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Cleaning workers are at increased risk for asthma, and a causal role of irritants has been hypothesised. Our aim was to evaluate the use of irritant cleaning products in relation to current asthma among European cleaning workers. As part of the ECRHS II and SAPALDIA-2 studies, 489 cleaning workers answered a modular questionnaire on the frequency of use of various products including established airway irritants. Bronchial hyperresponsiveness (BHR) was defined as a 20% fall in FEV1 associated with a methacholine dose of ≤ 1 mg. Associations between the use of irritants and the prevalence of (i) BHR, (ii) wheeze with breathlessness and (iii) 'current asthma' (attack of asthma and/or nocturnal breathlessness in the previous year and/or current treatment) were evaluated using logistic regression analyses, adjusting for sex, age, smoking status and country. Weekly use of ammonia (14% of subjects), bleach (33%), acids (25%) and solvents (13%) was positively associated with asthma outcomes, particularly for wheeze (Odds Ratio [OR] ranging 2.0–2.7). A dose-response relationship for frequency of use of ammonia with BHR was apparent: OR 1.7 (95% Confidence Interval [CI] 0.5–6.4) and 3.7 (CI 1.3–11) for use on 1–3 and 4–7 days per week, respectively; p for trend 0.02). Dose-dependent associations were also found for frequency of use of bleach with wheeze (OR 2.4 and 3.0; p-trend 0.02), and solvents with wheeze (OR 1.5 and 4.7; p-trend 0.01). We conclude that regular use of cleaning products containing irritant chemicals contributes to the burden of asthma in cleaning workers. The observed association between ammonia and BHR suggests that response or recall bias did not play a predominant role.

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Wood dust exposure and incidence of respiratory symptoms – results from a 6 year follow-up study in the Danish furniture industry

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Aims: To investigate relations between respiratory symptoms and wood dust exposure in a 6 year follow-up study.

Methods: 1,377 woodworkers and 297 controls participated. Data on respiratory symptoms, employment, and smoking were collected by questionnaire. Wood dust exposure was assessed from baseline measurements. Cumulative inhalable wood dust exposure was assessed using a study specific job exposure matrix (JEM) and exposure time.

Results: The dust level had decreased from GM (GSD) 0.94 mg/m³ (2.1) to 0.60 mg/m³ (1.6). Adjusted logistic regression for associations between cumulative incidence proportion (CIP) of respiratory symptoms and exposure revealed OR (95% CI) 8.75 (1.09–70.4) on chronic bronchitis and 2.93 (1.35–6.34) on daily coughing for female woodworkers vs. female controls. When exposure was grouped into quartiles of baseline exposure adjusted OR (95% CI) were 7.3 (1.5–35.6) on CIP of chronic bronchitis in the exposure group above 1.12 mg/m³ vs. non/low exposed females and 3.9 (1.5–9.7) on CIP of daily coughing for medium exposed females vs. non/low exposed females. Association between cumulative exposure grouped in quartiles and respiratory symptoms was shown for CIP of chronic bronchitis, adjusted OR (95% CI) 5.1 (1.3–21.1) for medium exposed female workers vs. non/low exposed female workers. A higher CIP of asthma symptoms was revealed among female workers, who had left the furniture industry, supporting a healthy worker effect.

Conclusion: In this low exposed cohort female woodworkers, but not male workers, showed an increased incidence of coughing and bronchitis.

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Exposure to airway irritants and asthma among professional cleaners from 10 European countries

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Possible influence of occupational exposure to high- and low-molecular-weight asthmagens on the atopic status

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Aims and objectives: Atopy had been reported in various studies as a risk factor of sensitisation to occupational high-molecular-agents. It is not known, whether sensitization to occupational low-molecular allergens is by analogy a risk factor for sensitization to common allergens.

Methods: Our aim was to investigate the associations between atopy and specific IgE-sensitization in two occupational groups with workplace-related complaints, i.e. in isocyanate workers (n=156) and health care workers (n=184).

Results: Latex sensitization showed a positive association with atopy. In contrast, a negative correlation exists between sensitization to isocyanate and atopy. In latex-sensitized health care workers, the percentage of atopics was higher, than in non-sensitized ones (44.8% vs. 25.6%). A contrasting relationship was found in MDI workers: atopics were in the subgroup of MDI-HSA-sensitized subjects underrepresented, and in the subgroup of non-sensitized, atopics were overrepresented (15% vs. 37.5%). The difference in proportion of atopics in occupational sensitized and non-sensitized subgroups between MDI exposure and latex exposure was significant (p<0.0001). Analogous results were obtained in the time courses: the number of atopics in health care workers increased in the course of time (r_s = 0.12; p=0.1), in MDI workers it decreased (r_s = - 0.21; p<0.05).

