

conduct research in the primary health care setting. Many barriers to conduct research were identified the three most highly rated barrier was no access to research fund. Limited training in research methodology and limited support were the next most highly rated barriers. Barriers found to be significantly associated with research willingness were limited time, no access to the fund and lack of experience in conducting Research.

**Conclusions** The study shows that PHC physicians are willing and have a positive attitude towards primary health care research but face many obstacles. The key obstacles are limited time, no access to fund, and lack of experience.

#### 145 STRUCTURED LIGHT PLETHYSMOGRAPHY, A NON INVASIVE, NON CONTACT METHOD OF RECORDING RESPIRATORY FUNCTION

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**Structured light plethysmography** (SLP) technology utilises pc gaming/movie techniques to scan a patient with visible light, capture an image, measure movement in the image and produce accurate, real time data on changes in respiration. A checker board pattern of light is projected from a light projector onto the chest of an individual. Movements of the grid are viewed by two digital cameras, digitalised, and processed to form a 3D model and can be interrogated to assess lung function. The system has been tested in normal adults and children, adults with COPD, and children with cystic fibrosis.

Most recently it has been used to measure respiratory patterns in healthy infants, within 24 hours of birth, those born prematurely with and without chronic lung disease (CLD). The infants are not sedated, but simply placed, bare chested, within the field of vision of the Thora3DI (Pneumacare™, Cambridge UK). There is no physical contact with the infant. This has not just one, but repeated data collection over short periods of time, on oxygen dependent infants with severe CLD, without changes in oxygen requirement or periods of clinical instability. Information on respiratory rate, tidal volume and the relationship between chest and abdominal volume change have been assessed, and will be included in this presentation.

Dr. Richard Iles is a Consultant in Respiratory Paediatrics, and founder and shareholder of PneumaCare Ltd, the Company that produces the Thora3DI.

#### 146 LUNG VOLUME IN VERY PRETERM INFANTS WITH EARLY RESPIRATORY DISTRESS SYNDROME (RDS) RECEIVING NASAL CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP)

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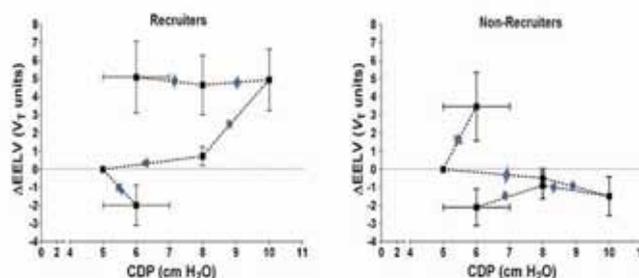
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**Background and aims** Although CPAP is extensively used for early RDS in very preterm infants from birth, the influence of CPAP on lung behaviour in early illness remains unclear. This study aimed to describe global volumetric behaviour and work of breathing (WOB) at differing continuous distending pressures (CDP) in very preterm infants in the first 12–18 hrs of life.

**Methods** Infants < 32 weeks' gestational age receiving nasal CPAP from birth were studied whilst supine. Data were initially recorded at the CPAP in clinical use [baseline; mean (SD) 6(1) cmH<sub>2</sub>O, FiO<sub>2</sub> 0.25(0.03)]. Then, CPAP was applied at 5, 8, 10 and 8 cmH<sub>2</sub>O for 15-mins each. Changes in end-expiratory lung volume [ $\Delta$ EELV

(V<sub>T</sub> units)] and tidal volume [ $\Delta$ V<sub>T</sub> (V<sub>T</sub> units)] were measured using respiratory inductive plethysmography and expressed relative to values obtained at CPAP 5 cmH<sub>2</sub>O. Breath-to-breath phase angles ( $\Theta$ ) and labour breathing index (LBI) were calculated post-hoc to determine respiratory asynchrony.

**Results** Twenty infants, mean(SD) GA 29(1) weeks and BW 1181(417)g were studied at median (IQR) 15(13.16)hours. No significant differences were seen in global EELV, V<sub>T</sub>, WOB or LBI at all CDP. Only 11/20 infants demonstrated hysteresis with a significant increase in EELV from baseline following a CPAP recruitment manoeuvre.



