The Preterm Pig as a Model for Acute Lung Disease

**Background and Aims**
Despite advances in ventilation support, acute lung disease (ALD) remains the leading cause of morbidity, mortality, and disability after preterm birth. There is a need for a spontaneous translational model of ALD after preterm birth.

**Methods**
Preterm pigs delivered at gestation days (GD) 98, 100, 102, and 104 days were provided ventilation support using supplemental oxygen (NC), Bubbles Continuous Positive Airway Pressure (bCPAP; 7–8 cm H2O), or mechanical ventilation (MV; Pressure Control Ventilation with Volume Guarantee; 5 ml/kg; PEEP 5 cm H2O). Monitoring included pulse oximetry, arterial blood gases, and radiography. Lungs were harvested after 24 h or after premature death for histology and measurements of surfactant protein B expression, and MV was essential for lung liquid clearance and aeration. Previous studies provided mechanical support for lung liquid clearance and aeration. However, little is known how efficient these are in lung recruitment and gas exchange. Aim was to measure tidal volume, functional residual capacity (FRC) changes and gas exchange during respiratory support in preterm infants at birth.

**Results**
 Patients (21 PSV+VG, 21 SIMV+VG) were enrolled. Median GA were 29 weeks and BW were 980.0 and 870.0 g in each group. Demographic characteristics were similar. Appropriate TV was higher in PSV+VG group. PIP, MAP and FiO2 were similar in two groups. Hypocarbia, hypercarbia, hypoxygenia and hypoxemia incidences were not different. PSV+VG group were less tachycardic than SIMV+VG group. Acute and chronic prematurity problems including chronic lung disease (CLD) defined as oxygen requirement at 36th GA were not different.

**Conclusions**
PSV+VG was associated with higher ‘appropriate TV’ without any adverse effects and similar CLD occurrence. These findings can support the beneficial use of PSV+VG which is more physiologic due to better inspiratory – expiratory synchrony.

**Abstract PO-0770 Table 1**

<table>
<thead>
<tr>
<th>SI (median (IQR))</th>
<th>PPV (median (IQR))</th>
<th>Breathing (median (IQR))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vte (mL/kg)</td>
<td>CO2 (mmHg)</td>
<td>RC change per breath/inflation (AU/kg)</td>
</tr>
<tr>
<td>5.1 (1.0–10.4)</td>
<td>10 (2–19)</td>
<td>6 (73–114)</td>
</tr>
<tr>
<td>4.2 (3.3–8.7)</td>
<td>2 (2–6)</td>
<td>6 (15–41)</td>
</tr>
<tr>
<td>6.9 (5.2–9.8)</td>
<td>18 (12–24)</td>
<td>4 (41–45)</td>
</tr>
<tr>
<td>5.7 (2.8–4.9)</td>
<td>20 (9–32)</td>
<td>7 (57–38)</td>
</tr>
</tbody>
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**PO-0770 Respiratory Inductance Plethysmography and Expired CO2 Levels of Preterm Infants at Birth**

**Background**
Preterm newborns often need respiratory support for lung liquid clearance and aeration. Previous studies provided tidal volumes during positive pressure ventilation (PPV) and breathing, but little is known how efficient these are in lung recruitment and gas exchange. Aim was to measure tidal volume, functional residual capacity (FRC) changes and gas exchange during respiratory support in preterm infants at birth.

**Methods**
Preterm newborns needing respiratory support the following measurements were performed: 1) expired tidal volumes (Vte (mL/kg)) using respiratory function monitoring, 2) changes in FRC (AU/kg) per breath using Respiratory Inductance Plethysmography (bands placed around the rib cage (RC) and abdomen (AB)), 3) expired CO2 using a volumetric CO2 monitor. For respiratory support a T-piece resuscitator and mask were used with PIP 25 cm H2O and PEEP 5 cm H2O. Data was analysed during sustained inflation (SI), the first 30s of PPV and breathing on CPAP.

**Results**
15 infants were included (median (IQR) gestational age 28 (27–31) weeks, birth weight 1080 (994–1300) grams). There was no difference in Vte between SI, PPV and breathing (table). Gas exchange was more efficient during breathing and inflations coinciding with breathing compared to SI and inflations only (table). Little change occurred during the SI, PPV and breathing measured at the RC. In contrast, there was FRC gain at the AB during the SI, PPV and most with breathing.

**Conclusions**
While tidal volumes during PPV and breathing were similar, breathing was more effective in gas exchange and caused more gain in FRC than PPV.

**PO-0771 The Effect of Exogenous Surfactant Therapy on Lung Mechanics in Very Preterm Infants**

**Introduction and Aim**
Surfactant replacement is a corner stone therapy for respiratory distress syndrome (RDS) and has been shown to be both safe and efficacious for premature infants. The aim of this study was to assess the immediate changes in lung mechanics caused by administration of two different natural surfactants. Secondary aim of this study was to determine the