

ENDEMIC BRONCHIOLITIS OBLITERANS SYNDROME IN MICROWAVE POPCORN WORKERS: A NEW OCCUPATIONAL LUNG HAZARD

K. Kreiss¹, A. Gomaa¹, G. Kullman¹, K. Fedan¹, P. Schleiff¹, E. Simoes², P. Enright¹
National Institute for Occupational Safety and Health, Morgantown, WV, ²Missouri Department of Health and Senior Services, Jefferson City, MO, USA.

RATIONALE: In followup of a cluster of severe fixed airway obstruction in former workers, we studied current employees and exposures in a microwave popcorn plant.

METHODS: We conducted questionnaire interviews, spirometry, lung diffusing capacity, and chest x-rays. Age- and smoking-adjusted rates were compared to National Health and Nutrition Examination III data.

RESULTS: We evaluated exposure-response relations by comparing rates of symptoms and abnormalities by estimates of cumulative exposure to diacetyl, the predominant ketone in artificial butter flavoring and in the plant air.

RESULTS: The 117 current workers (87% response rate) had 2.6 times the rates of chronic cough and shortness of breath compared to national data; 3.3 times the rate of obstructive spirometry abnormalities; and about twice the rate of physician-diagnosed asthma and chronic bronchitis. Excess abnormalities were higher in never smokers, who had 11.8 times the national rate of airways obstruction. Strong exposure-response relationships existed between quartile of estimated cumulative exposures to diacetyl and respirable dust and frequency and degree of airway obstruction.

CONCLUSION: The exposure-related excess lung disease in this plant population is best explained by work-related bronchiolitis obliterans syndrome from inhaling butter flavoring vapors. Animal studies and longitudinal surveillance will clarify the causative agent(s) and efficacy of prevention measures.

This abstract is funded by: CDC

TITLE: BRONCHIOLITIS OBLITERANS IN THE FOOD FLAVORING

MANUFACTURING INDUSTRY. J. Lockey, R. McKay, E. Barth, J. Dahlsten, R. Baughman, University of Cincinnati College of Medicine, Cincinnati, OH. Bronchiolitis obliterans (BO) results from damage to the bronchiolar epithelium that in susceptible individuals leads to fibrosis and narrowing of the small airways and irreversible airway obstruction. The frequency of this disorder is most likely underestimated due to the historical difficulties in localizing abnormalities involving the small airways, its ability to masquerade as other respiratory disorders, and its relatively low frequency of occurrence. The causes of BO range from infectious agents, toxic gases, fumes, mists or dusts, connective tissue disorders, complication from bone or heart-lung transplantation, as well as idiopathic. An index case of BO was identified in a worker involved in the food flavoring manufacturing industry. A subsequent survey of the workforce identified an additional four workers with clinical findings consistent with BO. A comprehensive review of the worksite identified multiple agents within the food flavoring industry as potential causative agents and most prominently acetaldehyde. Of the five patients identified with BO, all had normal pre-placement spirometry results. These values subsequently demonstrated a precipitant drop with the development of moderate to severe non-reversible airway obstruction. After removal from exposure for four to five years, these patients have no further loss in their lung function. Ingredients used in the food flavoring manufacturing industry can number in the thousands and the vast majority have not been studied for inhalational toxicity. This case series indicates that the manufacturing of food flavors in relatively large amounts and at high concentrations and the use of aerosolized manufacturing processes may represent a respiratory hazard in susceptible workers.

University of Cincinnati College of Medicine

This abstract is funded by:

SENSITISATION TO HEMICELLULASE AND CELLULASE IN UK BAKERS.

J. Elms, J. Walker, E. Robinson, D. Fishwick and A.D. Curran, Health and Safety Laboratory, Lane, Sheffield, S3 7HQ, UK

Rationale: Enzymes in flour improver are known to be a significant cause of respiratory in the baking industry, but there are few reports in the scientific literature which highlight the potential of commonly used enzymes to induce sensitisation other than fungal alpha amylase. The objective of this study was to assess serum taken from bakers to determine whether have specific antibodies to hemicellulase and cellulase.

