IRISH & AMERICAN PAEDIATRIC SOCIETY MEETING

41st Annual Meeting

SEPTEMBER 30 - OCTOBER 4, 2009
HYATT REGENCY HOTEL,
BUFFALO, NEW YORK, USA
Scientific Sessions
Thursday, October 1, 2009  8:00am-noon  Hyatt Regency Hotel
Friday, October 2, 2009  8:00am-noon  Women & Children's Hospital of Buffalo
Saturday, October 3, 2009  7:45am-11:15  Hyatt Regency Hotel

Thursday, October 1, 2009 – at the Hyatt

8:00    Welcome and Opening of Meeting – President Court Anthony

Session I – Moderator:  Henry Halliday, MD

8:15  Billy Franklin Andrews  U Louisville  A Life’s Romance with Small For Date Infants
8:30  Andy Delany  University College, Dublin  Elevated Troponin is Associated with Neonatal Term Brain Injury
8:45  William O’Connor  U Kentucky  Left Ventricular Noncompaction Cardiomyopathy (LVNC) - Expanding The Clinical And Pathologic Spectrum
9:00  Carol M. Cottrill  U Kentucky  Cor Triatriatum: Discussion Of The Entity and 2 Cases
9:15  William O’Connor  U Kentucky  Idiopathic Infantile Arterial Calcinosis (IIAC): A Potentially Reversible Rare Vascular Disease Of Infants

9:30  Thomas Cone Founders Lecture:
Jacqueline Noonan, MD, University of Kentucky:
“Fifty Years as a Pediatric Cardiologist”

10:00  break

Session II – Moderator:  Tom Clarke, MD

10:30  Vasanth Kumar  U Buffalo  The Effects of the Catalytic Antioxidant MnTBAP and Neonatal Hyperoxia on Airway Hyperresponsiveness (AHR) in Conscious Mice
10:45  Babu Paturi  U Buffalo  The Effects of Antioxidant MnTBAP on Angiogenesis & Oxidative Pathway Focused Gene Expression in Newborn Mice with Hyperoxic Lung injury
11:00  Jennifer Trask  U Buffalo  The Importance of Colonization Site in the Current Epidemic of Staphylococcal Skin and Soft Tissue Abscesses in Children
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15</td>
<td>Michael Barrett</td>
<td>Children’s University Hosp, Dublin</td>
<td>Incidence and Issues of Gastrochisis in Ireland</td>
</tr>
<tr>
<td>11:30</td>
<td>Lisa McCarthy</td>
<td>Natl Maternity Hosp, Dublin</td>
<td>Ultrasonically Detectable Cerebellar Haemorrhage in Preterm Infants</td>
</tr>
<tr>
<td>11:45</td>
<td>Lisa Clark</td>
<td>Stony Brook University</td>
<td>Buprenorphine Exposure and the Neonate. What Do We Really Know? A Case Presentation</td>
</tr>
</tbody>
</table>

Friday, October 2, 2009 – at Women & Children’s Hospital of Buffalo

7:00 Leave for Women & Children’s Hospital of Buffalo (WCHOB)

8:00 William Kidney Founders Lecture:  
   Henry Halliday, MD, Royal Maternity Hospital, Belfast  
   “Update on Neonatal Postnatal Steroids” (Pediatric Grand Rounds)

8:45 Tribute to John Fisher – Michael Caty, MD, Chief of Pediatric Surgery

Session III – Moderator: Eleanor Molloy, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00</td>
<td>Satyan Lakshminrusimha</td>
<td>U Buffalo</td>
<td>Oxygen Concentration and Pulmonary Vascular Resistance in Newborn Lambs with Persistent Pulmonary Hypertension of the Newborn (PPHN)</td>
</tr>
<tr>
<td>9:30</td>
<td>Mohit Sahni</td>
<td>Toronto Sick Hospital</td>
<td>Early Functional Echocardiography (fECHO) Predicts Postoperative Cardiorespiratory Instability after Patent Ductus Arteriosus (PDA) Ligation</td>
</tr>
<tr>
<td>9:45</td>
<td>Deirdre Sweetman</td>
<td>Natl Maternity Hosp, Dublin</td>
<td>Intraventricular Haemorrhage as a Predictor of Neurodevelopmental Outcome at 2 Years of Age of Infants Born at the Threshold of Viability</td>
</tr>
<tr>
<td>10:00</td>
<td>Jan van Eys</td>
<td>Vanderbilt U</td>
<td>Medical Ethics and the Poetry of Thomas Lynch</td>
</tr>
</tbody>
</table>

10:15 Break and Poster Session:  
   Michael Barrett  
   Travel award winner  
   Natl Maternity Hosp, Dublin  
   Are Flying Infants at Increased Risk?  
   Lisa McCarthy  
   Travel award winner  
   Natl Maternity Hosp, Dublin  
   Neurosurgical Management of Neonatal Hydrocephalus: The National Maternity Hospital Experience

Session IV – Moderator: Ward Rice, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45</td>
<td>Surendran Thavagnanam</td>
<td>Queens University, Belfast</td>
<td>Chronic Effects of IL-13 on Paediatric Bronchial Epithelial Cells In Vitro - Is There An Independent IL-13 Effect?</td>
</tr>
<tr>
<td>11:00</td>
<td>Michael Barrett</td>
<td>Natl Maternity Hosp, Dublin</td>
<td>Term Neonatal Encephalopathy: Deep White Matter Changes Correlation To Clinical Presentation And Placental Histopathology</td>
</tr>
</tbody>
</table>
### Session V – Moderator: Fred Battaglia, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15</td>
<td>Ronnie McKinnon</td>
<td>Stony Brook University</td>
<td>The Patient Safety and Quality Improvement Act: A Prescription for Medical Error Reporting Without Reprisal with Side Effects of Team Collaboration and Quality Improvement</td>
</tr>
<tr>
<td>8:30</td>
<td>Eleanor Molloy</td>
<td>Natl Maternity Hosp, Dublin</td>
<td>Do Very Low Birth Weight Infants (VLBW) Need Routine Iron Supplements?</td>
</tr>
<tr>
<td>8:45</td>
<td>Frederick Battaglia</td>
<td>U Colorado</td>
<td>Clinical Studies of the Roles of D-Mannose and Myoinositol in Perinatal Nutrition</td>
</tr>
<tr>
<td>9:00</td>
<td>Michael Barrett</td>
<td>Our Lady's Hosp Children, Dublin</td>
<td>Clinical Outcomes and Treatment Difficulties in Boys with Hypophosphataemic Rickets</td>
</tr>
</tbody>
</table>

**Fred Burke Founders Lecture:**

*Drucy Borowitz, MD, University at Buffalo:*

*“Are We Close to Curing Genetic Diseases Like Cystic Fibrosis?”*

<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:45</td>
<td>Break</td>
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</tbody>
</table>

### Session VI – Moderator: Lorna Fitzpatrick, MD

<table>
<thead>
<tr>
<th>Time</th>
<th>Name</th>
<th>Institution</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:15</td>
<td>Myra Lezine</td>
<td>U Rochester</td>
<td>Development of a Child Abuse Information and Tracking Form</td>
</tr>
<tr>
<td>10:30</td>
<td>Rita Ryan</td>
<td>U Buffalo</td>
<td>T Lymphocytes in Human Infants with Bronchopulmonary Dysplasia (BPD)</td>
</tr>
<tr>
<td>10:45</td>
<td>Carol M. Cottrill</td>
<td>U Kentucky</td>
<td>“Particles” in Obese and Non-Obese Children</td>
</tr>
<tr>
<td>11:00</td>
<td>Jane Donohue Battaglia</td>
<td>U Colorado</td>
<td>Practitioners of Medicine and Practitioners of Philosophy</td>
</tr>
</tbody>
</table>

Scientific Planning Committee: Rita M. Ryan, Chair; Thomas E. Potter, CME Director; Lorna Fitzpatrick, Bobby Mathew, Eleanor Molloy
This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Medical Society of New Jersey (MSNJ) through the joint sponsorship of St. Joseph’s Regional Medical Center and the Irish & American Paediatric Society. St. Joseph’s Regional Medical Center is accredited by the Medical Society of New Jersey to provide continuing medical education for physicians. St. Joseph’s Regional Medical Center designates this educational activity for a maximum of 12.0 AMA PRA Category 1 Credit(s). Physicians should only claim credit commensurate with the extent of their participation in the activity.
A LIFE’S ROMANCE WITH SMALL FOR DATE INFANTS

Billy Franklin Andrews, M.D., Department of Pediatrics, University of Louisville School of Medicine, 571 S. Floyd Street, Louisville, Kentucky 40202, (502) 852-3719.

Background:

I was born on September 22, 1932 to a beautiful blond, 19 year primipara of Irish-German descent with toxemia at 34 weeks gestation and birth weight of around 3 pounds in Alamance County Hospital, Burlington, North Carolina. Her physician Willard C. Goley, was a distinguished Pennsylvania graduate with 5 years of postgraduate training to return to practice in a small town, Graham, North Carolina. He was my first great caretaker and saved my life on many occasions before his entry into World War II, when he became a general at the hand of General Douglas McArthur. I never with him that he did not tell me I must be a doctor; I owed my life to medicine.

Methods:

The real emphasis toward study of infants of small stature came from Doctors Wilburt C. Davison, Ogden C. Bruton, Harry H. Gordon and Virginia Apgar. The opportunity over several months’ time to see a large group of infants of low birth weight who lived was my stimulus. It is most important to note that several of my first encounters were with infants of mothers with severe toxemia and twins with the parabiotic syndrome and congenital infections, etc. It was at a perinatal conference that the concept of how to look at a newborn, iatrogenesis and small for date infants was discussed. The latter was to convince pediatricians and obstetricians that most of the very small infants who lived were because of their gestational age and not great care on our part.

My first research project at the University of Louisville was to be about infants of toxemic mothers, which I did not even start because of the direction of most powerful persons for me to use the lamb model to determine effects of magnesium sulfate on premature mammals.

Results:

Now over a half century later, new and more appropriate terms have been derived such as intrauterine growth retardation, small for gestational age, etc. Numerous etiologies for small for date infants have been found and others continue to be found.

Conclusions:

The concepts of “Neonatology—A Six Finger Exercise” and the “Small for Date Infant” have been used for over 50 years. There is still great need for further study on the many effects of toxemia on the newborn and other areas.
THE NATIONAL INCREASE IN GASTROSCISIS REPAIRS
Barrett M.J1, Kinsella CBK2, Malone F2, Flood K2, Soha S2, Foran A1.

1Dept. Neonatology, Children’s University Hospital, Temple Street, Dublin.
2Dept. Foetal Medicine, Rotunda Hospital, Dublin.

Aims:
(1) Documenting incidence and rates of Gastroschisis repair in Irish tertiary level paediatric hospitals over the last 8 years.
(2) Documenting incidence of antenatal diagnosed Gastroschisis at the Rotunda Maternity, Ireland during the same time period.

Methods:
Retrospective review of patients diagnosed antenatally at the Rotunda Maternity and of babies admitted for Gastroschisis repair in the period 1999-2006 to all Irish tertiary level paediatric hospitals. Patients were identified using foetal medicine database, ultrasound anomaly register, theatre records, the hospital inpatient enquiry system (HIPE) and were cross-referenced with ICU datasets and patient case notes.

