measure of gas mixing, Lung Clearance Index (LCI), derived from multiple breath washouts using sulphur hexafluoride as tracer gas and a modified Innocor gas analyser, to detect early airway changes in smokers with normal spirometry.

Methods Current cigarette smokers with a smoking history of over 10 pack years and no known cardiac or respiratory disease were recruited from smoking cessation clinics. Spirometry was performed to ERS standards before and after salbutamol. Participants with post-bronchodilator FEV_1<80% predicted, FEV_1/FVC<0.7, or a significant bronchodilator response were excluded from analysis. St George's Respiratory Questionnaire (SGRQ) was completed. LCI reported is the mean of at least two technically acceptable repeat measurements.

Results 17 participants remained after exclusions, mean age 44 years (range 31–57) and mean smoking history of 25 pack years (range 11–60). Mean (SD) post-bronchodilator FEV_1 and FEF_{25-75} was 101 (12) and 80 (23)% predicted respectively. Only one participant had FEF_{25-75}<60%. There was a moderate negative correlation between smoking history and FEF_{25-75} (r=−0.51, p=0.037) but not between smoking history and FEV_1. Mean (SD) LCI was 7.7 (0.98) with mean (SD) intra-visit coefficient of variation of 3.7 (2.5)%. Eight participants had LCI>7.5 (95% CI for LCI in normal subjects 5.9–7.5), suggesting impaired lung gas mixing. There was a negative correlation between LCI and FEV_1 (r=−0.55, p=0.02) and between LCI and FEF_{25-75} (r=−0.66, p=0.004) but no significant correlation between LCI and smoking history or total SGRQ score. Mean (SD) total SGRQ score was 10.9 (7.5), 12 participants scoring over 7 (95% CI for total SGRQ score in normal subjects 5–7). Total SGRQ did not correlate with smoking history, LCI, FEV_1 or FEF_{25-75}.

Conclusions These data support the hypothesis that LCI is a sensitive marker of early airway changes in smokers with normal FEV_1 and FEF_{25-75}. The effects of smoking cessation on this measure are currently being investigated.

P130 LIMITS OF AGREEMENT FOR PEAK EXPIRATORY FLOW MEASURED BY MINI-WRIGHT'S METER AND A PNEUMOTACHOGRAPH

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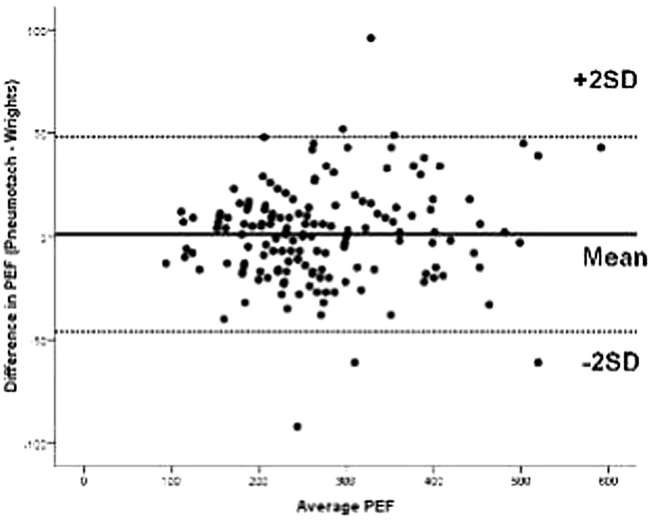
Background Differences in peak expiratory flow (PEF) in children have been shown using a short exhalation PEF compared with a forced vital capacity (FVC) manoeuvre, when measured by turbine spirometry. Furthermore, PEF measures using a traditional Wright's scale PEF metre have been compared with those measured by FVC using a pneumotachograph in adults. The traditional Wright's scale may give rise to misleading results in children, and as such universal adoption of the EU scale has been advocated in the UK. To our knowledge, no study has compared PEF measured using a mini-Wright's EU scale PEF metre and PEF measured by FVC manoeuvres using a pneumotachograph in children.

Methods A retrospective review of children attending asthma clinic at a tertiary paediatric asthma clinic were carried out. Children underwent spirometry (Jaeger Masterscreen PFT Pro) using a pneumotachograph in accordance with ATS/ERS guidelines. In addition, peak expiratory flow (PEF) using a mini-Wright's PEF metre (Clement-Clarke International) was performed by each subject. Bland and Altman statistics were used to assess the limits of agreement for PEF measured by the two different techniques.

