COUGH REFLEX SENSITIVITY IN BAKERS WITH RESPIRATORY SYMPTOMS.

CM Barber, D Fishwick, J Elms, AD Curran
Health and Safety Laboratory, Broad Lane, Sheffield, S3 7HQ, UK

Rationale: Exposure to bakery allergens remains a leading cause of occupational asthma. It has recently been suggested that its prevalence may be overestimated as bakers experience work-related respiratory symptoms (WRRS) due to irritation from bakery dusts.
Increased cough reflex sensitivity has previously been found in symptomatic workers exposed to irritant gases; its importance in bakery workers is unknown.
Methods: Work-place citric acid cough challenges were performed by 22 of 28 (79%) bakery workers identified with WRRS from a population of 133 workers in a large UK bakery. Mean cough thresholds in this group were compared with 22 of 27 (81%) asymptomatic workers.
Results:

	WRRS n=22	Asymp. n=22	p value
Age – years (range)	36 (20-63)	36 (16-58)	NS
Male: Female - %	91:9	77:33	0.22
Smokers/Ex:Never - %	55:45	45:55	NS
Mean time in industy (SD) - years	13 (9)	11 (10)	NS
Mean FEV_1 (SD) - % predicted	98 (14)	109 (15)	0.02*
Mean log cough threshold D_2 (SD) – mM	3.10 (0.45)	3.15 (0.40)	0.7

Conclusion: Work-related respiratory symptoms in this population of bakery workers were not related to differences in cough reflex sensitivity. This may suggest that the symptoms had an allergic rather than irritant basis.

Health and Safety Executive
This abstract is funded by:

TIME-COURSE OF FUNCTIONAL AND PATHOLOGICAL CHANGES IN CHLORINE EXPOSED A/J MICE

H.R.Campbell, D.Ramos-Barbón, S.A.Tuck, J.G.Martin Meakins-Christie Laboratories,McGill University,Montreal,Quebec, Canada.

Inhalation of irritants such as chlorine (Cl_2) can lead to the development of irritant-induced asthma. Few animal models have been developed to study the effects of Cl_2 on airway cellular responses and changes in lung function. To investigate *in vivo* the effects of Cl_2 on airway inflammation and lung function, A/J mice were exposed to inhaled Cl_2 (400 ppm) for 5 min. Animals were assessed 24h, 48h and 7 d after exposure by measuring repiratory system resistance (R_{RS}) and elastance (EL_{RS}) in response to i.v. methacholine (MCh). BAL was performed to determine total and differential cell counts and epithelial cell shedding. To determine the effects of inhibiting iNOS, a group of animals was treated with 1400W in addition to being exposed to Cl_2 (400 ppm) for 5 minutes and studied 24 h after Cl_2 exposure. Maximal inflammatory response to Cl_2 was observed 24 h after Cl_2 exposure and was characterized by increased BAL total cell counts (n=6; p<0.001), granulocytes (n=6;p<0.002), macrophages (n=6;p<0.001) and epithelial cells (n=6;p<0.001). The total lymphocyte count was reduced in all Cl_2 exposed groups (p<0.03). Neither baseline R_{RS} nor EL_{RS} was elevated at any time point, while EL_{RS} was increased in response to 40, 80 and 160 µg/kg i.v. MCh (n=7; p<0.04) compared to controls at 24 h but not at 48 h or 7 d after exposure. Animals studied 24 h after treatment with 1400W and exposure to Cl_2 (400 ppm) showed elevated R_{RS} and EL_{RS} in response to 160 µg/kg i.v. MCh (n=6;p<0.05) compared to mice treated with 1400W alone. In conclusion, a single high-dose exposure to inhaled Cl_2 caused transient hyperresponsiveness to MCh, increased inflammatory cell influx and epithelial shedding. These changes had resolved by 48 h after Cl_2 exposure indicating rapid recovery from the acute injury. The inhibition of iNOS in animals exposed to Cl_2 did not abrogate hyperresponsiveness to MCh observed at 24 h, caused by the Cl_2 exposure.

NIOSH 1 R01 OH04058-01
This abstract is funded by: J.T. Costello Memorial Research Fund

Microflora of air and peat in peat moss processing plants in Eastern Canada

P. Pageau, A. Mériaux, Y. Cormier, N. Gover, C. Duchaine. Centre de recherche, Hôpital Laval, Institut universitaire de cardiologie et de pneumologie de l'Université Laval, Québec, Canada.