Results:

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroschisis repairs</td>
<td>11</td>
<td>19</td>
<td>11</td>
<td>9</td>
<td>13</td>
<td>19</td>
<td>18</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>National Births¹</td>
<td>53,354</td>
<td>54,239</td>
<td>57,882</td>
<td>60,521</td>
<td>61,517</td>
<td>61,684</td>
<td>61,042</td>
<td>64,237</td>
<td></td>
</tr>
<tr>
<td>Rate of repairs per 10,000 births</td>
<td>2.06</td>
<td>3.50</td>
<td>1.90</td>
<td>1.48</td>
<td>2.11</td>
<td>3.08</td>
<td>2.94</td>
<td>2.80</td>
<td></td>
</tr>
<tr>
<td>Antenatal dx</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Births at Maternity</td>
<td>6,334</td>
<td>6,310</td>
<td>6,600</td>
<td>6,971</td>
<td>6,790</td>
<td>6,731</td>
<td>6,804</td>
<td>7,325</td>
<td>8,325</td>
</tr>
<tr>
<td>Rate of gastroschisis per10,000 in Maternity</td>
<td>3.15</td>
<td>0</td>
<td>0</td>
<td>1.43</td>
<td>2.94</td>
<td>5.94</td>
<td>5.88</td>
<td>4.09</td>
<td>12.01</td>
</tr>
</tbody>
</table>

Discussion:
While the actual number of Gastroschisis repairs is relatively small the observed rise in recent years nevertheless represents a sizeable increase on the annual number of cases (usually one or two prior to 1994) ². This study also highlights the need for a prospective collection of socio-demographic data for these infant mother pairs.

References:
DO VERY LOW BIRTH WEIGHT INFANTS (VLBW) NEED ROUTINE IRON SUPPLEMENTS?
Barrett M, McCarthy R, Molloy EJ.
Dept of Paediatrics, National Maternity Hospital, Holles St., Dublin; UCD School of Medicine and Medical Sciences, University College Dublin, Ireland.

AIMS

Iron essential for growth and hematopoiesis but excessive free iron has been associated with brain injury in models of hypoxic-ischemic brain injury and infection. Preterm neonates require iron supplements in the management of anemia of prematurity. However, recent postmortem evidence suggests that preterm infants who received multiple blood transfusions may be iron overloaded. Low circulating levels of transferrin and other iron-binding proteins in preterm infants allow increased circulation of non-protein-bound iron. Neonatal animal models have shown a predisposition to iron overload due to an inability to down-regulate their iron absorption.

METHODS:

There is no definitive test to measure iron overload, and elevated serum ferritin is a nonspecific indicator of severe hepatocyte injury and inflammation. Iron indices were prospectively evaluated in VLBW before routine iron supplements were commenced in a tertiary referral centre. Birth history, clinical parameters, mortality and brain imaging were evaluated.

RESULTS:

32 VLBW infants were included and divided into those with normal or elevated ferritin levels (Figure 1). The 8 infants with significantly elevated ferritin levels were significantly smaller and of lower gestational age. They also had a significantly longer duration of ventilation, CPAP and oxygen dependency. However the Haemoglobin, Transferrin, iron, C-reactive protein and albumin were similar in both groups.

CONCLUSIONS

Iron overload appears to be a significant issue for VLBW. However preterm infants receive routine iron supplementation as well as iron-fortified formula feeds and red cell transfusions. Careful evaluation of iron indices is essential to prevent potential organ injury and unnecessary iron supplementation.

Figure 1:

<table>
<thead>
<tr>
<th>Ferritin</th>
<th>N=</th>
<th>Gestation</th>
<th>BWt</th>
<th>Rcc Tx</th>
<th>Ferritin</th>
<th>Transferring sat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>weeks</td>
<td>kg</td>
<td>number</td>
<td>ug/l</td>
<td>%</td>
</tr>
<tr>
<td>Elevated</td>
<td>8</td>
<td>26.49+/-.2.1</td>
<td>0.81+/-.0.28</td>
<td>3.7+/-.2.1</td>
<td>593+/184</td>
<td>39.6+/-.12</td>
</tr>
<tr>
<td>Normal</td>
<td>24</td>
<td>28.26+/-.2.1</td>
<td>1.17+/-.0.22</td>
<td>1.4+/-.1.1</td>
<td>155+/-.83</td>
<td>34.9+/-.13</td>
</tr>
<tr>
<td>P value</td>
<td>ns</td>
<td>0.047</td>
<td>0.0007</td>
<td>0.0006</td>
<td>&lt;0.0000001</td>
<td>0.37</td>
</tr>
</tbody>
</table>

BWt: Birthweight; RCC TX: Red cell transfusion;
CLINICAL OUTCOMES AND TREATMENT DIFFICULTIES IN BOYS WITH HYPOPHOSPHATAEMIC RICKETS
Barrett MJ, McDonnell E, Costigan C, Cody D
Department of Endocrinology, Our Lady’s Hospital for Children, Crumlin, Dublin

Introduction: Hypophosphataemic rickets (HPX) is characterised by growth retardation, rickets or osteomalacia, hypophosphataemia, and renal defects in phosphate reabsorption and in vitamin D metabolism. The X-linked form (X-linked dominant) is the most common with a defect in phosphate transport in the proximal tubule leading to persistent hypophosphataemia and high levels of phosphate in the urine.

Aims: To describe male patients with HPX in relation to their growth, biochemistry, medications, side effects and radiology.

Methods: An endocrine database provided a retrospectively analysed cohort.

Results: Eight male patients were identified. Median age of diagnosis was 3.2 (0.3-9.3) years. At diagnosis 5/8 had radiological evidence of rickets. Tubular maximum phosphate reabsorption mean was 53% (31-69%) and mean phosphate was 0.81mmol/L (range 0.59-0.95), calcium 2.4 mmol/L (2.3-2.63), alkaline phosphatase 575 IU/L (396-784), parathyroid hormone 51.6 pmol/L (32.3-107).

<table>
<thead>
<tr>
<th>Complications</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrocalcinosis</td>
<td>3</td>
</tr>
<tr>
<td>Persistent rickets after 2 years therapy</td>
<td>2</td>
</tr>
<tr>
<td>Combination of persistent rickets and nephrocalcinosis</td>
<td>2</td>
</tr>
<tr>
<td>Sub-optimal pre-pubertal growth rate, i.e. &lt; 5cm / year</td>
<td>7</td>
</tr>
<tr>
<td>Combination of persistent rickets, nephrocalcinosis &amp; suboptimal growth rate</td>
<td>2</td>
</tr>
<tr>
<td>GI symptoms from phosphate</td>
<td>4</td>
</tr>
<tr>
<td>Secondary hyperparathyroidism</td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Medications</th>
<th>1 year</th>
<th>3 years</th>
<th>5 years</th>
<th>10 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>One alpha Ng/kg/day</td>
<td>24.5 (0-54.5)</td>
<td>24 (16-36)</td>
<td>50.7 (27-88)</td>
<td>74 (15-114)</td>
</tr>
<tr>
<td>Phosphate Mg/kg/day</td>
<td>55.3 (38-90)</td>
<td>80.5 (60-125)</td>
<td>74.4 (27-105)</td>
<td>55.5 (31-100)</td>
</tr>
</tbody>
</table>

Urine calcium creatinine ratios mean 0.2 (0.03-0.44). Mean height was 72.3 cm (-SD 2.0, n=3), 88.2 cm (-SD 3.1, n=4), 99.5 cm (-SD 5.3, n=5) and 125.3 cm (-SD 3.5, n=3) at 1, 3, 5 and 10 years of age respectively. Mean pre-pubertal height velocity was 4.61 cm/year (-SD 0.9, n=6) from diagnosis. GH therapy was not used. 1/9 complied with night-time phosphate therapy and 4/8 had gastrointestinal symptoms due to phosphate.

Conclusion: The current management strategies of HPX are sub-optimal. Night-time phosphate is problematic for patients and families and compliance is poor. Short stature with slow growth velocity remains a predominant finding in our patient cohort. Complications developing during treatment include secondary hyperparathyroidism and nephrocalcinosis and can be difficult to prevent. Close regular clinical and biochemical monitoring is necessary to achieve optimal outcomes and reduce complications. Efforts are needed to reduce the age of diagnosis, particularly if a child is growing poorly in 1st year of life and/or there is a positive family history. The use of growth hormone for short stature in HPX is unproven while chlorothiazide to reduce urine calcium excretion may be considered.
ARE FLYING INFANTS AT INCREASED RISK?
Barrett MJ, Molloy EJ
Dept of Paediatrics, National Maternity Hospital, Holles St., Dublin; UCD School of Medicine and Medical Sciences, University College Dublin, Ireland.

Introduction:
Infant air travel safety has been highlighted by the Federal Aviation Authority (FAA) and American Academy of Paediatrics (AAP) to be deficient. An approved child restraint system (CRS), which is designed to protect an infant in cases of non-fatal or survivable airplane incidents is being encouraged by FAA and insisted upon by AAP in air travel. This is a gold standard of infant safety in flight. Analysis of airplane crashes in which there were fatalities and survivors from 1976-1979 has revealed a relative mortality risk of 5.9 (United States) and 9.6 (worldwide) in children compared to restrained adults.

Aim:
To document current availability of information, CRS devices and incentives for infant safety in commercial airlines.

Methods:
A systematic review of commercial airline websites. We identified current infant safety information, CRS supply and financial incentives for infant safety. The three groups identified were: ‘ten transatlantic low fare carriers’, ‘top ten international airlines 2008’ and ‘Top 10 US Domestic September 2007-August 2008’.

Results:

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mandatory CRS</th>
<th>Encourage CRS</th>
<th>Discount without CRS</th>
<th>Discount with CRS</th>
<th>CRS supplied by airline</th>
<th>Website info on CRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transatlantic</td>
<td>No 10/10</td>
<td>No 5/10</td>
<td>No 0/10</td>
<td>No 7/10</td>
<td>No10/10</td>
<td>No 6/10</td>
</tr>
<tr>
<td></td>
<td>Yes 0/10</td>
<td>Yes 5/10</td>
<td>Yes10/10</td>
<td>Yes 3/10</td>
<td>Yes4/10</td>
<td></td>
</tr>
<tr>
<td>International</td>
<td>No 10/10</td>
<td>No 8/10</td>
<td>No 0/10</td>
<td>No 0/10</td>
<td>No10/10</td>
<td>No 5/10</td>
</tr>
<tr>
<td></td>
<td>Yes 0/10</td>
<td>Yes 2/10</td>
<td>Yes10/10</td>
<td>Yes10/10</td>
<td>Yes5/10</td>
<td></td>
</tr>
<tr>
<td>US Domestic</td>
<td>No 10/10</td>
<td>No 2/10</td>
<td>No 1/10</td>
<td>No 5/10</td>
<td>No10/10</td>
<td>No 2/10</td>
</tr>
<tr>
<td></td>
<td>Yes 0/10</td>
<td>Yes 8/10</td>
<td>Yes 9/10</td>
<td>Yes 4/10</td>
<td>Yes8/10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>UK 1/10</td>
</tr>
</tbody>
</table>

Key: CRS –Child Restraint System; UK- Unknown
No airline had implemented mandatory CRS usage. The US domestic group had 8/10 carriers encouraging CRS usage and only 2/10 of the International group. US domestic and International carriers groups revealed increasing charges for infants travelling in CRS. No airline supplied CRS.