Discussion and Conclusions: We found drastic differences in the relationship between atopy and occupational sensitization in both professional groups. Exposure to the allergic substance latex promotes sensitization to environmental allergens, occupational exposure to the chemical irritant isocyanate prevents it.

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Markers of airway response to isocyanate in sensitised subjects

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Airway response to toxic substances may include changes in production of NO, in pH of lining fluid, and in bronchiolar integrity assessed by serum level of Clara cell protein (CC16). We investigated whether exposures to isocyanates, able to induce asthmatic reactions in sensitised subjects, are associated with changes in exhaled NO (eNO), pH of exhaled breath condensate (EBC), and serum CC16. Six subjects with positive specific inhalation test (SIT) to isocyanates and 9 subjects with negative SIT were compared. eNO was measured before and after isocyanate or sham exposures. Blood samples were taken and EBC was collected before and 7h after isocyanate/sham. Serum CC16 was measured with ELISA and pH was determined in argon-degassed EBC. eNO increased from baseline (96±35 ppb) up to 48h after isocyanates (150±34 ppb; p<0.05) in SIT+, whereas no changes were observed in SIT- patients or after sham. Serum CC16 at baseline

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did not differ significantly in SIT+ subjects (30 ± 11 ng/ml) compared with SIT- (15 ± 8 ng/ml), and did not change after isocyanates. EBC pH values did not differ between the two groups either before (7.76 ± 0.15 SIT+; 7.72 ± 0.09 SIT-) or 7h after isocyanates (8.01 ± 0.12 SIT+; 8.13 ± 0.08 SIT-). EBC pH values were significantly higher in the 7h samples (afternoon) compared with baseline (morning) both in SIT- ($p < 0.02$) and in SIT+ ($p < 0.03$) after sham, whereas after isocyanates this difference was significant in SIT- only ($p < 0.01$).

In conclusion, asthmatic reactions induced by isocyanates are associated with a delayed increase in eNO without evidence of loss of bronchiolar epithelium integrity. Changes in EBC pH induced by isocyanates may be hidden by a circadian rhythm.

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The role of CD14, TLR2, and TLR4 genetic polymorphisms in atopy and new onset asthma in young Danish farmers: a nested case-control study

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Background: Evidence exists that exposures to high levels of microbial agents in the farm environment decrease the risk of atopic sensitization. Genetic variation in innate immunity genes may modulate the response to microbial agents and thus play a role in the development of asthma and atopy.

Aim: To study potential associations between single nucleotide polymorphisms (SNPs) in CD14, Toll-like receptor 2 (TLR2), and TLR4 genes, and new onset asthma and baseline atopy in young farmers.

Methods: A cohort of 1901 young Danish farmers established in 1992–94 was followed for new onset asthma up to 1999. Within this cohort a nested case-control study was conducted. We genotyped 100 incident asthma cases and 88 control subjects for three CD14 SNPs, three TLR2 SNPs, and two TLR4 SNPs. Atopy at baseline (defined as a positive skin prick test (SPT) to one or more common inhalant allergens) was found in 17 asthma cases (17.0%) and in 17 controls (19.3%).

Results: No associations between CD14, TLR2, or TLR4 genotypes and new onset asthma were found. The CD14/-260 T allele was significantly associated with less atopy (Odds Ratio (OR) 0.39; 95% CI 0.21–0.72, additive genetic model), whereas the CD14/-651 T allele was positively associated with atopy (OR 2.53; 95% CI 1.33–4.80). Similar results were obtained by haplotype analysis. Stratified analysis by farm childhood showed stronger effects of both CD14 SNPs on atopy among farmers who were born and raised on a farm.

Conclusions: The CD14/-260 and CD14/-651 promoter polymorphisms are associated with atopy prevalence among young adults exposed to farm environments.

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Prevalence of airway allergic diseases, atopy and COPD in coal-dust miners

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The purpose of this study was to find out whether exposure to coal mine dust contributes to the development of atopy, allergic diseases and COPD.