Abstract 146 Figure 1 Change in EELV in Recruiters vs. Non-Recruiters

**Conclusions** Not all preterm infants have recruitable lung disease. Infants with recruitable lung disease may benefit from a CPAP recruitment manoeuvre. Further work is needed to define the optimal CPAP level to use in early RDS.

#### 147 LOSS OF END-EXPIRATORY LUNG VOLUME DURING PERIODS OF HYPOPNOEA IN PRETERM INFANTS WITH EARLY RESPIRATORY DISTRESS SYNDROME (RDS) RECEIVING CPAP

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**Background and aims** Whether variations in end-expiratory lung volume (EELV) occur in stable infants receiving nasal CPAP is unknown. This study aimed to describe global and regional volumetric behavior over periods of hypopnoea (< 20 breaths/min over 15-secs) in preterm infants < 18 hours of age receiving nasal CPAP.

**Methods** Twenty infants < 32 weeks' receiving CPAP were studied whilst supine. Clinicians set CPAP level at mean(SD) 6(1)cmH<sub>2</sub>O in FiO<sub>2</sub> 0.25(0.03). Relative  $\Delta$ EELV and tidal volume (V<sub>T</sub>) [respiratory inductive plethysmography] and regional  $\Delta$ EELV [electrical impedance tomography] were measured. 20-secs of data were analysed preceding and following episodes of hypopnoea and  $\Delta$ EELV and  $\Delta$ V<sub>T</sub> determined (expressed as average V<sub>T</sub> units at baseline). Breath-to-breath phase angles ( $\Theta$ ) and labored breathing index (LBI) were calculated post-hoc.

**Results** Ten episodes of hypopnoea lasting mean(SD) 26(11)s were analyzed in 10 infants mean(SD) GA 29(1) weeks and BW 1119 (264)g. EELV and V<sub>T</sub> fell significantly from baseline by median(range) 0.3(-1.1, 0.5) and 0.2 (0.3)V<sub>T</sub> units(p<0.05) during episodes of hypopnoea. Both non-dependant and dependant halves of the chest contributed equally to global loss in EELV during hypopnoea. During recovery, the non-dependant hemi-thorax recovered median (range)70 (9,100)% and dependant 63 (4,100)% of the loss of EELV in those regions respectively. No changes were seen in HR, oxygen saturations, FiO<sub>2</sub>, LBI and thoraco-abdominal asynchrony during these episodes.

Abstract 147 Table 1

	Preceding	Hypopnoea	Recovery
LBI*	1.4(0.1)	1.3(0.1)	1.3(0.1)
RR/min*	70(11)	13(7)	68(24)
Θ(°)	65±37	-	54±36
ΔEELV(VT units)#	0	-0.3 (-1.1, 0.5)	-0.2(-1.1, 2.2)
ΔVT(VT units)#	1	0.2(0.3)	1(0.6)
Co-efficient of variation (CV) for VT (%)*	40(31)	65(41)	38(24)

\*mean (SD) #median (range)

**Conclusions** A significant loss in EELV may occur during hypopneic phases of respiration in infants considered stable on CPAP. Further work is needed to determine the significance of these observations.

### 148 PARTIAL LUNG AERATION CAUSES VENTILATION/PERFUSION MISMATCH IN THE LUNGS AT BIRTH

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**Background** Although lung aeration increases pulmonary blood flow (PBF) at birth, the regional relationships between lung aeration and the increase PBF are unknown. We investigated the effect of partial ventilation on pulmonary vessels immediately after birth using simultaneous phase contrast X-ray imaging and angiography.

**Method** Newborn rabbits were delivered near-term (~30 d GA; term ~32 d GA) and an iodine contrast agent was infused into the jugular vein before and then during both unilateral (of the right lung) and then ventilation of both lungs. Visible vessels were counted and diameters and integrated intensity line profiles that transected vessels at different locations were measured; the latter provides a relative measure of PBF.

**Results** Unilateral ventilation of the right lung increased visible vessel number (from 15±1 to 44±4), vessel diameter (from 493±80µm to 543.2±84.3µm) and integrated intensity (from 2496±472 µm.AU to 6594±658 µm.AU) in the left lung while it was still liquid-filled and unaerated. As a result, the visible vessel number of perfused pulmonary vessels (right: 42±4, left: 44±4), mean vessel diameters and integrated intensity (left: 6594±658 µm.AU, right: 8012±1423 µm.AU) were not different between aerated and non-aerated lung regions. Angiography videos demonstrating the spatial and temporal changes in PBF after birth will also be presented.