Conclusion:
There are no world or EU wide operational standards in effect addressing the impact protection of infants. Consequently, dedicated seats and CRS types are not mandatory but optional only. The “supplementary loop belt” is provided by operators. A number of studies performed suggest however that the supplemental loop belt or lap holding options may not provide infants with a level of protection comparable to that provided by an approved CRS. CRS use is not mandated internationally. United States based airline carriers lead the way with provision of information but have the least financial incentives. Parents who plan to use a CRS face a paucity of information and little subsidized travel. We recommend that all airlines provide: 1) standardised information on CRS use during air travel, 2) financial incentives (discount fares) when using a CRS and 3) approved age-appropriate CRS at the departure point.
TERM NEONATAL ENCEPHALOPATHY: DEEP WHITE MATTER CHANGES CORRELATION TO CLINICAL PRESENTATION AND PLACENTAL HISTOPATHOLOGY

Barrett MJ¹, Mooney EE², Donoghue V³, Twomey A¹
¹ Department of Neonatology, ² Department of Pathology and ³ Department of Radiology, National Maternity Hospital, Holles Street, Dublin

Introduction:
Deep white matter injury is characteristically described in the preterm population. However, it is increasingly recognised that this type of injury is also seen in term infants. We report 5 term infants with evidence of isolated acute white matter injury on early MRI imaging and discuss the clinical presentation, radiology, placental pathology, neurodevelopment outcome and follow up MRI at mean 25 months of age.

Methods:
Our institution collects data on all infants presenting with neonatal encephalopathy. In the period 2005-2007 we identified 5 infants with acute changes noted on early MRI that were exclusively confined to the deep white matter.

Results:
In the 3 year period a total of 24,368 neonates were born of which 21,441 were between 37 and 41+6 weeks gestation. 75 patients had neonatal encephalopathy. Of the 5 infants, 4 were male (80%). Gestational age ranged from 36+4 to 39 weeks. All infants had a 5 min Apgar of ≥7. Of the three infants with cord blood gases, no infant had a cord pH ≤ 7.0. Four of the 5 infants were well enough at birth to be transferred directly to the postnatal ward. 3 had mild encephalopathy on presentation, of which, 2 developed seizures. One patient, admitted from home, developed seizures day 4 of life. One patient had no neurological symptoms but had an abnormal cranial ultrasound appearance (performed because of a concern regarding sepsis). In all cases, diffusion MRI demonstrated patchy restricted diffusion in the white matter. Congenital infection and metabolic disease were excluded in all cases. Follow up MRI at 2 years of age demonstrated the white matter signal abnormality in the same location as the initial lesions. The appearance on MRI resembled that of periventricular leucomalacia. Histopathological examination of the placenta revealed that 4 of the 5 infants (80%) had evidence of high grade chronic lymphocytic villitis of which 3 of the 4 cases were at the severe end of the spectrum with associated stem vessel obliteration. We report chronic villitis (High/ Low grade) in 7% of patients presenting, locally, with neonatal encephalopathy and the severe end of the spectrum is only seen in 2%. At a mean of 27 months standardised neuropsychology assessment (Bayleys Score 3rd Edition) revealed that 3 children had a normal assessment and 2 infants had evidence of cerebral palsy (one infant with mixed pattern cerebral palsy and severe cognitive impairment and one infant with a hemiplegia and a borderline low cognitive score).

Conclusion:
The feature of this group of term/near-term infants was presentation with neonatal encephalopathy with specific deep white matter injury. High grade villitis with stem vessel obliteration was found to be associated with neonatal encephalopathy and acute deep white matter changes in our cohort. In the term infant with neonatal encephalopathy the evolution of MRI and its availability, the correlation of clinical and pathophysiological findings, will lead to better understanding of the complex subgroupings of neonates with encephalopathy.
CLINICAL STUDIES OF THE ROLES OF D-MANNOSE AND MYOINOSITOL IN PERINATAL NUTRITION
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University of Colorado Denver School of Medicine, Aurora, Colorado, USA.

The data presented represent a series of studies carried out by colleagues at 3 universities in the Departments of Pediatrics and Obstetrics-Gynecology. The studies are focused on 2 carbohydrates, one a reducing sugar, D-mannose and the other a cyclical alcohol, myoinositol. Both are required for a variety of metabolic processes and both must accumulate in fetal and neonatal tissues during growth. Studies of the umbilical uptake of carbohydrates have shown that D-mannose is taken up by the fetus and myoinositol is delivered out of the fetal circulation to the placenta. Mannose uptake follows a concentration gradient and fetal concentration is a linear function of maternal concentration over a fairly wide concentration range. Steady state studies with stable isotopes of glucose, mannose and inositol in uncomplicated pregnancies at the time of Cesarean section have shown that glucose and mannose have fetal/maternal enrichment ratios approximately equal to one confirming that most of the glucose and mannose present in the fetal circulation is derived from transplacental transport from the maternal circulation with very little fetal production of either sugar. Inositol, by contrast, has a fetal/maternal ratio of only 0.1. Hence, only approximately 10% of fetal plasma inositol is derived from the mother. A Multiple Infusion Start Time (MIST) protocol was used to study the plasma Disposal Rate of mannose and inositol in normal Term and nearTerm infants on full milk feedings. The mannose plasma disposal rate was 37.4±2.5 μmol•kg•hr\(^{-1}\) vs 63.7±6.7 μmol•kg•hr\(^{-1}\) for inositol. (P<0.01) The plasma clearances of mannose and inositol were significantly different as well, (P<0.01) [704.4±24.4 vs 503.4±41.5 ml•kg•hr\(^{-1}\) respectively].

Conclusions: From these studies we can conclude that mannose requirements during fetal life are met entirely by placental transport whereas those of inositol are met by fetal synthesis. Postnatally, both carbohydrates are provided in milk in very small amounts (<5% of the utilization rates). Hence, requirements are met by synthesis from glucose.
When medical practitioners think of philosophy, it is almost always of the applied variety -- perhaps to bandage a wound which may respond to soothing treatment from a foreign field. But there are practitioners in this other field; how are they thinking about issues that have not been corralled by applications to ethics, particularly of the professional medical variety.

Those of us who started higher education in the 1950's were introduced to logical positivism as embodied in A. J. Ayer's *Language, Truth and Logic*. Here was the flower of Anglo-American philosophy -- analytic, scientific, totally empirical (any statement which could not be empirically confirmed was meaningless) and a bit of a blind alley. The history of philosophy was taught as a history of epistemology -- how do we know that we know what we know?

The pursuit of knowledge through the thickets of epistemology left neither time nor inclination to consider the concept of wisdom which, in any case, is not empirically defensible and therefore meaningless.

Living in France in the 1970's brought experience of a different approach to philosophy. Philosophers were public figures, their pronouncements reported in the popular press. Continental philosophy differs from Anglo-American philosophy in being less exclusively analytic and more concerned with traditional philosophical questions about the way our lives are actually lived.

Two French philosophers whose lives overlapped, Foucault (1926-1984) and Levinas (1905-1995) considered questions beyond epistemology and analysis.

Foucault wrote about the close relationship of knowledge and power, and historical studies of mental illness and the development of clinical medicine.

A constant feature of these studies is the stress on what happened in actual human encounters, and his criticism of the treatment of those who are “different”, particularly the normal/abnormal distinction. He did not write about traditional branches of philosophy such as ontology or metaphysics.

Levinas took a more metaphysical path, rejecting the devouring ontology of Heidegger, and calling ethics the real “first philosophy”. This philosophy centers on a human being – the Other – the first to come along, poor, repellent, yet achieving a height resulting from a metaphysical bending of space between the Same and the Other, and entailing infinite obligations to the Other.

The writings of full time philosophers concern the lives of human beings and our relationships with them.
BUPRENORPHINE EXPOSURE AND THE NEONATE. WHAT DO WE REALLY KNOW? A CASE PRESENTATION

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University Hospital Medical Center Stony Brook, NY

Introduction: We live in a culture of drugs, with widespread use of both prescribed and illegal substances leading to abuse and addiction in pregnancy. Methadone is the recommended treatment for the opioid-dependent pregnant woman and it is associated with neonatal abstinence syndrome (NAS). In 2002, the FDA approved buprenorphine as a treatment of opiate addiction allowing for increased community access. Since then there have been more women being maintained on buprenorphine during pregnancy. Jones et al, (2005) found that buprenorphine exposed infants had reduced NAS scores, pharmacological treatment and length of stay as compared to methadone.

Patient Description: we report the case of a male infant born at 38 weeks gestation to a 36 year old G5P3 with a history of opiate addition. Prior to pregnancy she was treated with buprenorphine/naloxone 16 mg and was decreased to buprenorphine 8 mg in the last trimester. Her general health was unremarkable with continued smoking during pregnancy. The infant was delivered by repeat C/S with apgars of 8 and 9; birth weight 2.98 Kg; HC 33.5 cm; Lg 47 cm and a normal physical exam. The infant presented with tremors, increased tone, and poor feeding on DOL1 (NAS scores 3-7). Withdrawal peaked on DOL 4 (NAS score 5-9) with 9% weight loss but no medications were required. Supportive care continued to promote feeding and comfort. On DOL 6 the infant was noted to have random episodic myoclonic movements without apnea, bradycardia or cyanosis. Evaluation included urine and meconium toxicology (negative), CBC with differential and electrolytes (within normal limits). Additional levels were sent for buprenorphine and metabolite on cord blood (none detected) and urine (32ng/ml;280ng/ml). Pediatric neurology consult was obtained and a 24 hour video EEG ordered. This showed no persistent asymmetry or focal abnormalities. During recorded moyoclonus there was no abnormal correlate. No medications were given.

Outcome: Infant was discharged home on DOL 11 to parents, gaining weight (2.86 Kg) with reduced myoclonic movements, feeding 24 calorie formula at 154 cal/Kg/day. On outpatient pediatric follow up visit on DOL 21 the infant weighed 3.6 Kg with HC 34.9cm. There was complete resolution of myoclonic movements with continued irritability and recent vomiting. A diagnosis of GERD was made. Treatment required a change to a protein hydrolysate formula, ranitidine, and continued monitoring of growth and development.

Conclusion: Jones (2008) reports that approximately 546 babies in 32 research studies have been prenatally exposed to buprenorphine with 61% experiencing NAS and 51% requiring treatment. Presently the NIH has ongoing research comparing Methadone and Buprenorphine in Pregnant Women. Complications of buprenorphine maybe under reported and we are likely to see more exposed infants due to an increased use in pregnancy. Recommendations may include keeping infants exposed to buprenorphine infant in the hospital for a 7 day period and to be observed for signs of NAS.

COR TRIATRIATUM: DISCUSSION OF THE ENTITY AND 2 CASES

Carol M. Cottrill MD, Douglas Schneider MD, Deb Kozik MD, Mark Plunkett, md and William N. O’Connor MD.

Case 1: A 17 month old baby had failed to thrive. Prior to planned surgery to correct a tethered cord, cardiac clearance was sought. The heart sounds were normal and a non-specific systolic ejection murmur was present at the pulmonary area. Her oxygen saturation was 90%. EKG was normal and Chest X-ray showed cardiomegaly. Echo suggested that the pulmonary veins drained into a confluence behind the left atrium and a large atrial septal defect allowed for bidirectional shunting. Because not all four pulmonary veins were identified by echo, cardiac catheterization and CT scan of the thorax were undertaken and revealed the pulmonary veins to drain into a confluence just behind the left atrium. The left upper and lingular veins were obstructed at their entrance into the confluence just medial to a left superior vena cava which led to the left atrium. The coronary sinus was totally unroofed. Studies and surgical results are presented.

Case 2: A 19 year old primigravida woman presented on her due date for a fetal study.

