had significantly higher ET-1 levels than controls (1.88 and 3.82 pg/mL, respectively, P = 0.001)

Conclusion: Our newborn infants with and without **congenital pneumonia** had similar plasma ET-1 levels, whereas ET-1 levels were higher in **congenital pneumonia** than in control newborns 18 to 40 h after birth. The increased vascular resistance in **congenital pneumonia** may be related to high ET-1 levels.

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EFFECTS OF REDUCED ELECTRODE TEMPERATURE ON THE ACCURACY AND PRECISION OF TRANSCUTANEOUS CARBON DIOXIDE MEASUREMENTS

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Background and aims: The harmful effect of hypocapnia on the neonatal brain emphasizes the importance of monitoring arterial carbon dioxide tension (PaCO2). Transcutaneous monitoring of carbon dioxide (tcPCO2) reduces need of arterial blood sampling. Drawbacks are high electrode temperature causing short application time and risks of skin burning. The aim of this study was to determine the accuracy and precision of tcPCO2 at reduced electrode temperature.

Methods: Forty newborns (GA 24.9- 41.7) were included. Two tc-monitors were applied (TCM4, Radiometer, Copenhagen). The metabolic constant was 0.53 kPa. Arterial blood gas sampling and recording of the tcPCO2-level at different electrode temperatures was done simultaneously (39°C, 40°C, 41°C, 42°C, 44°C). The Bland and Altman method was used for analysis. PaCO2-tcPCO2 difference was expressed in fraction of the mean.

Results: Mean PaCO2 was 5.8 kPa [3,2; 7.9]. The mean PaCO2 - tcPCO2 difference (bias) increased from 5% at 44°C to 17% at 39°C, but did not differ significantly between 41°C and 40°C (14.8% vs. 11.8%). The precision of the tcPCO2 at each temperature ranged from +7% to +10%. After correction for the temperature-dependent overreading, the Bland-Altman plot showed increasing PaCO2 - tcPCO2 difference with increasing PaCO2, approx. 2% pr. kPa increase of CO2. Sequence of electrode temperatures did not matter. Only mild transient erythema was observed.

Conclusions: A lower electrode temperature in tcPCO2-monitoring increases systematic overreading of the tc-electrode. However, in very preterm babies, monitoring at 40°C or 41°C is possible provided bias correction of 12-15%.

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ELECTRICAL IMPEDANCE TOMOGRAPHY (EIT) CAN RAPIDLY DETECT SMALL PNEUMOTHORACES

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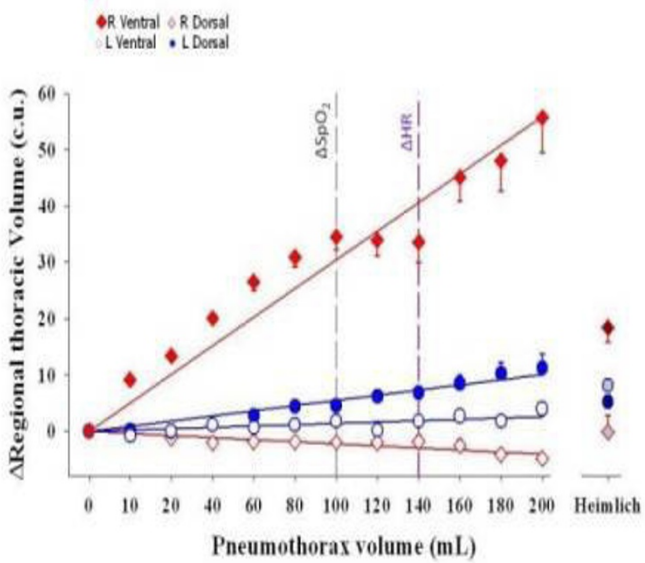
Background: Diagnosis of pneumothorax currently relies on clinical suspicion and chest radiography and is often delayed.

Aims: To determine whether EIT can accurately identify the location of surgically created pneumothoraces of varying sizes.

