

European Respiratory Society Annual Congress 2013

Abstract Number: 1894
Publication Number: P4659

Abstract Group: 7.1. Paediatric Respiratory Physiology

Keyword 1: Gas exchange **Keyword 2:** Infants **Keyword 3:** Neonates

Title: Decreased variability of expired CO₂ yield in infants with bronchopulmonary dysplasia

Dr. Sotirios 1623 Fouzas sfouzas@gmail.com MD ^{1,2}, Christoph 14673 Häcki christoph.haecki@ukbb.ch ², Edgar 14674 Delgado-Eckert Edgar.Delgado-Eckert@ukbb.ch ², Dr. Elena 14675 Proietti elena.proietti@insel.ch ³, Dr. Philipp 14676 Latzin philipp.latzin@insel.ch ³, Dr. Roland 14680 Neumann roland.neumann@ukbb.ch ², Prof. Sven 14681 Schulzke sven.schulzke@ukbb.ch ² and Prof. Urs 14697 Frey urs.frey@ukbb.ch ². ¹ Paediatric Respiratory Unit, University Hospital of Patras, Patras, Greece ; ² University Children's Hospital of Basel, UKBB, Basel, Switzerland and ³ University Children's Hospital of Bern, Inselspital, Bern, Switzerland .

Body: Background: Bronchopulmonary dysplasia (BPD) is characterized by alterations in ventilation-to-perfusion (V/Q) matching and gas exchange capacity. The aim of this study was to examine the breath-by-breath variability in the expired CO₂ volume (VCO₂) and to assess its value in describing disturbances of gas exchange in BPD. Methods: Lung function parameters from 181 healthy infants (128 term, 53 preterm) and 87 infants with BPD (46 mild, 55 moderate, 32 severe) were compared. Expiratory capnograms were obtained by mainstream capnography over 100 consecutive tidal breaths. The ratio of VCO₂ to expiratory volume (V_e) was used as measure of the expired CO₂ yield per breath. The two-dimensional (2D) domain area of the VCO₂/V_e embedding plot (1-breath lag) and the domain area of the VCO₂-V_e scatter plot (both calculated by an ellipse-fitting method) were used as indicators of the variability in CO₂ yield. Results: BPD infants had smaller 2D VCO₂/V_e domains (median [IQR]: 7.8 [4.9-11.6] vs. 10.6 [7.1-15.3]; P<0.001) and VCO₂-V_e domain areas (4.0 [2.6-6.2] vs. 7.4 [5.3-10.8]; P<0.001). BPD was a significant determinant of the domain areas independently of V_e and respiratory rate. The discriminatory ability (ROC curve analysis) of the domain area of the VCO₂-V_e plot (AUC 0.796 [0.744-0.849]) was significantly higher than that of the 2D domain of the VCO₂/V_e embedding plot (0.722 [0.665-0.774]) and that of the LCI (0.589 [0.528-0.646]). Conclusions: Infants with BPD presented significantly lower breath-by-breath variability in CO₂ yield, a finding that may reflect disease-related disturbances in V/Q matching and gas exchange capacity.