A 2x2 cm cystic mass was noted posterior to the left atrium. Color flow was not seen in this structure. There were two pulmonary veins seen entering the left atrium. The baby was uneventfully delivered at a community hospital and seen in the Cardiology clinic on the 5th day of life. The EKG and Chest X-ray were normal. Echo confirmed that the two lower pulmonary veins entered the left atrium, which was small, and the two upper pulmonary veins entered the large chamber posterior to the left atrium. The posterior chamber communicated with the left atrium through a 3 mm orifice and no obstruction was found. The patent foramen ovale shunted left to right. The baby will be followed serially watching for obstruction of the communication between the left atrium and the posterior confluence of pulmonary veins.

Using these two cases as illustrations, the embryology of cor triatriatum is discussed.
Stressed endothelial cells can react in several ways. They can “explode” or die in such a way as to release intracellular contents which adversely affect their cellular milieu; or they can “implode”, undergoing apoptosis, shrinking down and protecting the adjacent cells. Recently it has been appreciated that stressed endothelial cells, in an effort to maintain cellular stability are able to “pinch off” part of their cell walls which enclose offending agents. These pinched off “microparticles” are 0.5 to 1.5 microns and are shed into the circulation. The cast off particles contain bits of the cell walls and the antecedent cell can be identified by cell surface markers. We all have some of these circulating microparticles. In adults, obesity, diabetes, smoking, coronary artery disease and hyperlipidemia have been associated with increases in the numbers of endothelial cell derived particles.

We have conducted a small pilot study, comparing obese and non-obese children’s clinical information (weight, height, BSA, heart rate, blood pressure, fasting lipid profile and fasting glucose levels) with the presence and numbers of endothelial derived microparticles as defined through FACS scanning. Results will be presented and discussed.
ELEVATED TROPONIN IS ASSOCIATED WITH NEONATAL TERM BRAIN INJURY

A. Delany¹, A. Walsh¹, V. Donoghue³, A. Twomey², E.J. Molloy¹,²,⁴

¹UCD School of Medicine & Medical Science, University College Dublin; Depts. Of Paediatrics², Radiology³, National Maternity Hospital; ⁴Dept. Of Neonatology, Our Lady’s Hospital for Sick Children, Dublin, Ireland

AIMS

Troponin is a sensitive marker of asphyxia in term infants mirroring the myocardial injury sustained in global hypoxia-ischemia. In addition troponin is a sensitive marker of severity of stroke in adults and neonatal encephalopathy. We aimed to examine the relationship between Troponin-T in infants with asphyxia and brain injury on MRI.

METHODS:

Serum troponin was sampled in infants requiring resuscitation at birth and/or neonatal encephalopathy in a tertiary referral neonatal centre from July 2006-July 2008. Infants with congenital defects, evidence of infection and maternal drug addiction were excluded from the study. Infants were retrospectively divided into those with normal and abnormal MRI and/or cranial ultrasounds. Birth history, clinical parameters and brain imaging were evaluated.

RESULTS:

108 term infants with asphyxia had serum troponin-T measured of which 57 were excluded as the samples were hemolysed, unavailable or unsuitable. 21 infants with abnormal cerebral imaging had mean (+/-SD) troponin 0.4+/-.3ng/mL (Normal <0.1 ng/mL). 22 infants with normal cerebral imaging had mean troponin of 0.1+/-.07ng/mL (p=0.01 versus infants with brain injury). Gestation, birthweight and Apgar scores were similar in both groups. Troponin did not correlate with cardiac involvement such as inotrope use or bradycardia.

Conclusions

Infants with brain injury on MRI or cranial ultrasound following perinatal asphyxia had significantly elevated serum troponin. Further studies combining troponin and MRI may assist in classification of neonatal brain injury to define aetiology, prognosis and response to treatment.
C-REACTIVE PROTEIN RESPONSE IN TERM NEONATES: REPEAT SAMPLES ARE VITAL IN THE EVALUATION OF EARLY-ONSET SEPSIS

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Introduction:

Sepsis commonly induces a systemic proinflammatory response. C-reactive protein is routinely used to guide diagnosis and treatment of neonatal sepsis and inflammation. Early onset sepsis is difficult to diagnose as infants are frequently culture-negative due to maternal antibiotic treatment and small blood samples available for blood culture. We aimed to explore the role of CRP and other inflammatory markers in the diagnosis of term neonatal sepsis differentiate it from SIRS.

Methods:

All term neonates admitted to a tertiary paediatric intensive care unit and evaluated for early-onset sepsis including a CRP were enrolled. Routinely measured inflammatory markers such as CRP, Full blood counts, immature-to-mature neutrophil (IT) ratio, cultures (Blood, CSF or urine) were included.

Results:

95 infants were eligible for study inclusion and none had a positive blood culture. There were 30 infants with >1 abnormal CRP (>10mg/dl) and 16 had a normal 1st CRP. In the entire group 81 had a normal 1st CRP and it was repeated in 45. There were significant differences in birthweight but not gestation between the groups although paradoxically those with a lower birthweight had normal CRPs. The IT ratio and CRPs between the groups were significantly different.

<table>
<thead>
<tr>
<th>CRP</th>
<th>Birthweight</th>
<th>Gestation</th>
<th>CRP</th>
<th>IT ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>mg/dl</td>
<td>kg</td>
<td>weeks</td>
<td>1st</td>
<td>2nd</td>
</tr>
<tr>
<td>Normal n=65</td>
<td>3.4+/-0.5</td>
<td>39.4+/-2</td>
<td>1.4+/-2.1</td>
<td>3.6+/-2.8</td>
</tr>
<tr>
<td>Abnormal n=30</td>
<td>3.8+/-0.8</td>
<td>39.3+/-1.4</td>
<td>18.7+/-21.6</td>
<td>37.9+/-33.6</td>
</tr>
<tr>
<td>p value</td>
<td>0.01</td>
<td>0.81</td>
<td>&lt;0.0001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Conclusion:

CRP is a valuable adjunct in the diagnosis of neonatal sepsis. However the first CRP cannot be used in isolation for the diagnosis of early-onset sepsis in term infants. Serial FBC and CRP samples are essential in addition to the clinical condition of the infants in management decisions in term infants with possible sepsis. The clinical condition of the patient and other parameters are also essential. CRP should be repeated as standard in all cases in which a measurement was deemed initially prudent.
SUPERFICIAL TRAUMA SCORING: PREDICTING OUTCOME IN ELBW

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AIMS:
Extremely low birth weight (ELBW) infants have a high risk of bruising during delivery either vaginally or by caesarean section. Severe bruising has been associated with IVH in a previous study by Szymonowicz W et al (1984) but has not previously been quantified. Recent evidence from animal studies has suggested that limb ischaemia is associated with a systemic inflammatory response and increased brain injury. We aimed to quantify the degree of bruising in ELBW and associations with inflammation and abnormal cerebral imaging.

METHODS:
Using a Lund and Browder burns scale we evaluated the bruise surface area for each ELBW. Mode of delivery, antenatal history, and postnatal outcome were examined.

RESULTS:
36 infants <1kg were evaluated. Infants were divided into those with <10% and >10% bruising. There were no significant differences in gestation, birthweight, antenatal steroid doses, C-reactive protein, Immature-to-mature neutrophil ratio, Haemoglobin and potassium.

<table>
<thead>
<tr>
<th>Bruising</th>
<th>% Bruising</th>
<th>Breech</th>
<th>C-Section</th>
<th>Apgar 1</th>
<th>Mortality</th>
<th>IVH</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10% n=22</td>
<td>2.8+/-3.4</td>
<td>2</td>
<td>15</td>
<td>6</td>
<td>0</td>
<td>Gr II n=1</td>
</tr>
<tr>
<td>&gt;10% n=14</td>
<td>20.2+/-5.8</td>
<td>9</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>Gr IV n=4</td>
</tr>
<tr>
<td>p value</td>
<td>&lt;0.0001</td>
<td>0.0002</td>
<td>0.0025</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSIONS
Bruising at birth >10% of surface area in ELBW is associated with breech presentation and lower 1st minute Apgar scores. In addition significantly bruised infants have a higher mortality and IVH rates.
THE EFFECTS OF THE CATALYTIC ANTIOXIDANT MNTBAP AND NEONATAL HYPEROXIA ON AIRWAY HYPERRESPONSIVENESS (AHR) IN CONSCIOUS MICE

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Background: Prolonged exposure of newborn mice to O\textsubscript{2} leads to lung changes similar to infants with bronchopulmonary dysplasia (BPD). Many of these infants later have abnormalities of pulmonary function. Antioxidants such as MnTBAP have been found to be effective in various \textit{in vivo} lung injury models in blocking oxidant stress.

Objective: We hypothesized that early hyperoxia will increase later AHR and that treatment with MnTBAP during hyperoxia exposure will ameliorate AHR.

Design/Methods: On postnatal day 3 (P3), newborn mouse litters were randomized to 85\% O\textsubscript{2} (OX) or room air (RA) for 12 days (P3-P14) during which litters were randomized to receive MnTBAP 10mg/kg/day (MN) or saline (SL) by daily intraperitoneal injection from P3 - P14. On P15 all animals were recovered in RA until 12wks of age. PFTs were then performed using whole body plethysmograph pre and post methacholine (MCC) challenge. Enhanced pause (Penh) was calculated as a measure of AHR. Results were analyzed by ANOVA.

Results: At 12wks previously hyperoxia-exposed mice had higher AHR both at baseline and following methacholine challenge. MnTBAP did not ameliorate the effect of hyperoxia exposure on AHR at 12 weeks of age.

Conclusions: Exposure to hyperoxia in the newborn period predisposes to reactive airways in young adult mice. Infants with BPD are known to develop reactive airways disease and later onset asthma. Mechanisms leading to reactive airways disease following neonatal hyperoxia are not well understood.
OXYGEN CONCENTRATION AND PULMONARY VASCULAR RESISTANCE IN NEWBORN LAMBS WITH PERSISTENT PULMONARY HYPERTENSION OF THE NEWBORN (PPHN)


Department of Pediatrics(1), and Physiology and Biophysics(2), and Biostatistics(3), State University of New York, Buffalo NY and Department of Pediatrics(4) Northwestern University, Chicago IL

**Background:** The effect of oxygen concentration on lowering pulmonary vascular resistance (PVR) during resuscitation in a model of PPHN is not known. Also, little is known about the optimal FIO2 or PaO2 that maximizes pulmonary vasodilation in PPHN.

**Methods:** PPHN was induced in fetal lambs by ductal ligation 9d prior to delivery. Following delivery by cesarean section, PPHN lambs were resuscitated with 21%, 50% or 100%O2 (n=6 each) for 30min. Lambs were then ventilated with 50%O2 for 60min and exposed to inhaled NO (iNO-20ppm). Finally, each lamb was randomly and sequentially ventilated with 10%, 21%, 50%, or 100%O2.

**Results:** Resuscitation of PPHN lambs with 21%, 50% or 100%O2 produced similar decreases in PVR. Initial resuscitation with 100%O2 significantly impaired the subsequent response to iNO compared to 21%O2 (42±9 vs. 22±4% decrease from baseline PVR following prior exposure to 21% and 100% O2 respectively). Finally, to evaluate the optimal PaO2 during management of PPHN, each lamb was randomly and sequentially ventilated with 10%, 21%, 50%, or 100%O2. PVR decreased with increased concentrations of inhaled O2 up to 50%, there being no additional decrease in PVR with 100% O2. When PVR was correlated with PaO2, the maximal change in PVR was achieved at PaO2 values < 60 mmHg. PVR decreased with increased concentrations of inhaled O2 up to 50%, there being no additional decrease in PVR with 100% O2 (see table). When PVR was correlated with PaO2, the maximal change in PVR was achieved at PaO2 values < 60 mmHg.

