

A number of epidemiological investigations have identified asthma prevalence in cleaners around 1.5–2.0 times those of reference populations. There are around 700,000 cleaners in the UK, asthma prevalence is around 8%, and that suggests a high burden of work-related disease. However, a clinical diagnosis of occupational asthma in cleaners is established relatively rarely. We have investigated the hypothesis that this discrepancy occurs because cleaner's asthma is a form of low dose irritant asthma that is visible to epidemiologists but does not have the typical clinical features of occupational asthma. A questionnaire was sent to 1400 cleaners working in local hospitals and universities. 14% had a previous diagnosis of asthma, and in 32% of these the asthma started after they began work as a cleaner. Investigations for possible occupational asthma comprised paired measurements of airway responsiveness at and away from work ( $n = 13$ ), serial PEF analysed using OASYS-2 ( $n = 13$ ) and a structured clinical history ( $n = 10$ ). 5 subjects had a greater than 3 fold improvement in PD20 away from work, and 2 subjects had OASYS score  $>2.5$  indicating a probable occupational effect. 1 subject had both. The clinical histories were sent to 9 physicians with an interest in occupational asthma who were asked to score them for the likelihood of occupational asthma on a scale 0 to 100% with and without the OASYS scores and the airway responsiveness measurements. Before seeing the investigation results, 7 of the 90 individual scores (9 physicians  $\times$  10 subjects) were above 50% indicating that the diagnosis of occupational asthma was thought likely. After seeing the investigation results, 29 of the 90 scores were above 50%. The mean probability score based on the history alone did not exceed 50% for any cleaner but was above 50% for 2 cleaners when the investigations were taken into account. These findings support the view that cleaner's asthma has features that make it difficult to identify from the clinical history.

**P133 LONGITUDINAL DECLINE IN FEV1 IN OCCUPATIONAL ASTHMA DUE TO IRRITANTS IS NOT ALTERED BY REMOVAL FROM EXPOSURE**

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**Introduction** Airborne irritants and allergens in the workplace can induce and trigger occupational asthma (OA). OA due to sensitisation is associated with an accelerated rate of decline in FEV<sub>1</sub> (100 mls/yr) compared with healthy controls (25 mls/yr)<sup>1</sup>, which improves on removal from exposure. We sought to describe the rate of FEV<sub>1</sub> decline in patients with irritant-induced OA before and after their removal from exposure.

**Methods** Cases of irritant-induced OA reported between 1991 and 2011 were identified from the SHIELD database (a voluntary reporting scheme for OA) and their demographic characteristics and serial FEV<sub>1</sub> measurements were gathered. Generalised estimating equations with an exchangeable correlation structure were used to calculate an average rate of FEV<sub>1</sub> decline for all patients before and after removal from exposure.

**Results** A total of 526 FEV<sub>1</sub> readings (179 prior to removal, 347 post removal) were gathered from 52 patients. 30 patients had FEV<sub>1</sub> data both before and after removal; 5 patients had FEV<sub>1</sub> data only before removal, and 17 patients had FEV<sub>1</sub> data

only after removal; demographics were not significantly different between the groups. FEV<sub>1</sub> decline prior to removal of the irritant was 44 ml/year (95% CI: 32–58) and FEV<sub>1</sub> decline after removal was 49 ml/year (95% CI: 36–62). There was no significant difference between the intercepts of the two lines, implying no improvement in FEV<sub>1</sub> after removal from exposure.

**Conclusion** In this cohort, irritant-induced OA was associated with an accelerated decline in FEV<sub>1</sub>, which persisted after removal from the irritant. These results might be attributed to differences in the underlying pathology of sensitisation and irritant-induced OA, differences in patient behaviour, or differences in treatments offered to the two groups.