Results 161 children (90 male) aged 4–17 years with mean (sd) age of 10.1 (3.2) years were analysed. PEF measures varied from 87 to 613 l/min on spirometry, and from 100 to 570 l/min with the PEF metre. The mean (sd) difference between PEF measures by spirometry and PEF metre was 1.1 (23.5) l/min. A Bland-Altman plot showing mean (+/−2SD) difference is shown (Abstract P130 Figure 1).



Abstract P130 Figure 1

Discussion Whilst close agreement for a childhood asthma population was demonstrated for two measures of PEF, individual differences could be quite marked with 100 l/min differences in PEF measurement being seen in either direction. One should be aware of potential differences in PEF measures when choosing testing equipment. Consideration should be given to dual measures of PEF in the setting of paediatric asthma (and not simply relying on a mini-Wright's PEF alone).

P131 FITNESS TO FLY ASSESSMENT IN PATIENTS WITH NEUROMUSCULAR DISEASE

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Introduction Patients with neuromuscular disorders (NMD) can develop ventilatory impairment due to respiratory muscle weakness but despite disability, many travel by air. The British Thoracic Society (BTS) recommends hypoxic challenge test (HCT) in those who have baseline oxygen saturation (SpO2) at sea level between 92–95%.[1] However, this recommendation is based on very limited evidence.

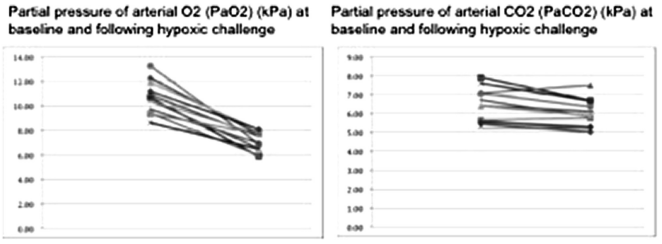
Objectives To determine if baseline pulse oximetry at sea level provides a safe guide to predict hypoxia during flying and preclude a HCT in NMD patients.

Methods HCT performed on 12 NMD patients (11 Motor Neuron Disease and 1 Duchene's Muscular Dystrophy) attending ventilation clinic were retrospectively reviewed. HCT was performed to assess their fitness to fly irrespective of their baseline SpO_2. A fall in PaO_2<6.6 kPa was considered positive, PaO_2 between 6.6 and 7.4 kPa was considered borderline and >7.4 kPa was considered negative.[1] Spirometry and sniff nasal inspiratory pressure (SNIP) were also recorded.

Results There were nine male and three female patients, age range 27–72 years (median 63 years). Four patients were positive for HCT and two had borderline results. Only two patients among this group met the criteria for HCT as per BTS recommendation. Six patients were negative for HCT and only one met the criteria for HCT. There was no difference in median FEV_1 (1.85 vs 2.04 L/s) and median FVC

(2.5 vs 2.41 l) between patient with positive or borderline HCT and patients with negative HCT. SNIP was lower in those who were positive or borderline than those who were negative (median 28.5 vs 43 cmH_2O).

Conclusions Patients with NMD and respiratory muscle weakness are prone to develop hypoxia irrespective of their baseline oxygen saturation, FEV_1 and FVC. SNIP may be better at predicting the risk of hypoxia during air travel.



Abstract P131 Figure 1

REFERENCE

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P132 CARBON DIOXIDE SENSITIVITY IN PATIENTS WITH HYPERVENTILATION SYNDROME

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Background Many body systems may be affected by chronic hyperventilation and symptoms may be wide-ranging. There is no obvious cause, no gold standard test and not all patients with Hyperventilation Syndrome (HVS) demonstrate characteristic low resting $PaCO_2$. No previous studies were found that reported the breath-hold time of HVS subjects at functional residual capacity, subjects' end-tidal carbon dioxideat the breakpoint of breath-hold, the subjective experience of breath-hold or the effect of carbon dioxide inhalation on the perception of breathing discomfort in HVS subjects.