**Conclusions:** We conclude that resuscitation with 100%O2 does not enhance pulmonary vasodilation compared to 21% and 50%O2 but impairs the subsequent response to iNO in PPHN lambs. Hypoxia increases PVR but hyperoxia does not confer significant additional pulmonary vasodilation in lambs with PPHN.

<table>
<thead>
<tr>
<th>O2 (%)</th>
<th>Control Lambs</th>
<th>PPHN Lambs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pH</td>
<td>pO2 (mmHg)</td>
</tr>
<tr>
<td>10%</td>
<td>7.39 ± 0.02</td>
<td>17 ± 1</td>
</tr>
<tr>
<td>21%</td>
<td>7.40 ± 0.01</td>
<td>53 ± 1*</td>
</tr>
<tr>
<td>50%</td>
<td>7.34 ± 0.03</td>
<td>148 ± 15**†</td>
</tr>
<tr>
<td>100%</td>
<td>7.37 ± 0.03</td>
<td>358 ± 25**†‡</td>
</tr>
</tbody>
</table>

Data are shown as mean ± SEM. *p < 0.05 compared to 10%O2, †p < 0.05 compared to 21%O2, ‡ p < 0.05 compared to 50%O2, § p < 0.05 compared to corresponding control value.
DEVELOPMENT OF A CHILD ABUSE INFORMATION AND TRACKING FORM

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Ann Marie Lenane, M.D. University of Rochester/Strong Memorial Hospital (Rochester, NY)
602-606-7516

Background

Identification of child physical abuse is an important skill for medical providers working in an Emergency Department (ED) setting. An estimated 1.3-15% of young children presenting to an ED with injuries are victims of non-accidental trauma. Maintaining competence for identifying risk factors and knowing age appropriate evaluation when child abuse is suspect is a challenge. In addition when these children are hospitalized, there is the potential for miscommunication or incomplete information in the transition of care to inpatient providers. This may limit a complete, systematic, and well-documented evaluation. These issues prompted us to determine ED providers’ attitudes regarding the necessity for and value of a tool to improve identification, evaluation and communication regarding children with suspected physical abuse.

Methods

Subjects are medical providers that work in a university based teaching hospital ED, including emergency medicine residents, mid-level providers, pediatric emergency fellows and faculty. The educational section of the tool is based on Kellogg & American Academy of Pediatric (AAP) Committee on Child Abuse and Neglect’s 2007 guidelines and prior studies. A table was adapted from MC Pierce 2006. The tool is designed to identify and manage physical abuse in children up to five years of age (known to be at the highest risk for serious injury). ED providers were asked to complete a survey about the tool's utility with respect to identification of suspected abuse, appropriate evaluation and facilitation of communication/transition of the patient to the inpatient team, as well as whether the tool is clear and usable. Also included in the survey were questions of the provider’s position, experience with child abuse, and confidence in identifying and managing child physical abuse cases. Additional questions addressed their opinion about problems with communication/patient transition. There was also a “free response” section to allow subjects to provide critique and suggestions.

Results

31 subjects were enrolled. 87% indicated that there is a need for a tool such as this in the ED setting. 42% found that it is not easy/reliable communicating to other providers. 82% found this tool to be clear and user-friendly. Free responses included clarifying certain sections, and making an electronic version of the child abuse form available.

Conclusion

Emergency medicine providers in a university setting perceived a need for a tool to assist in the identification and evaluation of child physical abuse and to facilitate communication when transitioning the patient from the ED to the inpatient unit. Providers found our tool to be clear and usable.
EPINEPHRINE IN THE DELIVERY ROOM RESUSCITATION OF EXTREMELY PRETERM INFANTS BORN AT THE THRESHOLD OF VIABILITY

Bobby Mathew, MBBS, University at Buffalo, Women & Children’s Hospital of Buffalo

Introduction - Practice varies widely between countries with the use of epinephrine in the delivery room resuscitation of infants born at the threshold of viability. There is very little evidence supporting the usefulness of or the futility of using epinephrine infants < 26 weeks gestation. This is a retrospective study of outcomes to discharge of infants less than 26 weeks gestation born between January 2000 to December 2008 who received epinephrine in the delivery room at a regional referral neonatal intensive care unit at the Women and Children's Hospital of Buffalo.

Methods - Eligible patients were identified from the electronic database Neodata using the search terms epinephrine and cardiopulmonary resuscitation. Fourteen patients were matched to 28 controls for gestational age ± week, birth weight ± 100 g and race and closest birth date. The outcome variables studied included incidence of hypotension, bronchopulmonary dysplasia, total number of days of mechanical ventilation, intraventricular hemorrhage, periventricular leukomalacia, necrotizing enterocolitis, number of days to full oral feeds and length of stay in the NICU. Chi squared, Mann Whitney and ANOVA tests were used for statistical analysis. Power and sample size calculation (PS Power and sample size calculator – Vanderbilt university) demonstrated that with 14 patients matched to controls 1:2 the study had 80% power to exclude a difference of 50% mortality between the epinephrine treated and control infants with an α of 0.05.

Results - There were no statistically significant differences in the mortality, or short-term morbidities studied. There was an increased incidence of periventricular leukomalacia in the epinephrine treated group but this did not reach statistical significance.

Conclusion - The use of epinephrine in the delivery room resuscitation of infants at the threshold of viability appears safe for all of the short-term outcomes studied. The high incidence of periventricular leukomalacia in the epinephrine treated group needs to be studied in larger populations and long-term follow up studies of developmental outcomes are warranted.

<table>
<thead>
<tr>
<th></th>
<th>Epinephrine</th>
<th>Control</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational Age -weeks (SD)</td>
<td>24±4 (±4) days</td>
<td>24±4 (±4) days</td>
<td></td>
</tr>
<tr>
<td>Birth Weight</td>
<td>707 ± 102g</td>
<td>693 ± 69g</td>
<td></td>
</tr>
<tr>
<td>Antenal Steroids</td>
<td>46.5</td>
<td>50</td>
<td>NS</td>
</tr>
<tr>
<td>APGAR 1 &amp; 5 mins (median)</td>
<td>1</td>
<td>4</td>
<td>0.001</td>
</tr>
<tr>
<td>Cord pH</td>
<td>7.23</td>
<td>7.33</td>
<td>0.036</td>
</tr>
<tr>
<td>Worst Base Deficit on D1</td>
<td>7.19</td>
<td>7.25</td>
<td>0.068</td>
</tr>
<tr>
<td>Hypotension %</td>
<td>35</td>
<td>44</td>
<td>NS</td>
</tr>
<tr>
<td>IVH % (Grade 3 or 4)</td>
<td>21</td>
<td>32</td>
<td>NS</td>
</tr>
<tr>
<td>PVL %</td>
<td>18.5</td>
<td>5</td>
<td>0.15</td>
</tr>
<tr>
<td>Ventilator Days</td>
<td>85</td>
<td>85</td>
<td>NS</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>123</td>
<td>117</td>
<td>NS</td>
</tr>
<tr>
<td>Survived to Discharge</td>
<td>64.3</td>
<td>67.8</td>
<td>NS</td>
</tr>
</tbody>
</table>
NEUROSURGICAL MANAGEMENT OF NEONATAL HYDROCEPHALUS. THE NATIONAL MATERNITY HOSPITAL EXPERIENCE

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Introduction. The occurrence of severe IVH and subsequent development of post haemorrhagic hydrocephalus is a serious complication of preterm birth. There are several challenges associated with the insertion of ventriculoperitoneal (VP) shunts particularly in very small infants with blood-stained proteinaceous CSF following IVH. Even when faced with a rapidly enlarging head shunt insertion often has to be deferred due to prematurity and LBW. The insertion of an external ventricular reservoir offers the patient an effective temporizing measure for the daily removal of CSF while awaiting VP shunt insertion. To date the technique has been discouraged due to high rates of complicating infection.

Aim. To describe the National Maternity Hospital’s experience since the re-introduction of ventricular reservoir insertion under neurosurgical guidance in the last 12 months.

Procedure. The threshold for reservoir insertion is based on cranial ultrasound measurements to determine the ventricular index. The V.I. is the distance between the midline and the most lateral point of the lateral ventricle in mms measured in the coronal plane at the foramen of Monro. This measurement is then plotted on the V.I graph.

10mls/kg of CSF is removed via the reservoir daily to alleviate the increasing hydrocephalus. Aseptic technique is vitally important. This technique is recommended until the infant reaches approximately 3kg in weigh at this point a VP shunt is inserted.

Results.

Fig 1. NMH Cases

<table>
<thead>
<tr>
<th>Cases</th>
<th>Gestation (Weeks)</th>
<th>BW (Kg)</th>
<th>Cause</th>
<th>Reservoir Insertion (Days/GA)</th>
<th>VP Shunt Insertion (Days/GA)</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>28+2</td>
<td>1.06</td>
<td>A.S</td>
<td>19 (31+0)</td>
<td>87 (40+4)</td>
<td>No</td>
</tr>
<tr>
<td>2</td>
<td>24+0</td>
<td>0.52</td>
<td>P.H.H</td>
<td>35 (29+0)</td>
<td>84 (39+3)</td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>29+0</td>
<td>1.48</td>
<td>P.H.H</td>
<td>17 (31+3)</td>
<td>Awaited</td>
<td>Yes</td>
</tr>
</tbody>
</table>

A.S: Aquaductal Stenosis, P.H.H: Post Haemorrhagic Hydrocephalus

Conclusions. EVR insertion offers the potential for an effective intermediate intervention in the containment of hydrocephalus. Until the infant is deemed suitable for a permanent VP shunt placement.
CEREBELLAR HAEMORRHAGE IN EXTREMELY PRETERM INFANTS. AN OMINOUS FINDING
LK McCarthy, V Donoghue, JFA Murphy
The National Maternity Hospital, Holles Street, Dublin 2.

**Background:** Cerebellar Haemorrhage (CBH) is an under recognised condition in preterm infants. Diagnosis has been improved by the use of the mastoid window view in cranial ultrasound scanning. Previous studies have shown that cerebellar injury may contribute to long term neuro-developmental disability in survivors.

**Objective:** To present a series of ELBW infants with CBH.

**Methods:** CBH was identified by viewing the cerebellum through the mastoid fontanelle in ELBW infants undergoing routine cot-sidecranial ultrasound scanning. All scans were performed by the same consultant Pediatric Radiologist (V.D.) The presence and the extent of CBH was documented.