**REFERENCE**

<sup>1</sup> Anees W *et al.* FEV<sub>1</sub> decline in occupational asthma. *Thorax* 2006;61:751–5

**P134 SENSITISATION TO CROSS-REACTIVE CARBOHYDRATE DETERMINANTS IN BRITAIN'S BAKERS: THE IMPLICATIONS FOR HEALTH SURVEILLANCE**

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**Introduction and objectives** The diagnosis of baker's asthma as part of health surveillance schemes in some UK supermarkets relies on determining sensitisation to wheat flour and/or alpha amylase. Recently, data have emerged suggesting that serum IgE analysis in bakers may be complicated by the presence of clinically irrelevant specific IgE to cross-reactive carbohydrate determinants (CCDs), which are complex-type Asn (N)-linked glycan structures commonly formed in plants. Potentially this might lead to false positive flour specific IgE assays, which would have an impact on bakers undergoing surveillance. The aim of this study was to identify the prevalence of CCD sensitisation in UK bakers and investigate the impact of CCD specific IgE within a health surveillance setting.

**Methods** Serum samples from UK bakers attending our occupational asthma clinic ( $n = 209$ ) were analysed for specific IgE to CCD (MUXF<sup>3</sup>) using ImmunoCAP assay (Phadia). Any positive samples were further tested for specific IgE to grass pollen, and competitive inhibition assays were used to determine cross-reactivity between CCD, flour and grass pollen.

**Results** Sensitisation rates to CCD in our population of UK bakers were low (7%) despite high sensitisation rates to grass pollen (48%) and flour (60%). Sensitisation to CCD was more prevalent in those sensitised to either flour or grass than in those not sensitised to flour (11.5% vs 0%,  $p < 0.001$ ) or grass (10.9% vs 2.8%,  $p = 0.025$ ). We observed cross reactivity between flour and grass pollen and competitive inhibition assays between CCD and flour or grass pollen revealed cross-reactivity in some but not all sensitised bakers.

**Conclusions** Our study demonstrated that a minority of bakers were sensitised to CCD and, interestingly, this was associated with being co-sensitised with both flour and grass. It is unlikely that CCDs have major implications for the health surveillance for UK bakeries. In the minority of bakers with CCD specific IgE, there was some suggestion that CCDs may play a role in the cross-reactivity between flour and grass pollen, although in others it was less likely. Within the clinical setting, it may be prudent to measure CCD specific IgE in bakers who are co-sensitised to both flour and grass pollen.

### P135 PREVALENCE OF SENSITISATION TO SOYA FLOUR IN THE BAKING INDUSTRY WITHIN THE UK

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**Introduction** Soya flour is routinely used as a baking additive to increase shelf life, improve colour and introduce a nutty flavour to bread. Although a large number of bakers are exposed to soya flour, there is little information as to the prevalence of sensitisation to soya flour in the baking industry. One study reports sensitisation to soya flour in four bakers who were sensitised to flour and alpha amylase and a bronchial challenge to soya flour elicited an immediate or dual asthmatic response. Studies in soy processing plant (slightly different to bakeries) report soy-specific IgE in 21% of soy processing workers compared with only 4% in health care workers, suggesting soya is an important occupational allergen in the soy processing industry.

**Methods** To determine prevalence of sensitisation to soya flour in bakery workers, we carried out skin prick testing to soya flour (Allergopharma 598) in bakery workers exposed to soya flour (n = 196) and in non-bakery controls (n = 50), who attended an occupational lung disease clinic. Skin tests were categorised as positive if they induced a wheal with a mean diameter of  $\geq 2$  mm greater than the response to a negative (saline) control and histamine was used as a positive control.

**Results** In a total of one hundred and ninety five bakery workers exposed to soya, forty two bakers were sensitised to soya flour (21%), and forty of those bakers were also sensitised to either flour and or alpha amylase (95%) In comparison, none of the control group (n = 50) were sensitised to soya flour.

**Conclusion** In our preliminary study of bakery workers exposed to soya flour, we found that around a fifth of the population were sensitised to soya flour. The clinical significance of soya flour need further investigation, although it seems prudent to include soya flour in the diagnostic tests for bakers asthma.