Methods: Six anaesthetised and muscle-relaxed piglets with saline lavaged surfactant-deficient lungs ($AaDO_2$ >350mmHg in F_{IO2} 1.0) were studied. A chest drain was inserted into the right ventral chest and increasing amounts of air (10 to 200 mL in 10-20mL aliquots) were instilled into the pleural space. At the end of these instillations, a Heimlich valve was attached to the chest drain. At each instillation, regional end-expiratory volumes (EELV) were measured using EIT concurrently with SpO_2, heart rate and arterial blood pressure (BP).

Results: At all volume instillations, mean impedance within the right ventral (RV) quadrant was significantly higher than all other quadrants ($p< 0.0001$ ANOVA). A significantly greater EIT time-course signal was identified in the RV quadrant after as little as a 10 mL instillation ($p< 0.0001$; ANOVA). Impedance in the RV quadrant fell from mean (SD) 46 (39.5) c.u. to 18.3 (20.5) suggesting a 60.3% resolution of the pneumothorax within 60-secs following attachment of the Heimlich valve ($p< 0.001$; ANOVA). A deterioration in SpO_2 to 89 (6)% did not occur until 100 mL instillation ($p< 0.001$;

ANOVA) and tachycardia mean (SD) to 245 (44) bpm occurred at 140 mL instillation (p=0.001).



[Regional thoracic volume vs Pneumothorax size]

Conclusions: EIT accurately identified the location of even small volume pneumothoraces before physiological parameters changed.

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HELIOX IN THE MANAGEMENT OF NEONATES WITH MECONIUM ASPIRATION SYNDROME (MAS)

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The aim of the study was to asses the influence of short-term mechanical ventilation with helium-oxygen mixture (heliox) in newborns with MAS on basic vital signs, oxygenation, acid-base balance and respiratory mechanics.

The study was carried out in newborns with respiratory failure requiring mechanical ventilation due to MAS.Patients were ventilated using PC-SIMV. Parameters of mechanical ventilation,respiratory mechanics,oxygenation,acid-base balance and vital signs were recorded during three periods of one hour before,during and after heliox ventilation.

Nine newborns with MAS were enrolled in the study. Mechanical ventilation with heliox did not affect vital signs, and infants' general condition remained stable during and after ventilation with heliox. Mechanical ventilation with heliox was associated with a statistically significant increase in dynamic compliance(mean 0,4 vs 0,53ml/cmH_2O).Heliox caused an increase in tidal volume(mean 5,57 vs 6,84ml/kg)and minute ventilation(mean 0,87 vs 0,95l)but this was not statistically significant. Mechanical ventilation with heliox allowed the use of significantly lower fractions of inspired oxygen(mean 0,62 vs 0,35),with a significant decrease in the oxygenation index(mean 8,09 vs 4,26)and alveolar-arterial oxygen tension difference(mean 320,04 vs 127,65mmHg).A significant increase in pH(mean 7,34 vs 7,38) was also observed with a concomitant decrease in $PaCO_2$(mean 43,4 vs 39,9)which was not statistically significant.Beneficial effects of heliox reversed after ventilation with this gas mixture was stopped.Patients required higher FiO_2(mean 0,35 vs 0,38),OI(mean 4,26 vs 5,27)and $AaDO_2$(mean 127,65 vs 159,6)increased.There was also a significant decrease in oxygen saturation(mean 93,69 vs 91,63).

Ventilation with heliox had a positive effect on the selected parameters of oxygenation,acid-base balance and respiratory mechanics in newborns with MAS.

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VOLUME-TARGETED VENTILATION REDUCES THE RISK OF DEATH OR BPD: A COCHRANE META-ANALYSIS

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Background and aims: Volutrauma is associated with neonatal lung injury. Modern ventilators offer volume-targeted modes aiming to reduce volutrauma and improve $PaCO_2$ stability. The objectives were to determine whether volume-targeted ventilation (VTV), compared with pressure-limited ventilation (PLV), reduces mortality, bronchopulmonary dysplasia (BPD) and other outcomes.

Methods: Cochrane systematic review of randomised clinical trials comparing VTV with PLV. Risk ratios (RR) or weighted mean difference with