**Results:** Over a four year period there were nine documented cases of CBH.

<table>
<thead>
<tr>
<th>Gestation (weeks)</th>
<th>BW (g)</th>
<th>Sex</th>
<th>Extent CBH</th>
<th>Timing (Hrs)</th>
<th>Seizures</th>
<th>Associated IVH</th>
<th>Hydrocephalus</th>
<th>Outcome/Age (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23+6</td>
<td>M</td>
<td>Extensive</td>
<td>72</td>
<td>Yes</td>
<td>Grade 3</td>
<td>No</td>
<td>Death 54</td>
</tr>
<tr>
<td>2</td>
<td>24+0</td>
<td>M</td>
<td>Extensive</td>
<td>48</td>
<td>Yes</td>
<td>Grade 4</td>
<td>Yes</td>
<td>Death 3</td>
</tr>
<tr>
<td>3</td>
<td>24+0</td>
<td>M</td>
<td>Extensive</td>
<td>48</td>
<td>Yes</td>
<td>Grade 4</td>
<td>Yes</td>
<td>Death 3</td>
</tr>
<tr>
<td>4</td>
<td>25+0</td>
<td>M</td>
<td>Extensive</td>
<td>72</td>
<td>Yes</td>
<td>Grade 3</td>
<td>No</td>
<td>Death 36</td>
</tr>
<tr>
<td>5</td>
<td>24+2</td>
<td>M</td>
<td>Extensive</td>
<td>192</td>
<td>Yes</td>
<td>Grade 4</td>
<td>Yes</td>
<td>Death 12</td>
</tr>
<tr>
<td>6</td>
<td>25+4</td>
<td>M</td>
<td>Extensive</td>
<td>72</td>
<td>Yes</td>
<td>Grade 3</td>
<td>Yes</td>
<td>Death 28</td>
</tr>
<tr>
<td>7</td>
<td>24+0</td>
<td>M</td>
<td>Extensive</td>
<td>72</td>
<td>Yes</td>
<td>Grade 3</td>
<td>Yes</td>
<td>Death 4</td>
</tr>
<tr>
<td>8</td>
<td>24+5</td>
<td>M</td>
<td>Extensive</td>
<td>72</td>
<td>No</td>
<td>Grade 3</td>
<td>No</td>
<td>Death 3</td>
</tr>
<tr>
<td>9</td>
<td>25+1</td>
<td>M</td>
<td>Extensive</td>
<td>36</td>
<td>Yes</td>
<td>Grade 4</td>
<td>Yes</td>
<td>Death 2</td>
</tr>
</tbody>
</table>

Mean Gestational Age 24+4 weeks (23+6 - 25+4). Mean BW 692g (520-860g). All of the cases were male and all had extensive CBH on imaging. 8/9 cases of CBH occurred early in the first 72 hours of life and all had associated severe IVH. Seizures occurred in 8/9 cases with hydrocephalus in 6/9 infants. All infants died.

**Conclusions:** In this series CBH represented a major event. When it occurred it was extensive in nature. It developed early usually in the first 72 hours of life and appeared to be invariably associated with IVH. Clinical manifestations, in particular seizures were common. Males predominate in this series. The outcome was devastating as all of the infants in our series died. There is no clear explanation as to the pathogenesis of these injuries. The cerebellum's blood supply is provided by branches from the vertebral basilar system. It is possible that CBH results from re-perfusion injuries as is proposed in IVH as the timing of these injuries is similar; however this is yet to be substantiated. CBH is a marker for poor prognosis. In clinical terms it provides additional guidance when counseling parents about the continuation of intensive care.
SEVERE INTRAVENTRICULAR HAEMORRHAGE VERSUS CEREBELLAR HAEMORRHAGE IN EXTREMELY PRETERM INFANTS: WHICH INFANTS ARE MOST AT RISK?

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Introduction. In contrast to cerebellar haemorrhage (CBH) intraventricular haemorrhage (IVH) is a common and well recognized complication of extreme prematurity. Both are associated with death in the early neonatal period and adverse neurodevelopmental outcome in those who survive. Advances in ultrasound resolution, improved probes and the use of the mastoid view for routine cot-side cranial ultrasound scanning allows for the early detection of both supra and infra-tentorial haemorrhage. We have previously demonstrated that the presence of a CBH represents a major event and is a very poor prognostic indicator with few surviving outside of the neonatal period.

Aims. To compare the clinical pattern and outcome of infants less than 32 weeks gestation with CBH to those with isolated severe IVH (Grade III-IV).

Methods. IVH and CBH were identified by performing routine cot-side cranial ultrasound scans on all extremely preterm infants admitted to the NICU in the National Maternity Hospital from Jan 2005 – Dec 2008. Clinical details and outcomes were recorded for each patient.

Results. Between Jan 2005 and Dec 2008 approximately 600 infants <32 weeks gestation were admitted to the NICU. All underwent routine CRUSS at the bedside by the same consultant radiologist (V.D). During this four year epoch 55 infants were found to have severe grade III-IV IVH. 9 of these infants were also found to have CBH. The mean gestational age of the CBH group was less than that of the IVH group (24.4 V's 27 weeks gestation) as was the birth weight (693g V’s 966g). A male predominance was not identified in the IVH group. The timing of the injury as seen on CRUSS was similar, by day 3 of life.

<table>
<thead>
<tr>
<th></th>
<th>Severe IVH</th>
<th>CBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation (wks)</td>
<td>Mean 27.0 (23+5 - 32+0)</td>
<td>Mean 24.4 (23+6-25+4)</td>
</tr>
<tr>
<td>Birth Weight (g)</td>
<td>Mean 966.4 (510-2060)</td>
<td>Mean 692.67 (520-860)</td>
</tr>
<tr>
<td>Sex</td>
<td>Male 16/39 (41%)</td>
<td>Male 9/9 (100%)</td>
</tr>
<tr>
<td>Timing IVH (days)</td>
<td>Mean 3.64 (D1-D9)</td>
<td>Mean 3.55 (D2-D11)</td>
</tr>
<tr>
<td>In/Out born</td>
<td>Out born 8/36</td>
<td>Out born 5/9</td>
</tr>
<tr>
<td>Mode Delivery</td>
<td>C-Section 19/36 (52.7%)</td>
<td>C-Section 1/9 (11.1%)</td>
</tr>
<tr>
<td>Outcome</td>
<td>Death 17/38 (44.7%)</td>
<td>Death 9/9 (100%)</td>
</tr>
<tr>
<td>Withdrawal of care</td>
<td>11/17</td>
<td>5/9</td>
</tr>
</tbody>
</table>

Conclusion. In our series the rate of severe IVH in extremely preterm infants is approximately 9% and the rate of CBH approximately 1.5%. The finding of CBH in conjunction with severe IVH is a poor prognostic indicator and is associated with a higher mortality than seen with isolated IVH. Infants who are at greater risk of CBH and hence poorer outcomes are smaller, more premature, are born by vaginal delivery and are male.
THE PATIENT SAFETY AND QUALITY IMPROVEMENT ACT: A PRESCRIPTION FOR MEDICAL ERROR REPORTING WITHOUT REPRISAL WITH SIDE EFFECTS OF TEAM COLLABORATION AND QUALITY IMPROVEMENT

Presented by: Ronnie McKinnon, RN, JD, CPHRM Associate Counsel, Stony Brook University Hospital and Health Sciences Center, Stony Brook, Long Island, NY, USA

The Problem: The Institute of Medicine (IOM) Report “To Err is Human” identified the fear of reporting medical errors and lack of aggregated data about medical errors, near misses, and patient safety issues as primary barriers to Patient Safety Improvement.1 State quality assurance and peer review privilege statutes do not adequately protect from discovery, statements made by health care providers in quality assurance, peer review and patient safety meetings such as root cause analysis. Consequently, Health Care Providers are reluctant to participate as Interdisciplinary Team Members in quality assurance, peer review and root cause analysis and other patient safety activities because they fear that the statements they make during those activities will be used against them to establish medical malpractice legal liability and/or create a basis for sanctions against them by professional licensing boards. The failure to report medical errors, near misses and patient safety issues, and the reluctance to participate in quality assurance, peer review and root cause analysis impedes Interdisciplinary Team Collaboration, creates a void in identifying latent errors and patient safety systems issues, reduces patient safety information, reduces the opportunity to aggregate and trend patient safety issues, impairs the ability to correct/improve patient safety systems, and thwarts quality and patient safety improvement.

The Intervention: Effective January 19, 2009, the Federal Patient Safety and Quality Improvement Act (“The Patient Safety Act”) targets the barriers identified in the IOM report, reduces the fear of reporting medical error by Health Care providers and makes confidential, privileged and not discoverable, all Patient Safety Work Product, including statements made by Health Care Providers, that are collected and reported to Patient Safety Organizations. The Patient Safety Work Product reported to Patient Safety Organizations will be collected; aggregated, analyzed, and privileged patient safety improvement recommendations will be made.

The Expected Results: The Patient Safety Act will facilitate Quality and Patient Safety Improvement by Team Collaboration as it will encourage full participation in a safe and just culture by all members of the Interdisciplinary Health Care Team in adverse event reporting, root cause analysis, peer review, quality assurance and patient safety activities.2 All Health Care Providers across the United States, will for the first time in US history, be able to voluntarily report medical errors, near misses, patient safety issues, participate in patient safety activities and make statements at root cause analysis meetings or while utilizing Patient Safety Evaluation Systems and creating Patient Safety Work Product that will be privileged and confidential and that cannot be used against them in medical malpractice litigation or by professional licensing boards. The Patient Safety Act will create national patient safety databases that will identify regional and national trends in patient safety issues, enable the aggregation and privileged protection of patient safety data for sharing among many Interdisciplinary Health Care Teams. By removing the fear of reprisal, this United States Federal Law could serve as a template for global application and adoption of similar legislation on an International basis, in order to improve reporting of medical errors, identification and sharing of patient safety issues and worldwide dissemination of patient safety solutions. Universal medical error and patient safety event reporting will result in increased multi-national health care team collaboration to prevent and respond to adverse patient events on a global basis and will improve quality and safety of patient care throughout the world.

NEONATAL GASTROCHISIS: AN INSTITUTIONAL EXPERIENCE

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¹Dept. Neonatology, Children’s University Hospital, Temple Street, Dublin.

Aims: (1) Document antenatal, maternal and perinatal history in cohort with gastroschisis. (2) Document co-morbidities and clinical course of the cohort.

Methods: Retrospective cohort review of neonates admitted to Temple Street Hospital with gastroschisis in the period January-December 2007.

Results: Ten patients were identified. Nine cases had an antenatal diagnosis. Mean maternal age 23.6 (18-29) years. Three mothers were primigravida. Three mothers admitted to previous illicit drug usage. There was a history of smoking in 3 cases. Occupation was not documented in any. Nine mothers were unmarried. One mother had concurrent hepatitis C. Mean gestation was 35 (32-37) weeks. Eight were spontaneous deliveries. Five were small for gestational age. Eight were female. Mean intensive care stay was 12.3 (5-30) days. Mean duration of parenteral nutrition was 32.9 (11-90) days. Ten experienced line sepsis, 6 of whom had broviac lines. Two developed necrotising enterocolitis and 1 had associated bowel atresia. Mean length of stay was 85 (17-199) days. All were followed up and 3 required subsequent readmissions.

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastroschisis Repairs</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>10</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>

Our institution experienced increases annually of gastroschisis in the previous 9 years. This mirrors the national experience.

Discussion: Given the length of hospital stay, congenital and acquired co-morbidities for each of these patients post repair this rise has significant resource, financial and manpower implications. This study provides us with data that can be provided to parents regarding the clinical course of gastroschisis in our institution. The need for a prospective collection of socio-demographic data for these infant mother pairs is highlighted.

Costello syndrome (CS) is a rare multi-malformation disorder due to a germline mutation in the HRAS gene located in the Ras-MAPK pathway. It is characterized by coarse facies, postnatal growth failure, developmental delay, loose skin, cardiac malformations and an increased risk for malignant tumors. Cardiac arrhythmias particularly atrial are relatively common in infancy.

