusion criteria:

- Neonates with complex congenital heart disease.
- Neonates with cerebral malformations.
- Neonates with genetic syndrome.
- Neonates with intraventricular and/or intraparenchymal hemorrhage on MRI performed on day 2 of life.

More information:

<http://www.neobrainlab.org>



THE SPEC STUDY

Project Title: Surveillance of Postnatal steroids Effects on Cardiac Function and Lung Water Content in Extremely Preterm Infants with Evolving BPD: the SPEC study

Type of study: Multicentric prospective observational study

Persons Responsible: Dr. Gabriel Altit and Dr. Guilherme Sant'Anna (MUHC) and external PIs

Clinical Research Coordinator: Daniela Villegas M. (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Currently, the use of postnatal steroids in preterm infants remains controversial mostly due to potential adverse effects on the neurological and cardiovascular systems. We recently reviewed our practice in infants born at less than 29 weeks of estimated gestational age and observed that the median cumulative dose of dexamethasone used was 1.19 mg/kg (IQR: 0.89 – 2.12), starting at the beginning of the third week of life. Thus, in practice we use a cumulative dose much lower than the one reported to be associated with LV hypertrophy. Nevertheless, anecdotally in a few cases, LV hypertrophy was noted with significant effects on heart structure and function shortly after the first doses of dexamethasone, indicating that there are other factors associated with cardiovascular side effects in these infants.

Aim of the study: to investigate the effects of dexamethasone on cardiac structure and/or performance and lung water content in the extremely preterm population undergoing treatment for significant lung disease.

Summary of intervention: Perform an echocardiogram, lung ultrasound and HRV (Heart rate variability) at different time points of the DEXA treatment: Start, Day 3, Day 7, Day 14, then Day 7 post-treatment, Day 14 post-treatment and 36 weeks CGA.

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Inclusion criteria:

- < 29 weeks of gestational age at birth admitted at the participating sites.
- To be initiated on dexamethasone therapy for treatment of significant lung disease as per medical team decision.

Exclusion criteria:

- Congenital heart disease (except: Atrial septum defect (ASD), Ventricular septum defect (VSD)). Major congenital anomalies/genetic disorder (Trisomy 13, 18, 21).
- Congenital severe lung or airway malformation (Trachea-esophageal fistula, congenital pulmonary airway malformation, congenital diaphragmatic hernia). Twin-twin transfusion syndrome.

More information:

<https://www.neocardiolab.com/research-h-recherche/ongoing-research-projects-projets-de-recherches-en-cours#h.sz6e4lvnpng>



THE UNICORN STUDY

Project Title: Understanding Infant Cerebral growth & Outcome Research in Neurodevelopment (The UNICORN study)

Type of study: Prospective observational study

Persons Responsible: Dr. Marie Brossard Racine, PhD
Other contact: Sarah Palmis, PhD (email: sarah.palmis@mail.mcgill.ca) & Camille Héguy (email: camille.heguy@mail.mcgill.ca)

Background: Thanks to improved health care, most babies born preterm or with a congenital heart defect (CHD) grow up to be independent adults and have satisfying lives. However, some may develop functional difficulties during childhood and adolescence. However, the relationship between these difficulties and brain development remains poorly understood. This information could help us identify sooner the children who will be facing challenges so we can react promptly. Overall, a better understanding of these will guide the development of targeted interventions and help us provide better support to babies and their families.

Aim of the study: This research study seeks to better understand brain growth and child development during the first 2 years.

Summary of intervention: Perform magnetic resonance imaging and/or age-appropriate neurodevelopmental evaluations following discharge (starting at term equivalent for the preterm born babies or post-open heart surgery for the babies with CHD) and every season (~3 months) during the first 12 corrected age. Also, perform age-appropriate evaluations only every 6 months during the second year of life.

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Inclusion criteria:

Babies born preterm :

- Infants born ≤ 37 weeks gestational age at the Montreal Children's Hospital.

Babies with CHD:

- Infants with CHD who underwent open heart surgery utilizing cardio-pulmonary bypass during the first six months of life.

Exclusion criteria:

- Presenting with brain malformation or severe brain injury detected by bedside ultrasound
- Congenital infection, genetic syndrome, or documented chromosomal anomaly

More information:

<https://www.abcdresearch.ca/projects>



THE WHEAT INTERNATIONAL TRIAL

Project Title: WithHolding Enteral Feeds Around Packed Red Cell Transfusion (WHEAT)

Type of study: Randomized controlled, unblinded, multicentric trial.