**Conclusion** Partial lung aeration promotes a global increase in PBF resulting in a highly significant ventilation/perfusion mismatch in unventilated lung regions. These observations indicate that a previously unsuspected mechanism contributes to the increase in PBF at birth.

### 149 EVALUATION OF NEEDLE ACUPUNCTURE ACTIONS ON CLINICAL IMPROVEMENT PULMONARY FUNCTIONS, INTERLEUKIN-6, IMMUNOGLOBULIN-E AND MEDICATIONS USED OF ASTHMATIC CHILDREN

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**Background and aims** Bronchial asthma is one of the most common illnesses in children. The chronicity of bronchial asthma and the fear of steroid therapy cause many patients to seek alternative

methods of treatment such as Acupuncture, herbal medicine and massage therapy. The complementary and alternative medicine is a widespread phenomenon. In Europe, complementary therapies are used by 20–50% of the population. Among pediatric populations, Acupuncture is considered the backbone of the CAM modalities.

**Methods** we applied the acupuncture sessions for 30 cases of children who suffering from asthma on their conventional medical treatment on certain points according to Traditional Chinese Medicine for 12 sessions in one month and measuring of Pulmonary functions including (VC%, FVC%, FEV1%, FEF25–75%, FEF25%, FEF50%, FEF75%, PEF%), IL-6, IgE, Eosinophilic count before and after the sessions. Clinical grading and medications used before and after the acupuncture sessions measured.

**Results** There were significant improvement in Pulmonary functions: VC% (p<0.001), FVC% (p<0.001), FEV1% (p<0.001), FEF25–75% (p<0.001), PEF% (p<0.001), FEF25% (p<0.001) FEF50% (p<0.001), FEF75% (p<0.001). There were significant decrease in Eosinophilic count (p<0.001). More over there were improvement in IL-6 and IgE levels in the blood. However there were improvements in clinical conditions of the patients (symptoms, signs, grade of asthma) also there was decrease in their medications used.

**Conclusions** Acupuncture improves pulmonary functions of the children with bronchial asthma however it decreases the serum levels of Eosinophilic count, IL-6 and IgE with decrease all medications used by children before needle sessions.

### 150 NEUROCOGNITIVE DEVELOPMENT OF CHILDREN FOUR YEARS AFTER CRITICAL ILLNESS AND TREATMENT WITH TIGHT GLUCOSE CONTROL: A RANDOMIZED, CONTROLLED TRIAL

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**Background and aims** The first large RCT on tight-glucose-control (TGC) to age-adjusted normoglycemia in the pediatric-intensive-care-unit (PICU) (Vlasselaers 2009) revealed that TGC reduced PICU morbidity and mortality as compared with usual-care, but increased hypoglycemia ≤40 mg/dL. As both hyper- and hypoglycemia may adversely affect the developing brain, an assessment of long-term neurocognitive function was required to exclude harm and validate any short-term benefit of TGC.

**Methods** Follow-up of all 700 patients included in the original RCT, was performed 4 years after randomization. Death or disability precluding neurocognitive testing were a priori defined as poor outcomes. The primary endpoint was full-scale IQ, assessed with age-adjusted intelligence-tests (Wechsler-IQ-scales). Neurodevelopmental-testing also encompassed a neurological examination, and tests for visual-motor-integration (VMI-Beery-Buktenica-Developmental-Test), attention and executive functions (ANT-Amsterdam-Neuropsychological-Tasks), memory (Children's-Memory-Scale), and behavior (Child-Behavior-CheckList). For comparison, 216 healthy siblings and unrelated children were tested.

**Results** At follow-up, TGC in PICU had not increased the incidence of poor outcomes [19% vs.18%, univariable OR for poor outcome with TGC 1.10 (0.76–1.62), P=0.6]. Sixteen percent of the 700 ICU patients declined participation or were not contactable. TGC did not affect full-scale IQ [median 88.0 (IQR 74.0–100.0) vs. 88.5 (74.3–99.0), P=0.7], nor other scores for intelligence, visual-motor-integration, memory and behavior. TGC actually improved motor coordination (all P≤0.03) and cognitive flexibility (P=0.02), the latter up to the level of healthy children.