Patient 1 was noted to be dysmorphic at birth but the exact diagnosis was uncertain. CS had first been reported in 1971 in New Zealand by Dr. Costello. It was about 1990 before geneticists in the USA recognized that a group of children who looked alike but had no clear diagnosis were indeed similar to the patients diagnosed by Costello and at that time patient 1 was recognized to have CS. He showed the typical findings (to be shown). At 2 ½ years of age he underwent surgery for resection of a fibromuscular subaortic obstruction. He did well but by age 6 the obstruction had recurred and at 6 ½ years of age surgery to resect the recurrent subaortic stenosis and repair of his mitral valve was performed with a good result; microscopic findings will be shown. He has shown considerable developmental delay, with only single word speech. He developed a seizure disorder well controlled with medication. At age 26 his heart condition is stable. He lives with his mother and remains friendly, cooperative and ambulatory with minimal speech, but able to communicate with single words and gestures.

Patient 2 was recognized as dysmorphic at birth and CS considered a possible diagnosis. He developed severe growth retardation requiring placement of a G-tube. A cardiac ultrasound showed only mild pulmonary stenosis.

He was a frail child who was unable to walk but did interact with others with smiling and eye contact. He was found to have growth hormone deficiency but the parents elected to forego treatment. The diagnosis of CS was confirmed when a mutation in the HRAS gene was identified in 2008. His last Echo at age 3 showed only very mild pulmonary stenosis. At age 7 10/12 years he died suddenly at home. Post mortem findings revealed hypertrophic cardiomyopathy as well as islet cell hyperplasia in the pancreas (nesidioblastosis). Microscopic findings will be shown.
LEFT VENTRICULAR NONCOMPACTION CARDIOMYOPATHY (LVNC) - EXPANDING THE CLINICAL AND PATHOLOGIC SPECTRUM

William N. OCONNOR, M.D., Carol M. COTTRILL, M.D., and Jacqueline A. NOONAN, M.D., University of Kentucky, Lexington

LVNC is a recently recognized congenital dilated cardiomyopathy affecting fetuses, infants, children and young adults.

Case 1: Presented in fetal life with ventricular arrhythmia at 32 weeks which subsequently resolved. Postnatally, trabecular VSDs, LVNC and Coarctation of aorta were noted. She required management of CHF after birth with digitalis, diuretics, and aspirin to prevent thrombosis. Over time, the VSDs got smaller due to trabecular hypertrophy and she is presently 4 years of age. Coarctation not repaired at this point because of risk of sudden death at surgery. LVNC persists.

Case 2. A 23 year old woman develops severe acute CHF unresponsive to treatment 3 weeks postpartum. MRI showed dilated cardiomyopathy with LVNC. She deteriorated and required urgent heart transplant. The explant heart showed hypertrabeculation, small intertrabecular LV thrombi and endocardial fibroelastosis. Her newborn has asymptomatic LVNC. In retrospect, 2 cousins have had a heart transplant for “unknown cardiomyopathy”.

SUMMARY: LVNC shows deep spongy intramyocardial sinusoids with thick trabeculations on ultrasound. These are especially well defined by cardiac MRI of the ventricles. Predominantly affecting the LV apex, but also the remaining myocardium, LVNC pathology resembles an arrest of embryonic development. Clinical manifestations include systolic dysfunction, acute or chronic CHF, embolism, arrhythmias and sudden death. Cardiac transplant may be required.

LVNC may be familial, sporadic, X-linked, or associated with complex congenital heart disease. The genetic basis for LVNC includes mutations affecting heart muscle cell elements; Z-line (ZASP), DYSTROBREVIN and mitochondrial membrane Cardiolipin/TAFFAZIN.

IDIOPATHIC INFANTILE ARTERIAL CALCINOSIS (IIAC): A POTENTIALLY REVERSIBLE RARE VASCULAR DISEASE OF INFANTS

William N. OCONNOR, M.D. and Carol M. COTTRILL, M.D., University of Kentucky, Lexington

We report the clinical presentation, diagnosis and outcome of 2 cases of IIAC; and review current pathobiology and evidence for successful treatment of some patients.

Patient 1. A 4 month old female previously healthy infant presents with pallor, quickly develops respiratory distress with desaturation, and dies suddenly 3 hours later. Necropsy discloses acute myocardial infarction due to diffuse white hardening of epicardial coronary arteries with microscopic calcification and luminal fibroproliferative obliteration.

Patient 2. A routine prenatal ultrasound showed fetal hydrops at 19 weeks with extensive aortic and coronary calcification on ultrasound accompanied by left ventricular dysfunction. Despite careful cardiac monitoring and therapy with plans for immediate postnatal bisphosphonate therapy the fetus succumbed at 36 weeks. Necropsy again disclosed typical pathology of IIAC.

Not only does this rare (160 cases so far reported) sometimes familial condition affect the coronaries with stillbirth, nonimmune hydrops and sudden death in infancy, but IIAC can involve renal, hepatic and cerebral arteries causing hypertension, renal/hepatic insufficiency and major neurologic sequelae. Interestingly another manifestation of IIAC is detection of radiographically visible calcinosis around joints. This reflects abnormal deposition of calcium hydroxyapatite in non-bony periarticular soft tissues.

The genetic basis for IIAC is mediated by ENPP1 (ectonucleotide pyrophosphatase/phosphodiesterase) on chromosome 6. This type II transmembrane glycoprotein cleaves a variety of substrates (polyphosphates) to their corresponding monophosphates. ENPP1 is necessary for normal levels of PPi (Pyrophosphate Inhibitor). Calcium homeostasis is at a high activity level in the fetus and infant, but slows later. Genetically, ENPP1 determined low levels of PPi cause a failure to limit calcium from depositing in extracellular matrix elastic of arteries and connective tissue around joints.

ENPP1 gene mutations are associated with IIAC, OPLL (ossification of the posterior longitudinal spinal ligament); and Insulin Resistance (mutation affects gate keeper role for insulin receptors).

MANAGEMENT: There has been some success with neonatal administration of bisphosphonates in reversing or eliminating the calcinosis of IIAC at various sites.
THE EFFECTS OF ANTIOXIDANT MnTBAP ON ANGIOGENESIS & OXIDATIVE PATHWAY FOCUSED GENE EXPRESSION IN NEWBORN MICE WITH HYPEROXIC LUNG INJURY

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Department of Pediatrics (Neonatology), University at Buffalo, Buffalo, NY, USA

ABSTRACT

Background: Pulmonary toxicity of prolonged exposure to O\textsubscript{2} is well recognized. Development of lung injury during prolonged O\textsubscript{2} exposure is a complex process, associated with changes in expression of a number of genes important in the adaptive response to hyperoxia. MnTBAP (Mn (III) meso-tetrakis 4-benzoic acid porphyrin) is a metalloporphyrin class of antioxidant and it is a compound with strong antioxidant properties including scavenging of superoxide, H\textsubscript{2}O\textsubscript{2}, peroxynitrite and lipid peroxyl radicals.

Objective: To study the effects of MnTBAP on angiogenic and oxidative gene expression in C57BL6 neonatal mice during hyperoxia.

Design: Newborn mice litters were randomized on postnatal day 4 to hyperoxia (> 95% O\textsubscript{2}) (OX) or room air (RA) for 72 hrs during which they received MnTBAP (MN) 10mg/kg or saline (SL) daily by IP injection for 3 days and then were sacrificed. Whole lung angiogenic and oxidative gene expression profiling (84 related genes for each) was done by real-time, reverse transcriptase, quantitative PCR (n=4 in each group) (SA Biosciences, MD). Data were analyzed using SA Biosciences PCR array data analysis

Results: Treatment with MnTBAP down regulated the expression of myeloperoxidase and peroxiredoxin 6, related sequence 1. Hyperoxia down regulated the expression of angiogenic genes such as angiopoietin 1 & 2, transforming growth factor (TGF) β1, TGFβ3 and hepatocyte growth factor (HGF); MnTBAP treatment during the hyperoxia exposure reversed the effects of hyperoxia on angiogenic pathway gene expression. Gene expression in oxidative pathway related genes related to antioxidant enzymes such as glutathione peroxidase 5, 6, 7 and copper chaperone for superoxide dismutase (CcS) were down regulated by hyperoxia but this effect was not up regulated by MnTBAP. In fact MnTBAP alone in room air decreased these antioxidant enzymes.

Conclusions: MnTBAP reversed the effects of hyperoxia on angiogenic gene expression in newborn mice. It also decreased the expression of myeloperoxidase, a marker of inflammation following hyperoxia. The protective effects of antioxidants need to be studied further to provide additional understanding of the Pathophysiology and management of bronchopulmonary dysplasia.
CD8+ T-LYMPHOCYTES IN INFANTS WITH BRONCHOPULMONARY DYSPLASIA (BPD)
Rita M Ryan, MD, Qadeer Ahmed, MD, Christopher A D’Angelis, MD, PhD, Vasanth H Kumar, MD, Satyan Lakshminrusimha, MD, Leon A Metlay, MD, Huamei Wang, MD and Gloria S Pryhuber, MD.

Background: The role of the lymphocyte (Lc) has not been well-studied in BPD. We have shown that T Lcs (CD3+) are increased in babies with BPD compared to term infants with no lung disease.

Objective: Our objective was to compare human infant autopsy lung samples from BPD babies and infants with no lung disease for the presence of CD8+ T Lcs.

Design/Methods: The right middle or lower lobe was preserved within 6h of death by inflation fixation with 10% buffered formalin at 20 cmH20 for 20h and paraffin embedded. CD8 immunohistochemistry was performed on lung sections from 18 neonates categorized as no lung disease (NLD, n=8) or bronchopulmonary dysplasia (BPD, n=10) using a mouse anti-human CD8 monoclonal (4B11, Vector Labs). A semi-quantitative analysis was performed by investigators blinded to the diagnosis, scoring the entire section from 0-5.

Results: Mean gestational age (GA) at birth and at death and age at death were 37wks, 38wks and 2.5 days for NLD babies and 27wks, 37wks and 63 days for BPD babies. The median score (IQR) for CD8 staining for each group was 2 (1, 2.25) for NLD and 3 (2.25, 4) for BPD (P=0.03, by Wilcoxon rank-sum test).

There was no difference in CD45 (general leukocyte marker) staining (data not shown).

Conclusions: We conclude that CD8+ T Lcs were found more frequently in the lung parenchyma of babies who died with BPD compared with those of similar corrected GA without lung disease. Further investigation into the role of lymphocyte subsets may provide important information about the pathogenesis of the chronic phase of BPD.
EARLY FUNCTIONAL ECHOCARDIOGRAPHY (fECHO) PREDICTS POSTOPERATIVE CARDIORESPIRATORY INSTABILITY AFTER PATENT DUCTUS ARTERIOSUS (PDA) LIGATION

Mohit Sahni\textsuperscript{1}, Arvind Sehgal\textsuperscript{2}, Lilian Stewart\textsuperscript{1}, Sandesh Shivananda\textsuperscript{3} & Patrick J McNamara,\textsuperscript{1} Neonatology, Hospital for Sick Children, Toronto, Ontario, Canada; \textsuperscript{2}Monash medical center, Melbourne, Victoria, Australia and \textsuperscript{3}Neonatology, McMaster childrens hospital, Hamilton, Ontario, Canada.

**Background:** Post-Ligation Cardiac Syndrome (PLCS) refers to postoperative systemic hypotension & oxygenation failure after PDA ligation secondary to left ventricular (LV) dysfunction. Early fECHO may facilitate identification of markers that predict PLCS.

**Objective:** To characterize early fECHO markers which predict later impairment in myocardial performance and cardiorespiratory instability.

