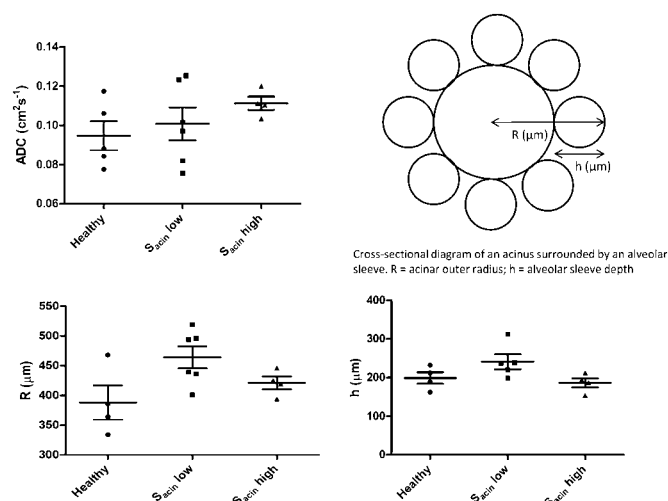


comprehensively characterise a group of patients with moderate to severe asthma using a variety of standard and novel physiological techniques, including hyperpolarised helium-3 magnetic resonance imaging (He-3 MRI), in order to non-invasively localise the major site of airway obstruction within the bronchial tree.

**Methods** We recruited 17 patients with moderate asthma (GINA 3/4), 12 patients with severe asthma (GINA 5) and fifteen healthy control subjects. Participants undertook standard pulmonary function tests, multiple breath washout (MBW) and impulse oscillometry (IOS). Five healthy subjects and 10 patients with asthma also undertook He-3 MRI. Two MRI sequences were performed. The first sequence allowed derivation of the apparent diffusion coefficient (ADC), a measure of alveolar airspace size, while the second sequence allowed derivation of the modelled parameters R and h, representing acinar outer airway radius and alveolar sleeve width respectively, as introduced by Yablonskiy *et al.*<sup>1</sup>

**Results** Patients with asthma displayed evidence of fixed airflow obstruction and air trapping, with reduced FEV<sub>1</sub> and increased RV/TLC ratio, compared to healthy controls. However, Kco was higher in patients with asthma than in controls. The MBW small airway marker S<sub>acin</sub> was significantly raised in patients with asthma compared to healthy controls (healthy=0.126, GINA 3/4 asthma=0.173, GINA 5 asthma=0.213; p=0.03), confirming the presence of acinar airspace disease in patients with moderate and severe asthma. S<sub>cond</sub>, a conductive airway marker, did not differ significantly between the groups. ADC, R and h also did not differ significantly between healthy controls and patients with asthma, or between asthmatic patients with and without evidence of acinar airspace disease (see Abstract S80 figure 1), suggesting that the alveoli are not a major site of involvement in asthma.



**Abstract S80 Figure 1** Characterisation of asthma patients with and without acinar disease by He-3 MRI. Means and standard errors of the mean are displayed. Data were analysed using one-way analysis of variance with no statistically significant differences found between groups.

**Conclusion** Our results suggest that the site of fixed airflow obstruction in patients with moderate to severe asthma may be localised to the proximal acinus, and that the alveoli are relatively spared.

## REFERENCE

1. Yablonskiy, *et al.* *J Appl Physiol* 2009;**107**:1258–65.

## S81 REFRACTORY ASTHMA IN THE UK: A FOLLOW-UP ANALYSIS

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**Introduction** Refractory asthma poses a major healthcare problem with limited therapies currently available and new therapies needed. The British Thoracic Society (BTS) Difficult Asthma Network has previously published demographic data on a cohort of patients with well-characterised refractory asthma<sup>1</sup> using a National Registry and detailed follow-up data is now available.

**Methods** Data on 349 of the original 382 patients was available from 4 specialist centres across the UK—Royal Brompton Hospital, London, Glenfield Hospital, Leicester, University Hospital of South Manchester and Belfast City Hospital. Data have been used to examine healthcare utilisation, therapeutic strategies and lung function compared to baseline.

**Results** The median follow-up period was 3.1 years (IQR 1.9–5.5 years). Improvements from baseline were noted in Pre bronchodilator FEV<sub>1</sub>% predicted (66%±23.6% vs 72.7%±26.8%; p<0.001) and Pre bronchodilator FVC% predicted (82.7%±20.3% vs 86.5%±21.5%; p<0.01). Reduced rescue steroids (Median 2 {IQR 4–6} vs 0 {IQR 2–4}; p<0.001), a reduction in hospital admissions (Median 0 {IQR 0–2} vs 0 {IQR 0–1}; p<0.01) and reduced unscheduled visits to GP's or A&E (Median 4 {IQR 2–6} vs 2 {IQR 0–6}; p<0.05) was seen. The most frequent therapeutic intervention was the introduction of maintenance oral steroids (OCS): 42% of the original cohort was on maintenance OCS at baseline, with 58% on maintenance OCS at follow-up. Most on OCS at baseline remained on OCS but 30 (9%) discontinued and 78 (22%) had OCS initiated. Steroid sparing agents (methotrexate, cyclosporine, azathioprine etc) were tried but showed minimal steroid sparing benefit with a success rate of between 0.6 and 3.2%. Omalizumab was only suitable for trial in 59 (17%) subjects with a response rate of 66%. In those who had a successful Omalizumab trial, 23 (92%; p<0.001) were successful in achieving either a reduction in OCS or complete withdrawal.

**Conclusion** In specialist centres, healthcare outcomes and lung function are improved in patients with refractory asthma. The most frequent intervention is the progression to maintenance OCS and treatment options remain limited. Steroid sparing agents show little benefit with the exception of Omalizumab.

## REFERENCE

1. Heaney LG, Brightling CE, Menzies-Gow A, *et al.* Refractory asthma in the UK: cross sectional findings from a UK multicentre registry. *Thorax* 2010;**65**:787–94.

## S82 FUNGAL SENSITISATION IN CHILDREN WITH SEVERE THERAPY RESISTANT ASTHMA

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**Introduction** Severe asthma with fungal sensitisation (SAFS) in adults is associated with reduced lung function and increased morbidity [*Eur Respir J* 2006;**27**:615–26, *Am J Respir Care Med* 2009; **179**:11–18]. We hypothesised that fungal sensitisation in children with severe, therapy-resistant asthma (STRA) is associated with increased symptoms, medication use and airway inflammation, and reduced lung function.

**Methods** STRA was defined as before [*Lancet* 2010;**376**:814–25]. All children had been through a detailed assessment to optimise