In the cross-sectional study the frequency distribution of COPD 0-IV (spirometry), allergic diseases in personal history (mucosal and cutaneous) and atopy (specific IgE to common inhalation allergens in blood) was studied in 489 coal miners (mean age 41 years, 12 SD) and 360 subjects of a control group (mean age 37 years, SD 12). Controls were recruited from men never exposed to dust and known professional allergens. Statistical analysis was by done χ^2 testing using contingency tables.

In the whole group of miners, the percentage of atopy was 29% after exposure to coal dust lasting 3–15 years and 24% after 16–30 years of exposure ($p=0.082$). Also percentage of allergic diseases did not change (26%).

Miners and controls of the same age groups (19–30, 31–47, and 48–60 years) were compared. Atopy was lower in older age miners than controls (19 vs. 38%, $p=0.001$). Also allergic diseases were less frequent in young miners than in controls (23 vs. 41%, $p=0.001$). On the other hand, COPD 0-IV was higher in miners of the medium and older age groups ($p=0.000$ and $p=0.000$, respectively). Statistical analysis has shown no influence of either coal-mine dust or smoking status on the prevalence of atopy, rhinitis and asthma. Prevalence of chronic bronchitis and COPD I-IV increased with age and length of exposure to coal-dust. According to these data, selection of healthy young men for coal mining and healthy worker's effect probably play a some role, however the occupation of a miner does not seem to represent a risk factor for atopy and respiratory allergic disorders.

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Mortality, morbidity and occupational exposure to airway irritating agents among men with an allergy diagnosis in adolescence

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Objectives: To elucidate the influence of an allergy diagnosis in adolescence on future health and occupation in Swedish men.

Methods: Data is collected from the linkage of four Swedish national registers. A job-exposure matrix for airway irritating substances was developed for application on the conscription cohort. The cohort includes 39,321 Swedish men born 1949–51. Three groups; healthy, asthmatics and other allergy were identified at conscription and analysed for mortality, inpatient care and strategies for choice and change of occupation with emphasis on airway irritating job-exposure. Analyses were adjusted for smoking and childhood socio-economic position.

Results: The prevalence of total asthma was 1.8%, severe asthma 0.45% and other allergy 2.9%. Mortality for all causes was significantly higher in total asthma, hazard ratio (HR) 1.35 (95% CI 1.02–1.78), and lower in other allergy, HR 0.59 (95% CI 0.43–0.82). Asthma was a risk factor for inpatient care while other allergy had less inpatient care (odds ratio (OR) for total asthma 1.16 (95% CI 1.01–1.34), severe asthma 1.38 (95% CI 1.04–1.85), other allergy 0.93 (95% CI 0.84–1.04). Asthmatics tended to avoid jobs with airway irritating exposure. Subjects with other allergy had less often exposed jobs, and especially jobs with a high probability for exposure.

Conclusion: Having an asthma diagnosis in adolescence only marginally influence the choice of job and airway irritating exposure. It does, however, mean an increased risk for morbidity and mortality. We believe that there is a need for improved action regarding asthmatic subjects to improve their health.

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Occupational asthma: the causes and resolution of an outbreak

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Introduction: In 1998 through cross-sectional survey of current employees in a modern detergent factory we identified a very large outbreak of occupational asthma (OA).

Aims: Here we report our subsequent investigations into the determinants of the outbreak and the outcomes of the consequent interventions.

Methods: We identified, retrospectively, all those employed in the factory for >4 months between 1.1.89 and 31.07.02. From employment records we extracted dates of first and final employment and dates of each job undertaken. Separately, blind to the employment history, we examined available occupational health records. Specifically we recorded information consistent with new-onset asthma and rhinitis. Sufficient information was available for 85% of the eligible cohort ($n=884$).

4 years after the original survey and following an extensive factory improvement programme we repeated a cross-sectional survey of current employees.

Findings: we identified 2 peaks of asthma incidence between 1989 and 2002. The second followed an increase in the use of enzymes within the factory. Both peaks followed – with a lag of about two years – large increases in the number of new employees. The intervention was followed by a significant reduction in the incidence of both sensitisation and symptoms consistent with occupational asthma. These reductions were more marked among the cohort of workers employed within 33 months of the second survey.

Conclusions: At a group level the incidence of OA is determined not only by exposure but also by changes in the pool of at-risk employees. Measures of improvement following any intervention should be expressed in terms of disease incidence with proper account of the population at risk.