Methods: The sample population consisted of employees who had participated in a cross sectional study of bakeries with fewer than 50 employees in the UK. 224 individuals completed physician-administered questionnaire, which assessed nasal and eye, upper and lower respiratory, and past medical history. Of these, 138 were analysed for specific IgE to wheat fungal alpha-amylase, cellulase and hemicellulase (specifically xylanase) by RAST.

Results: 31 (15%) bakers had IgE to fungal alpha-amylase, but only 8 (5.7%) had IgE to hemicellulase, cellulase, or both enzymes. Of these eight individuals, two did not have specific IgE to amylase. Furthermore there was a significant relationship between the appearance work related symptoms and the presence of specific IgE to both wheat flour and mixed grain ($p<0.05$); this relationship was more marked with the development of nose and eye symptoms ($p<0.02$).

Discussion: In the last few decades, enzymes have been introduced in the baking industry. Although many studies have focused on the potential of fungal alpha-amylase as a cause agent of respiratory problems, there is little information about other enzymes used. In this study we have demonstrated that 5.7% of the bakers studied had specific IgE antibodies to hemicellulase, cellulase or both enzymes, and that the presence of work related respiratory symptoms is associated with the presence of specific IgE to both enzymes and wheat.

This abstract is funded by:

Health and Safety Executive.

BIOAEROSOLS, INHALABLE PARTICLES, AND RESPIRATORY

SYMPTOMS FROM GLASS BOTTLE RECYCLING. S.M. Kennedy, R. Copes, M. Brauer, S. Na, V. Leung, B. Karlen, UBC School of Occup. & Envir. Hygiene, Vancouver, Canada

We surveyed airborne exposures and symptoms in retail liquor stores with bottle recycling and on site glass crushing programs. **Methods:** From a total of 223 stores, 36 were selected, by stratified random sampling. Each store was visited twice; between visits, glass crushing machines were shut down for 1 mo. in half the stores. We measured inhalable particles and endotoxin (270 full shift personal samples); and viable fungi (648 area samples). Employees ($n=272$, 86% participation) were interviewed using ATS and acute symptom questionnaires. **Results:** Mean exposure levels were 0.21 mg/m^3 (range $<\text{LOD}-1.8$) for inhalable particles, 7.5 EU/m^3 ($<\text{LOD}-105$) for endotoxin, and 1791 CFU/m^3 ($0 - >18,000$) for fungi. Fungal levels were highest around broken bottles and near the bottle drop-off and lowest at the cash desk, whether glass crushing machines were operating or not. Fungal counts were associated with mouldy bottles being broken in the store on the test day ($p<0.001$) and with the presence of uncovered glass bins ($p<0.05$). Compared to controls, employees reported more chronic chest tightness (31 vs 17%) and nasal symptoms (61 vs 49%) (both $p<0.05$). For work-related symptoms, relative risks were 4.8 for chest tightness, 2.9 for nasal symptoms, and 2.5 for eye irritation (all $p<0.05$). Acute chest symptoms (tightness, wheezing, cough, dyspnea) were associated with mouldy bottles being broken (OR: 2.6, 95% CI: 1.1, 6.4), but not with measured fungal counts. Particle levels above 0.2 mg/m^3 were associated with acute nose and throat irritation (OR: 2.3, 95% CI: 1.1, 4.3). **Conclusion:** We conclude that glass bottle recycling in these retail outlets may give rise to fungal exposures sufficient to elicit upper airway and chest symptoms.

This abstract is funded by: Workers' Compensation Board of British Columbia

SURVEY OF POSSIBLE PULMONARY EFFECTS IN BALLOON ARTISTS

E.Y. Kempeneers, J. Verschakelen, F. Rochette, B. Nemery

Laboratory of Pneumology (Lung Toxicology), K.U.Leuven, Leuven, Belgium.

Balloon artists inflate and then manipulate (talc-coated) latex balloons in different shapes. Following the discovery of pulmonary talcosis in balloon artists (Thorius *et al.* Lancet, 1999, 354, 124), we offered balloon artists the possibility of undergo health examination during one of their conventions. This included a detailed questionnaire, clinical examination, spirometry, and a chest x-ray.