Methods Five HVS patients, diagnosed by a respiratory physician, with no organic cause for breathlessness and referred for physiotherapy assessment (females, aged 21–70) and five healthy controls (females, aged 21–28) were studied. Breath-hold tests at total lung capacity (TLC) and functional residual capacity (FRC). Incremental inhalation of CO_2 was performed, whilst breathing frequency and volume was unconstrained ('free') and when 'fixed' by a breathing circuit and metronome. Components of minute ventilation were recorded via inductive plethysmography, in addition to end-tidal carbon dioxide ($P_{ET}CO_2$). A 100-mm visual analogue scale (VAS) was used to obtain a measure of breathing discomfort during breath-hold tests and CO_2 inhalation. The breathlessness experience associated with each CO_2 inhalation was assessed with the previously-published D-12 questionnaire.

Results The HVS group demonstrated a lower breath-hold time at TLC (32 vs 68 s, p=0.03) and could not hold their breath at FRC compared with controls. During the incremental CO_2 inhalation tests there was a borderline significant increase in $P_{ET}CO_2$ at the limit of tolerance in the HVS group during free breathing (1.5 kPa, p=0.07), but not fixed (2 kPa, p=0.1). Controls described feelings of air hunger following both inhalation tests: HVS patients tended to rate higher on work and effort descriptors.

Conclusions These data suggest that patients with HVS may be more sensitive to changes in CO_2 than controls. Breath-hold time at TLC and FRC may also be useful identifying patients with HVS and monitoring response to physiotherapeutic intervention. Breakpoint $P_{ET}CO_2$ during incremental CO_2 inhalation requires further validation in larger cohorts.

P133 PREDICTION EQUATIONS FOR PULMONARY FUNCTION VALUES IN HEALTHY IRANIAN CHILDREN (AGED 4–10 YEARS)

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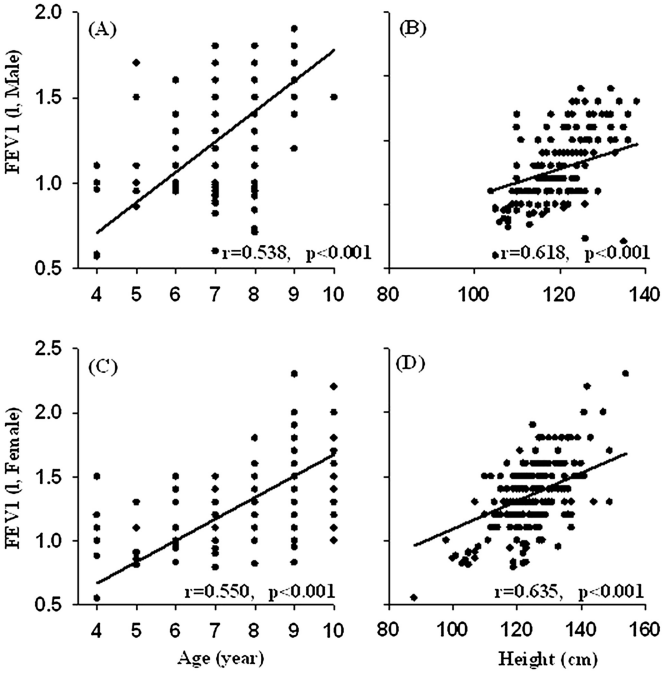
Pulmonary function test variables (PFTs) are dependent on height, age, and gender and there is evidence of PFT variation in different ethnic groups. Therefore prediction equations for PFTs were derived from healthy, urban children in the city of Mashhad (northeast Iran). Predicted equations for normal PFT values have been derived from 414 healthy children including 192 boys and 222 females (aged 4–10 years). The subjects underwent measurement of following spirometric variables: forced vital capacity (FVC), forced expiratory volume in 1 s (FEV_1), maximal mid-expiratory flow (MMEF), peak expiratory flow (PEF), maximal expiratory flow at 75%, 50% and 25% of the FVC (MEF_{75}, MEF_{50}, and MEF_{25} respectively). Regression analysis using height and age as independent variables was applied to provide predicted values for both sexes. There were positive correlations between each pulmonary function variable with height and age. The largest positive correlations were found for FEV_1 with height and age in both sexes. Comparison of PFTs derived from the equations of the present study showed significant differences with those of several previous studies ($p<0.001$ for most cases) (Abstract P133 Figure 1). A set of PFT reference values and prediction equations for both sexes has been derived using relatively large, healthy, Iranian children which has generated results that differ from several other prediction equations.



Abstract P133 Figure 1