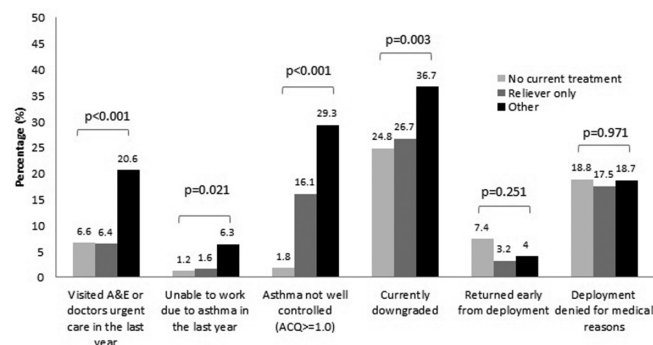
### P136 ASTHMA IN ROYAL AIR FORCE (RAF) PERSONNEL: MEASURING SEVERITY, CONTROL AND PREVIOUS IMPACT ON SERVICE CAREER

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**Background** The overwhelming majority of UK military recruitment occurs in the age group (18–24) in which the recent increases in childhood asthma have been greatest. Concerns about operational risks associated with asthmatic individuals are reflected in selection policies excluding applicants taking asthma treatment, reporting symptoms in the last five years or since the age of 16. This study was designed to characterise the severity and impact of asthma on current RAF serving personnel.

**Methods** Questionnaires were sent to all current service personnel with a diagnosis of asthma on their medical record; an equivalent number of non-asthmatic personnel (matched on age and sex) were also surveyed to provide a referent population. Information on asthma symptoms and treatment, reported change in deployment, medical fitness category and career intention was collected.



**Abstract P136 Figure 1** Prevalence of asthma and service-related outcomes in RAF asthmatics, stratified by asthma treatment

**Results** Of 463 asthmatics who responded to the survey, 167 (36.1%) were not currently on asthma treatment, 63 (13.6%) were on reliever therapy only and 233 (50.3%) were on regular asthma treatment. Two-thirds reported adult onset asthma. Those on regular treatment were more likely to have needed urgent/unscheduled treatment, been unable to work due to their asthma and have a current ACQ score indicating uncontrolled disease; whilst this group were more likely to be currently downgraded, they were no more likely to have returned early from deployment than those in other groups (Figure). Comparing individuals with asthma and matched referents, those with disease were significantly more likely to be downgraded (OR 2.36 (95% CI 1.48–3.77),  $p < 0.001$ ), prevented from deploying for medical reasons (OR 2.47 (95% CI 1.41–4.34),  $p = 0.006$ ) and be assigned unfit (OR 1.79 (95% CI 1.20–2.73,  $p = 0.006$ )). Very few individuals had to return early from deployment, suggesting that restrictions were effective in mitigating risks posed by uncontrolled asthma.

**Conclusions** The findings from this cohort suggest that asthmatics in the RAF, particularly those taking regular treatment, are being restricted from some jobs and environments; this affects few individuals and does not appear to have a negative impact on service career. Decisions at recruitment are likely to have greater impact and would benefit from being studied prospectively.

Abstracts M137 to M148 on page A212–218.

## Predicting clinical outcomes in acute respiratory illness

### P149 CHARACTERISTIC AND PROGNOSIS OF PATIENTS WITH COPD AND TYPE 2 RESPIRATORY FAILURE

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**Introduction** Factors associated with type 2 respiratory failure (T2RF) in COPD have been poorly described. Co-existent obstructive sleep apnoea is thought to play a part,<sup>1</sup> and episodes of worsening hypercapnia, associated with acidosis (AHRF), at the time of exacerbations is a well recognised feature.<sup>2</sup> We hypothesised that the development of hypercapnia or type 2 respiratory failure would associate with a higher risk of subsequent AHRF and higher mortality.

**Methods** 292 patients who had been prescribed oxygen for their COPD during 2006–2010 were studied. Medical records were