Introduction: Peat moss is an organic matter colonized by large amounts of microorganisms. Storage of peat moss prior to its processing can result in massive fungal and bacterial growth. Workers may thus be at risk of exposure to large amounts of biological contaminants. **Objectives:** our primary goal was to evaluate bioaerosol exposure in peat moss processing plants using dust removing systems by measuring inhalable dust, airborne molds (mesophilic and thermophilic), bacteria, and thermophilic actinomycetes. In addition, the presence of these microorganisms and mycobacteria was evaluated in peat moss. **Methods:** 12 processing plants in Eastern Canada were visited in the summers of 2000 and 2001. Air samples were taken throughout the day at different working sites using IOM cassettes for inhalable dust and AGI-30 samplers and Andersen six-stage impactors for microorganisms. Samples of stored and bagged peat moss were also taken and analyzed. **Results:** air samples contained up to 345.3mg/m^3 of inhalable dust and up to $5.58X10^7$CFU/m^3 mesophilic molds and $1.21X10^5$CFU/m^3 bacteria. Peat moss samples yielded up to $1.28X10^7$CFU/g (dry weight) and $1.25X10^5$ CFU/g (dry weight) of molds and bacteria respectively. In some peat samples, no acid fast rods were detected while, in others, about 10^7 CFU/g were isolated. Very few thermophilic actinomycetes and thermophilic molds were detected. Significant positive relationship existed between log transformed airborne dust and mold values (p<0.001, r=0.75). **Conclusion:** peat moss processing plants workers in Eastern Canada are exposed to very large amounts of microbial contaminated bioaerosols despite the use of dust removing systems.

Institut de recherche en santé et sécurité du travail du Québec (IRSST)
This abstract is funded by:

INDUCED SPUTUM IN NEW ONSET ASTHMA CASES AMONG MEDICAL RADIATION TECHNOLOGISTS (MRTs) AND PHYSIOTHERAPISTS.

J.Doherty, M. Speck, G.M. Liss, and S.M. Tarlo. Gage Occupational and Environmental Health Unit, University of Toronto, Toronto, Canada.

Rationale: MRTs are exposed to irritants and sensitizers and have been reported to develop occupational asthma (OA) and work-related respiratory symptoms. The mechanism is unknown. We compared induced sputum cytology among MRTs and physiotherapists with asthma which began since starting work. **Methods:** 17 MRTs with a possible diagnosis of OA identified from a questionnaire survey underwent methacholine challenge and sputum induction at the end of a work week. Results were compared to those of 10 non-smoking physiotherapists who reported doctor-diagnosed asthma since starting work. **Results:** Eight of 17 MRTs and 7 of 10 physiotherapists had positive methacholine challenges (PC20 ≤ 8 mg/ml). We examined induced sputum cytology in 7 MRTs and 6 physiotherapists. Of the 7 MRTs vs 6 physiotherapists, 86% vs 83% were atopic, 29% vs 17% were on inhaled steroids, both 100% female, mean age 47 vs 46 years. The 7 MRTs had a lower median (interquartile range) eosinophil count than the 6 physiotherapists: 0% (0.5) vs. 2.5% (20.25), and lower than previously reported median value for treated asthmatics (3%). The eosinophil count was identical [0% (0.5)] among the 5 MRTs not on inhaled steroids. Both the methacholine positive and negative symptomatic MRTs had higher median neutrophil counts: 47% (26) and 42.75% (40.5) than the literature reported normal values [37.5%(20.1)]. The 8 methacholine-positive MRTs had a longer median duration of symptoms than the methacholine-negative group: 15 (9) vs 6 (5) years. **Conclusion:** The lower eosinophil and greater neutrophil counts in MRTs with new-onset asthma could indicate a different mechanism related to workplace exposures, possibly irritant-related.

This abstract is funded by: Workplace Safety and Insurance Board of Ontario

EXHALED NO (eNO) INCREASES AFTER LATEX -ALLERGEN-EXPOSURE IN SENSITIZED SUBJECTS IRRESPECTIVE OF SYMPTOMS AND LUNG FUNCTION CHANGES.

X. Baur, L. Barbinova . Institute of Occupational Medicine, University Hamburg, Germany.

To determine the role of eNO as a marker of allergen-induced airway responses, we measured eNO after challenge test with powdered latex gloves. **Methods.** 31 non-smoking health care workers (HCW) (latex exposure range 1–28 yrs) reporting rhinitis and/or bronchial asthma upon contact with powdered latex gloves underwent an occupational type inhalative challenge test. eNO (using a chemiluminescence analyser CLD 780 TR, CH) and lung function were measured before, immediately, at 1 h, then 2, 4, 6, and 22 h post challenge. All subjects were examined on latex-IgE antibodies (CAP) as well as specific skin prick tests (SPT) with an own latex extract. **Results.** SPT and/or latex-IgE positive subjects (n=22) had a significantly higher basal eNO and eNO increase at 22 h after challenge than nonsensitized subjects(n=7) (basal eNO: 13.9±2.0 ppb vs. 8.2±2.6 ppb, p<0.05; ΔeNO: 7.3±2.1 ppb vs. 1.2±0.6 ppb, p<0.03). Interestingly, elevated basal eNO and ΔeNO were independent of whether sensitised subjects developed a significant bronchial obstructive response (Δ sR_{aw} 100 % and at least 2 kPa x s; n=7) or only an acute rhinitis response (n=14). One sensitised HCW who showed neither an asthmatic nor a rhinitis response was in between with basal eNO (10 ppb) and ΔeNO (2.5 ppb).
No correlations between ΔeNO after challenge and lung function changes was found.
Conclusions. eNO ncrease 22 h after allergen-exposure in latex-sensitized HCW indicates a late inflammatory response of the airways. Elevated basal eNO lets us assume that this response is ongoing or even becomes chronic. It obviously depends on the presence of IgE-antibodies and is irrespective, whether an asthmatic or rhinitis response from the clinical point of view occurs.