Out of approximately 160 participants, 53 subjects (46 males, 7 females) volunteered for the investigation. Their mean age was 38 y (range 21 to 60 y); 26% and 25% current or ex-smokers, respectively. The mean duration of manipulating balloons: 10 y (range $<1 - 31$ y), with a mean number of balloons used per year of 18.100 (100 - 80,000) and a mean weekly exposure of 13 h (range $<1 - 70$ h). The prevalence of chronic cough (11%), expectoration (2%), and dyspnea (7%) were low. Hay fever (26%), chronic sinusitis (34%) and allergies (36%) were common. Asthma symptoms were mentioned by 30%, and 9% had a doctor-diagnosed asthma. Spirometry generally gave above-normal values: mean FVC = 112% predicted, mean FEV₁ 111%, mean 120%, mean MEF₅₀ 104%. There was no correlation between pulmonary function indices and cumulative exposure to balloons. There were no differences between using a pump to inflate balloons and those who did not. No chest radiograph revealed anomalies suggesting talcosis.

In this group of active balloon artists, we found no overt pulmonary disease that can be attributed to their occupational or avocational activity. Nevertheless, in view of exposure to talc and latex, one should remain vigilant for possible long-term effects.

This abstract is funded by: FWO-Levenslijn & VRGT

SENSITISATION TO AIRBORNE MOULDS IN PEAT MOSS FAC

WORKERS. P. Pageau, Y. Cormier, A. Mériaux, E. Israël-Assayé, Duchaine, Unité de Recherche, Institut de Cardiologie et de Pneumologie de l'Université Laval, Ste-Foy, Québec, Canada.

Peat moss factory workers are exposed to mould contaminated dust. Previously described cases of hypersensitivity pneumonitis in these workers. The goal of the present study was to evaluate the incidence of sensitization to *Monicillium* and *Penicillium* (major moulds found in peat dust) in 111 exposed to stored peat moss and the health impact of the sensitization. One hundred and twenty eight workers from 12 peat moss processing plant recruited for the study. A venous blood sample and forced expiratory volume in one second measurement were obtained for each worker. Blood samples were obtained from 42 non exposed control subjects. Serum levels of specific antibodies were measured by ELISA. Air samplings from each plant obtained to measure the levels of airborne moulds. Thirty eight (30%) workers had a positive serum reaction to both moulds. The percentage of positive workers varied from plant to plant, going from none of 23 workers to 11 of 18. This variability was not correlated with the airborne levels of FEV_1 was lower in the workers with positive antibodies compared to seronegative workers ($p=0.02$). We conclude that there is a high incidence of mould sensitization in peat moss factory workers and that this sensitization may have a negative respiratory health impact.

Institut de Recherche en Santé et Sécurité du Travail du Québec (I

This abstract is funded by:

AMERICAN JOURNAL OF

Respiratory and Critical Care Medicine

ISSN 1073-449X

SUPPLEMENT

April 2002

Volume 165

Number 8

AMERICAN THORACIC SOCIETY

ABSTRACTS

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May 17–22, 2002 • Atlanta, Georgia

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This special supplement of the *American Journal of Respiratory and Critical Care Medicine* contains abstracts of the scientific papers to be presented at the 2002 International Conference. The abstracts appear in order of presentation, from Sunday, May 19 through Wednesday, May 22 and are identified by session code numbers. To assist in planning a personal schedule at the Conference, the time and place of each presentation is also provided.

Bennett, William D. (Bill)

From: Kreiss, Kay
Sent: Wednesday, June 25, 2003 5:12 PM
To: Bennett, William D. (Bill)
Subject: Re: Funding

Simoes was missouri state epidemiologist at the time and did not have a grant or cooperative agreement. The work was done by niosh as a technical assistance to the state health dept. Simoes is now in atlanta with cdc. Dr. Kathleen Kreiss 1095 Willowdale Road Morgantown, WV 26505-2888 kxk2@cdc.gov