has been recently related to a diffuse brain injury pattern. This study aims to analyse the relationship of total and regional CC volumes with intelligence and motor impairment severity in dyskinetic CP.

Methods 15 subjects (age range, 12–34) with dyskinetic CP and signs of perinatal asphyxia underwent a MRI. CC total, anterior, central and posterior volumes were calculated (Figure 1). The intelligence and motor scales most commonly used in CP were administered.

Results The CC total volume and most of its parts were related to intelligence and motor measures (Table 1).

Abstract O-073 Table 1 Partial correlation controlling for age

	Intelligence		Motor		
	Verbal[1]	Non-verbal[2]	GMFCS	BFMF	MACS
TOTAL CC	0.773***	0.775***	0.641**	0.542*	0.634**
ANTERIOR	0.612**	0.681**	no significative		
CENTRAL	0.659**	0.637 **	0.619**	0.587*	0.641**
POSTERIOR	0.812***	0.779***	0.684**	0.517*	0.656**

* <.05; ** <. 01; *** <. 001; GMFCS: Gross Motor Function Classification System; BFMF: Bimanual Fine Motor Function; MACS: Manual Ability Classification System; [1]Peabody Picture Vocabulary Test-3rd; [2]Raven's Progressive Matrices.

Conclusions Total CC volume may be indicative of intelligence and motor status in dyskinetic CP. Regionally, the posterior part is the most related to intelligence, in agreement with recent theories of intelligence. The anterior part of the CC is not found to be related to motor function. This result agrees with the fact that premotor and sensorimotor fibres are located more posteriorly than previously thought.

New Concepts In Neonatal Sepsis

O-074 THE RELATIONSHIP BETWEEN MULTISITE NIRS-MEASUREMENTS AND ROUTINE HAEMODYNAMIC MEASUREMENTS IN PRETERM INFANTS WITH CLINICAL SEPSIS

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Background Multisite Near-infrared spectroscopy (NIRS) monitoring may help to detect circulatory failure in preterm infants. The aim of this study was to assess the correlation between multisite NIRS-measurements and routine haemodynamic measurements in preterm infants with clinical sepsis.

Methods Prospective exploratory cohort study in which preterm infants (GA^{2}Leiden University Medical Centre, Leiden University, Leiden, Netherlands.

Background Heating and humidification of inspired gas is routine during neonatal non-invasive respiratory support, but little is known about the effects of different techniques on temperature and humidity in the upper airway.

Method Eight non-invasive respiratory support modes were applied to a neonatal manikin, in an incubator set to 34°C with relative humidity (RH) 60% (approximate normal upper airway conditions). Continuous positive airway pressure (CPAP), high-flow nasal cannulae (HFNC), and low-flow nasal cannulae (LFNC) devices were tested. Except for unhumidified LFNC, set humidifier temperature was 37°C. Typically used pressures and gas flows were assessed. Temperature and RH in the manikin's oropharynx were measured every 5 min for 30 min, using a thermohygrometer. Each variation was repeated 3 times.

Results Steady state was reached by 10 min. Median values from 10–30 min are shown below.

Abstract O-074 Table 1

Device	Prongs/cannulae	Set pressure (cm H_2O)	Set flow (L/min)	Oropharyngeal temperature (°C)	Oropharyngeal RH (%)
	Hudson	8	8	38.3	82.5
Bubble CPAP	Midline	8	8	36.9	96.7
Babylog	Hudson	8	8	36.5	94.3
8000 CPAP	Midline	8	8	36.8	97.2
SiPAP	Infant Flow	-	8	35.1	88.0
Optiflow Jr.	Optiflow Jr.	-	8	36.3	88.8
Vapotherm	Vapotherm	-	8	34.3	81.2
LFNC	Salter	-	8	33.5	0.8

Conclusions Achieved oropharyngeal temperature and RH varied between devices. RH of 0.8% occurred during LFNC using unconditioned 'dry' gas. Most devices achieved temperatures >34°C and >80% RH. Bubble CPAP delivered by Hudson prongs resulted in an oropharyngeal temperature above body temperature, which could result in water condensation as gas cools in the airway.

Non-Invasive Ventilation – What is the Evidence?

O-077 MEASUREMENT OF RESPIRATORY MECHANICS AND THORACOABDOMINAL ASYNCHRONY INDICIES IN NEONATES BY RESPIRATORY INDUCTANCE PLETHYSMOGRAPHY DURING NON-INVASIVE VENTILATION