Persons Responsible: Dr. Marc Beltempo (MUHC) & other external PIs

Clinical Research Coordinator: Daniela Villegas M. (email: daniela.villegas.martinez@muhc.mcgill.ca)

Background: Necrotizing enterocolitis is a serious complication related to prematurity. Almost 5% of infants born at <30 weeks gestation will develop necrotizing enterocolitis which can lead to death or long-term health and developmental problems among survivors. Red blood cell transfusion has been suggested as a possible factor that contributes to the risk of necrotizing enterocolitis. This transfusion-associated necrotizing enterocolitis may also be more severe with higher mortality. The majority of preterm infants born <30 weeks (60% to 90% have at least one transfusion) will require at least one transfusion during admission. Stopping milk feeds for a short period of time (12h) during red blood cell transfusion may reduce the risk of necrotizing enterocolitis by decreasing postprandial mesenteric. However, due to a lack of good-quality evidence, there is no consensus regarding the optimal feeding strategy during a blood transfusion.

Aim of the study: Compared with continuing feeds, withholding feeds during each packed red cell transfusion after randomization will reduce the incidence of NEC occurring after the first packed red cell transfusion.

Summary of intervention: Babies will be randomized before receiving a blood transfusion to stopping feeds during transfusions or continuing feeds during transfusions.

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Inclusion criteria:

- Preterm birth at <30+0 weeks of gestational age.

Exclusion criteria:

- Packed red cell transfusion with concurrent enteral feeds prior to enrolment (*infants who have received a packed red cell transfusion while nil-by-mouth or minimal enteral nutrition (<15 ml/kg/days feeds) are eligible).
- Infants where enteral feeding is contraindicated in the first 7 days after birth [e.g. Major congenital abnormality of the GIT].
- Previous episode of NEC or SIP prior to first packed cell transfusion.

More information:

<http://neoePOCH.com/wheat-trial>



THE WIRELESS NICU

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Project Title: The Use of Wireless Sensors in Neonatal Intensive Care

Type of study: Single center prospective observational study

Persons Responsible: Dr. Wissam Shalish & Dr. Guilherme Sant'Anna and Dr Robert Kearney (Biomedical Eng.)

Clinical Research Coordinator: Ana Ruiz & Shasha Lv (email: ana.saavedra.ruiz@muhc.mcgill.ca)

Background: Infants admitted in the Neonatal Intensive Care Unit are all subject to continuous monitoring of vital signs such as heart rate, respiration and oxygen saturation (SpO₂). These vital signs are measured non-invasively by placing sensors, leads, or bands directly on the patient's skin and connecting them to monitors via wires. Nurses, physicians and other providers routinely use these continuous vital sign values to make clinical decisions about their patients in real time. Unfortunately, despite witnessing rapid technological advances in smart monitoring and wearable devices across various industries, the healthcare sector has traditionally lagged. This is particularly pertinent to critical care units such as the NICU, where several monitoring limitations still exist.

Aim of the study: To demonstrate the feasibility of continuous wireless monitoring in term and preterm infants with variable degrees of maturity and levels of acuity in a busy NICU. To develop automated reports of physiological health (or impending ill health) using continuously acquired physiological signals from the wireless wearable devices. Lastly, to evaluate the accuracy of accelerometry in monitoring respiration and help classifying apneas via measurements of chest and abdominal wall movements.

Summary of intervention: For the Phase 1 - monitoring for 8h per day for 4 consecutive days using the wireless monitoring system and the standard monitoring system and Phase 2 - monitoring for 96h continuously.

 Ann & Robert H. Lurie
Children's Hospital of Chicago

Inclusion criteria:

- Term infants (37-42 weeks' gestation).
- Preterm infants with postmenstrual ages 28+0 to 36+6 weeks.
- Preterm infants with postmenstrual ages < 24+0 to 27+6 weeks.

Exclusion criteria:

- Congenital anomalies and surgical conditions (ex: gastroschisis, omphalocele, congenital diaphragmatic hernia), congenital heart disorders, congenital skin infections or known conditions with fragile skin (such as epidermolysis bullosa).

More information:

<https://www.clincosm.com/trial/use-wireless-sensors-neonatal-intensive-care>