This abstract is funded by:

HOG BARN DUST EXTRACT AUGMENTS LYMPHOCYTE ADHESION TO AIRWAY EPITHELIAL CELLS

T.L. Mathisen, S.G. Von Essen, D.J. Romberger, Omaha VAMC and University of Nebraska Medical Center, Omaha, NE, USA.

Workers in animal confinement facilities have an increased incidence of chronic bronchitis symptoms. Increased lymphocytes are present in chronic bronchitis airway tissue. We hypothesized that the dust of hog barns modulates lymphocyte-epithelial cell interactions. To examine this hypothesis, we used an in vitro adhesion assay with human bronchial epithelial cells (BEAS-2B cell line) (BEC) and human peripheral blood lymphocytes (PBL). BEC were grown to confluency on 96 well plates and exposed to varying concentrations of serum free medium with hog barn dust extract (HDE) for up to 24 hrs. After exposure to HDE, BEC were rinsed and PBL ($3x10^6$/ml), labeled with calcein, AM and activated with phorbol dibutyrate (50 ng/ml for 15 min) were allowed to adhere to BEC for 20 minutes. 5% HDE resulted in 2 fold increase in PBL adhesion to BEC in comparison to unstimulated BEC (p<0.0001, n=6 experiments). Time course studies showed no change in PBL adhesion after 15 minutes of HDE but with a 1.6 fold increase after 3 hours HDE exposure. BEC treated with interferon gamma (100 U/ml) resulted in 1.5 fold increase of PBL adhesion. HDE-stimulated PBL adhesion to BEC was partially inhibited by pretreatment of BEC with ICAM-1 antibody (200 ng/ml, 1hr). PBL adhesion to BEC exposed to HDE first applied to a polymyxin B column to reduce endotoxin was nearly completely inhibited by ICAM-1 antibody. We conclude that HDE augments lymphocyte adhesion to airway epithelial cells at least in part via epithelial cell ICAM-1 receptors.

Supported by VA Merit Review Program
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

2002 International Conference

May 17–22, 2002 • Atlanta, Georgia

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.

Title:	Irritant-Induced Asthma: Epidemiology and Pathogensis
Investigator:	Jean-Luc Malo, M.D.
Affiliation:	Hospital du Sacre-Coeur
City & State:	Montreal, QC
Telephone:	(514) 338-2796
Award Number:	5 R01 OH004058-03
Start & End Date:	9/30/1999–12/29/2002
Total Project Cost:	$375,000
Program Area:	Asthma & Chronic Obstructive Pulmonary Disease
Key Words:	asthma, inhalation toxicology, airborne contaminants

Final Report Abstract:
It has been recently recognized that exposure to irritant materials can cause asthma, a type of asthma called Irritant-Induced asthma (IrIA). One of the most dramatic manifestations of this condition was the bronchopulmonary disease that occurred in the survivors of the World Trade Center (1). When this syndrome occurs at work, it is a type of occupational asthma (2).

The general aim of this proposal was to explore the following questions related to IrIA from both epidemiological and physiopathological approaches: 1) Do single irritant exposures (Reactive Airways Dysfunction Syndrome--RADS--) and multiple irritant exposures (IrIA) result in equivalent consequences for airway structure and function? 2) Are baseline characteristics (atopy, airway caliber and responsiveness) relevant to susceptibility of developing IrIA and RADS?

We examined and followed new employees at risk of acute exposure to chlorine and serially assess their characteristics (atopy, airway caliber and responsiveness, smoking, nasal symptoms) and exposure events. In a sub-sample, we also examine induced sputum. In a mouse model, we: 1) explored the mechanisms of airway damage following chlorine exposure; 2) determined the time course of airway damage and repair after chlorine exposure.

We found that:
1) subjects who undergo the most significant changes in airway caliber and hyper-responsiveness generally have more numerous episodes of accidental inhalations and have suggestive evidence of airway remodeling (increased metalloproteinase activities in induced sputum); moreover, there is suggestion that subjects with lower airway caliber and higher responsiveness are at increased risks of lung function deterioration;

2) in the mouse model, chlorine causes dose-dependent changes in pulmonary function and histopathological dames as indicated by altered lung mechanics and epithelial cell sloughing, increased protein in bronchoalveolar lavage fluid. Repair of the damaged airways is characterized by a large increase in epithelial and subepithelial cell proliferation, which peaked five days post-exposure. There is evidence of oxidative stress in airway tissues as indicated by the findings of an increase in carbonyl residues and the