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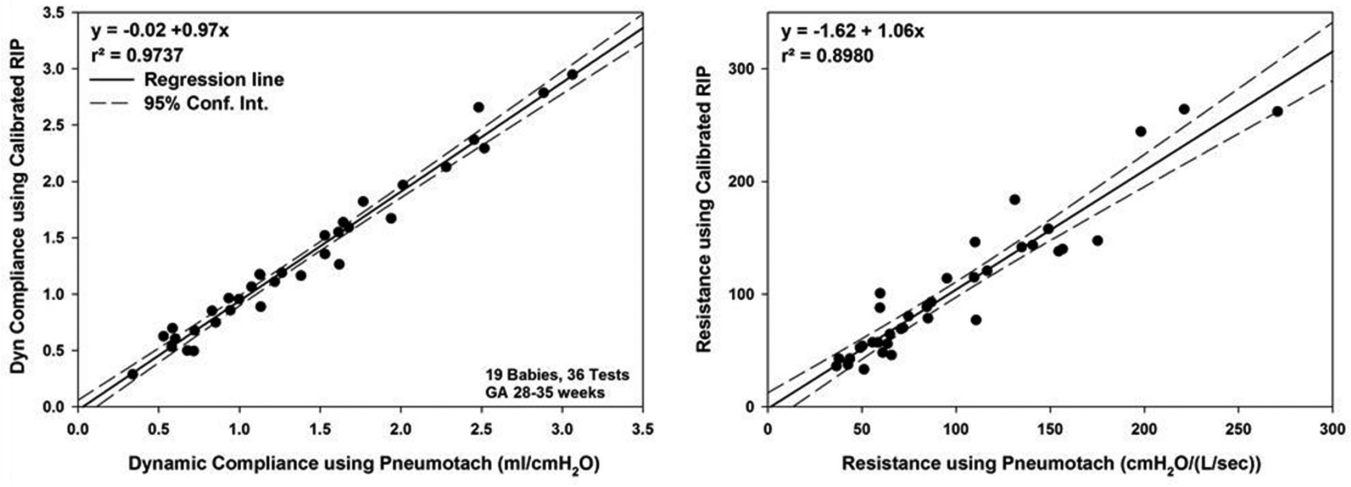
Background Measurement of respiratory mechanics during non-invasive ventilation (NIV) precludes use of the traditional airway flow sensor. Increasing use of NIV in premature infants necessitated novel instrumentation for measuring airflow without interfering with the nasal/oral interface. Respiratory inductance plethysmography (RIP), in addition to providing chest wall motion analysis, may be used for volume and airflow measurements when properly calibrated.

Objective To develop an efficient RIP calibration technique to allow bedside measurement of respiratory mechanics and to validate it's accuracy against traditional pneumotachometer (PNT) measurements while simultaneously computing thoracoabdominal asynchrony indices in premature infants.

Design/methods RIP ribcage and abdominal signals were recorded simultaneously with facemask PNT signals. RIP was calibrated by qualitative diagnostic calibration and multiple



Abstract O-077 Figure 1

linear regression algorithms on artefact-free breaths with amplitudes within the mean±1SD. A sequence of optimising iterations for computer breath selection produced best-fit regression coefficients with the PNT flow. Transpulmonary pressure was measured by esophageal catheter. Lung compliance and airway resistance were computed by a least mean square technique. Ribcage to abdominal phase angle (phi), Laboured breathing index (LBI), and phase relation in total breath (PhRTB) were computed from analysis of RIP ribcage and abdomen excursions. Validation measurements were performed on 18 infants of 28–35wks GA.

Results Correlation coefficients for compliance and resistance by PNT vs. RIP were r^2=0.9737 and 0.8980 respectively. LBI for these infants was 1.2 ± 0.6, phi was 54.4 ± 7.4 degrees and PhRTB was 33.4 ± 3.1%.

Conclusion When properly calibrated, RIP derived respiratory mechanics measurements provide sufficient diagnostic accuracy in infants receiving NIV support.

O-078 NEONATAL CHEST ULTRASOUND PREDICTS NON INVASIVE VENTILATION FAILURE IN PRETERM INFANTS

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Background Non invasive ventilation is the treatment of choice for neonatal moderate respiratory distress (RD). Predictors of nasal ventilation failure may be helpful in preventing clinical deterioration. Work on neonatal lung ultrasound has shown that the persistence of a hyperechogenic, "white lung" image correlates with severe distress in the preterm infant. In the present study we investigate the persistent white lung ultrasound image as a marker of non invasive ventilation failure.

Methods Newborns admitted to the Neonatal Intensive Care Unit with moderate RD and stabilised on nasal continuous positive airway pressure for 120 min were enrolled. Lung ultrasound was performed and blindly classified as Type 1 (white lung), Type 2 (prevalence of B-lines), or Type 3 (prevalence of A-lines). Chest radiograph was also examined and graded by an experienced radiologist blind to the infant's clinical condition. Main outcome of the study was the accuracy of bilateral Type 1 to predict intubation within 24 h from scanning. Secondary outcome was the performance of the highest radiographic grade within the same time interval.

Results Fifty-four preterm infants were enrolled (gestational age 32.5 ± 2.6 weeks; birthweight 1703 ± 583 grams). Type 1 lung profile showed sensitivity 88.9% (95% CI 67.2–96.8), specificity 100% (CI 94.9–100), PPV 100% (CI 80.6–100), NPV 94.7% (CI 82.7–98.5). Chest radiograph had sensitivity 38.9% (95% CI 20–61.1), specificity 77.8% (CI 61.7–88.5), PPV 46.7% (CI 24.8–69.9), NPV 71.8% (CI 56.2–83.4).

Conclusions After a 2 h nasal ventilation trial, neonatal lung ultrasound is a useful predictor of the need for intubation, largely outperforming conventional radiology. Future studies should address whether including ultrasonography in the management of neonatal moderate RD confers clinical advantages.

O-079 NASAL CONTINUOUS POSITIVE AIRWAY PRESSURE AND CARDIAC FUNCTION IN PRETERM INFANTS WITH LUNG DISEASE

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Introduction Previous studies of infants on ventilatory support suggest that right ventricular output (RVO) decreases with increasing mean airway pressure. This may be due to increased pressure in the thoracic cavity. We investigated changes in cardiac output (CO) at different levels of nasal continuous positive airway pressure (nCPAP) in preterm infants with evolving chronic lung disease.

Methods We studied infants between 28 and 34 weeks corrected gestational age, a minimum of two weeks old, treated with nCPAP of 5 to 7 cm H_2O, with an O_2 requirement of 25–40%, in whom written parental consent was obtained. Infants with significant cardiac shunts were excluded. Infants were randomly assigned to nCPAP levels of 4, 6, and 8 cm H_2O for 15 min each. Right and left ventricular output, left pulmonary artery flow, superior vena cava flow, heart rate and blood pressure were measured after each change with a Vivid-I ultrasound machine by a single examiner (FB) blinded to nCPAP levels.