**Design/Methods:** Prospective evaluation with serial fECHO before & after (1, 8 & 24 hrs) PDA ligation. Data collected included indices of cardiorespiratory stability [e.g. systolic arterial pressure (SAP)], myocardial performance [fractional shortening (FS)] & left ventricular output (LVO). The frequency of indicators of PLCS [defined by SAP < 3\textsuperscript{rd} centile, need for cardiotropic support, increased FiO\textsubscript{2} > 20\%, low FS < 25\% and LVO<170mls/kg/min was determined. Univariate and multiple regression analysis were performed to determine predictors of each of these endpoints.

**Results:** 63 neonates undergoing PDA ligation at a mean age of 27.6 ± 10.5 weeks & weight of 1083 ± 383g were studied. Transductal diameter was 3.0 ± 0.6mm. The frequency of SAP<3\textsuperscript{rd} Centile, increased FiO\textsubscript{2}, low FS & low LVO @ 8 hrs were 12(20\%), 33(53.2\%), 24(38.7\%), & 15(23.8\%) respectively. Antenatal steroids (p=0.01), preoperative & one-hour FS (p<0.01) & airway pressure (p=0.04) were associated with low 8-hr FS. Age (p=0.007) & weight (p<0.001) at surgery, preoperative & one-hr SAP (p<0.05), preoperative & one-hr LVO (p<0.001) were associated with low 8-hr LVO (Figure 1). Gestational age (p=0.04), baseline FiO\textsubscript{2} (p=0.01) & one-hr FS (p=0.01) were associated with increased FiO\textsubscript{2} at 8-hrs. 5-min Apgar (p=0.03), preoperative cardiotropes (p<0.001) and one-hr SAP (p=0.03) were associated with SAP<3\textsuperscript{rd} at 8-hr. One-hr FS remained associated with low FS & increased FiO\textsubscript{2} at 8 hrs; 1-hr LVO was associated with low 8-hr LVO, & 1-hr SAP was associated with SAP<3\textsuperscript{rd} on multiple logistic regression analysis.

**Conclusions:** Early fECHO may help anticipate postoperative cardiorespiratory instability following PDA ligation & guide cardiac intensive care. We have identified an important association between 1-hour LVO, FS, SAP & markers of PLCS.

**Figure 1.** Correlation between pre- and 1-hour postoperative LVO and LVO at time at clinical deterioration (8 hours)
**INTRODUCTION**

We recently reported on the survival of infants born at the threshold of viability (≤ 26 weeks gestation) in our institution. We now report on the neurodevelopmental outcome at 2 years corrected gestational age of the surviving cohort and their corresponding severe IVH rate during their NICU stay.

**Methods:** The study group consisted of all liveborn, normally formed infants with a birthweight ≥ 401g or a gestational age of 22 weeks or more, who were inborn between Jan. 2001 and Dec. 2006. Infants were followed to 2 years corrected gestational age and underwent a detailed neurological and psychological assessment (Bayley Scale of Infant Development-II). Infants were then categorised into 4 groups. Category 1 (severely affected) included infants who were blind, deaf, had evidence of severe cerebral palsy and/or significant developmental delay (Bayley Mental score 2 or more standard deviations below the mean). Category 2 included infants with a Bayley Mental score 1-2 standard deviations below the mean or infants with mild-moderate cerebral palsy without evidence of cognitive delay. Category 3 included infants with motor delay and/or abnormalities of tone but with a Bayley Mental score within the average range. Category 4 (normal) included infants with no developmental delay or tone abnormalities and with normal Bayley Mental and Motor scores. The Cranial Ultrasound results of the infants in the study group were collected and each infant was placed in one of two groups: Group 1 = No IVH/PVL, Group 2 = Severe IVH (Grade 3 or 4) and/or PVL. The presence or absence of severe IVH/PVL during their NICU stay was compared with their neurodevelopmental outcome at 2 years corrected gestational age.

**Results:** A total of 116 infants were born during the study period of which 56 (48%) survived to discharge. No infant ≤ 23 wks gestation survived to discharge. Survival to discharge of infants offered active resuscitation in the delivery room was 44% at 24 wks, 60% at 25 wks and 70% at 26 wks respectively. One infant died of complications related to prematurity prior to follow up. Of the 55 remaining survivors, 46 (84%) infants were followed up. A total of 22 infants (48%) were classified as neurologically normal (category 4). Twelve infants (26%) were severely affected (category 1). Six infants (13%) were classified in category 2 and 6 infants (13%) were classified in category 3. Although numbers are small, 33% of infants born at a gestational age of 24 wks were severely affected decreasing to 16% at 26 wks gestational age. Corresponding figures for infants considered to be normal were 33% and 52% respectively. If infants with a severe IVH (Grade 3 or 4) and/or PVL were considered (n=9), 22% of these infants were severely affected on follow up but interestingly, 45% were classified as normal.

**Conclusions:** No infant at 23 wks or less survived to discharge. Survival to discharge at 24 wks was 44% increasing to 70% at 26 wks. At 2 years corrected gestational age, approximately one half of the surviving cohort was found to be neurologically normal while approximately one quarter were classified as severely disabled. With advancing gestational age, there was a decrease in the percentage of infants considered severely disabled with a corresponding increase in the percentage classified as normal. Severe IVH/PVL did not predict poor neurodevelopmental outcome with 45% of these infants being classified as normal on follow up suggesting that gestational age at birth still remains the strongest predictor of long-term neurodevelopmental outcome.

CHRONIC EFFECTS OF IL-13 ON PAEDIATRIC BRONCHIAL EPITHELIAL CELLS IN VITRO. IS THERE AN INDEPENDANT IL-13 EFFECT?

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Background
In chronic asthma, goblet cell hyperplasia and decreased ciliogenesis are characteristic features which may be influenced by Th2 cytokines (eg IL-13). In vitro basal mucociliary differentiation and differences in paediatric epithelial cells (normal & asthmatics) exposed to IL 13 were studied.

Method
Blind non-bronchoscopic bronchial brushings obtained from children were differentiated at air liquid interface for 28 days. Cells were treated with IL-13 (2 and 20ng/ml). Transepithelial resistance (TEER) and cell numbers were assessed using immunocytochemistry as a measure of tissue differentiation - ciliated cells (anti α1-acetylated tubulin antibody) and goblet cells (Muc5AC+).

Results
Both asthmatic and non-asthmatic primary bronchial epithelial culture (PBECs) formed well differentiated pseudostratified epithelium (TEER > 500 Ω/cm²). Compared to non-asthmatic children, PBECs from asthmatic children have a significantly higher number of goblet cells (34.1% ± 19.4 v 19.2% ± 6.2, p<0.05) and a significantly lower number of ciliated cells (16.3 ± 4.2 v 22.7 ± 8.0, p< 0.05.) under basal conditions (n=10). Atopic non-asthmatics had similar number goblet and ciliated cells when compared to non-atopic non-asthmatics (18.8% ± 3.3 v 19.6% ± 8.3; 27.5% ± 4.9 v 18.9% ± 8.4 respectively).

Chronic exposure to 20ng/ml IL-13 in non-asthmatic PBECs, resulted in a significantly increased number of goblet cell (33.8% ± 7.1 v 18.9% ± 5.3 , p<0.05) and reduced number of ciliated cells ( 8% ± 5.5 v 22.7% ± 8, p < 0.05) (n=10). However, in the asthmatic PBEC, we only observed a significant reduction of ciliated cells with chronic exposure to 20ng/ml IL-13 (8.8% ± 7.5 v 17.8% ± 6.2 , p < 0.05) (n=10).

Conclusions
Under unstimulated (basal) conditions, differentiated epithelial cells from asthmatic children have a different phenotype compared to normal children and most importantly atopic children who don’t have asthma, which resembles the asthmatic epithelium in vivo. Atopic non-asthmatic children are identical to normal (non-atopic, non-asthmatic). This basal difference appears to be IL-13 independent and suggests that there may be alternative ‘intrinsic’ mechanism regulating goblet cell hyperplasia in this paediatric asthmatic bronchial epithelial model. It is also significant that this effect is not seen in the atopic non-asthmatic population, suggesting it relates to the asthmatic phenotype, and is not secondary to background atopy.

In-vitro chronic exposure to IL-13 drives a normal PBEC towards asthmatic phenotype. In-vitro exposure to IL-13 in asthmatics did not increase % goblet cells but only reduced % ciliated cells suggesting a limited goblet cells hyperplasia threshold and independent/additional anti-ciliogenic effect in asthmatic children.
THE IMPORTANCE OF COLONIZATION SITE IN THE CURRENT EPIDEMIC OF STAPHYLOCOCCAL SKIN AND SOFT TISSUE ABSCESSES IN CHILDREN

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Abstract

Background

The role of nasal colonization as a risk factor for Staphylococcus aureus infections has been widely accepted. However, the observation that many skin and soft tissue abscesses in the current epidemic are located below the waist led us to hypothesize that colonization in the rectum might play a role in the development of skin and soft tissue abscesses.

Methods

Sixty consecutive children with S. aureus skin and soft tissue abscesses requiring surgical drainage and 90 controls were enrolled. Cultures of the nares and rectum were taken in both groups. S. aureus isolates from all sites were characterized by multiple locus variable tandem repeat analysis (MLVA), pulse field gel electrophoresis, SCCmec typing for methicillin-resistant S. aureus (MRSA) isolates, and presence of Panton-Valentine leukocidin (PVL) genes.

Results

S. aureus was detected significantly more often in the rectum of children with abscesses (47%) compared to the control group (1%), p = 0.0001. Nasal colonization with S. aureus was equivalent for abscesses (27%) and controls, (20%); p = 0.33. S. aureus recovered from the rectum were identical to S. aureus in the abscess in 88% compared to 75% of nasal isolates. Pulse field type USA 300, SCCmec type IV, and the PVL genes were significantly increased among the S. aureus from children with abscesses compared to controls.

Conclusion

Skin and soft tissue abscesses in the current epidemic of community-associated staphylococcal disease are strongly associated with rectal colonization by pulsed field type USA300. Nasal colonization in children does not appear to be a risk factor.
MEDICAL ETHICS AND THE POETRY OF THOMAS LYNCH

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End-of-life decision making constitutes a major area of Medical Ethics. Physicians may be asked to discontinue life-sustaining interventions or they are forced to admit the futility of their efforts. Physicians usually reason their way to a decision by evaluating the quality of life of the patient and the applicability of the notion of the sanctity of life in general. However, there is also the unacknowledged vision of a possible life after death. Incorporating the need to evaluate our concept of life after death creates a whole additional confounding factor.

Thomas Lynch is an Irish-American poet and author. He lives in Milford, Michigan, where he is also active as an undertaker. He is a practicing Roman Catholic. Lynch has published several books. They include The Undertaking and Booking Passage; We Irish and Americans. He also issued several volumes of his poetry, one of which is entitled Still Life in Milford, published in 1999 by W.W. Norton, New York, NY. All poems I will cite come from that book.

Through his poetry Lynch manages to clearly express the dilemma and self-searching that the thoughts about life hereafter pose, whenever a decision based on data might be leavened by a perception based on faith. Even though that faith might not be shared by the patient or parents, suppressing his or her own ideas leaves a physician vaguely dissatisfied whenever confronted with challenging end-of-life decisions. Such unease is sensed by patients.

Lynch suggests that the realm of death is unknowable and we ought to be at peace with that. Such peace prevents our tendency to be judgmental, however slight that may be. Lynches poetry illustrates that powerfully.

Acknowledgment of our attitudes is important for being a good doctor, even while we should be mindful that our personal opinions about life are dangerous territory. However, unless we have resolved our own dilemmas we cannot be seen as giving sage advice.