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Title: Longitudinal study of lung function in very prematurely born infants

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Body: Introduction: Small airway function of prematurely born infants may deteriorate over the first year after birth. Aims and objectives: To determine whether small airway function, assessed by measuring the degree of gas trapping, changed between one and 12 years in children born extremely prematurely and whether any changes were affected by neonatal factors. Methods: A subset of 42 children from the United Kingdom Oscillation Study (UKOS) who had detailed pulmonary function measurements at one and 12 years at a single centre were studied. Lung volumes were assessed by plethysmography (FRC_{pleth}) and helium gas dilution (FRC_{he}); the degree of gas trapping was calculated as the FRC_{He}: FRC_{pleth} ratio. Changes in FRC_{He}: FRC_{pleth} and the effects of gestation, sex, and oxygen dependency at 36 weeks PMA (BPD_{36}) were analysed using mixed models. Results: Nineteen of the infants were born between 23-25 weeks gestation and 23 between 26 and 28 weeks; 24 (57%) had BPD_{36}. The mean (SD) for FRC_{He}: FRC_{pleth} at one and 12 years were 0.90 (0.12) and 0.84 (0.12) respectively. For those with BPD_{36}, the mean ratios were 0.87 (0.13) at age one year and 0.81 (0.13) at age 12 years; for those without BPD_{36}, they were 0.94 (0.11) and 0.87 (0.10) respectively. Overall, there was a reduction in FRC_{He}: FRC_{pleth} of 5.9% (95% CI: 0.70%, 11%; p=0.026) between ages one and 12 years after adjusting for birth weight, gestational age, sex and BPD_{36}. There was no significant difference in the degree of deterioration between the children who had and not had BPD_{36}. Conclusion: These results suggest that small airway function deteriorates between one and 12 years in children born very prematurely.