Potential Occupational and Non-Occupational Risk Factors for Workplace Exacerbation of Asthma

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Rationale: There is limited information on the risk factors associated with workplace exacerbation of asthma (WEA). This paper utilizes preliminary findings of the baseline phase of the Workplace Exacerbation of Asthma Study. **Methods:** Adults 18-44 years old with asthma were selected from a health maintenance organization population and requested to complete a telephone questionnaire. Adults with WEA were distinguished from other adults with asthma by having both exposure to asthmagens at work and worsening of symptoms or increased use of asthma medications in association with exposures at work. Those with and without WEA were compared on several past and current factors possibly associated with WEA. **Results:** At the mid-point of data collection, there were 332 employed participants. Twenty-four percent (n=79) of the 332 participants had experienced WEA during the previous 12 months. Individual history of cigarette smoking, allergies and respiratory diseases, parental history of allergies and asthma, past asthma and occupational factors, and exposures in the home environment varied little by WEA status. WEA was associated with a history of a high-level exposure incident (HEI) to gases, smoke, or fumes resulting from a large one-time spill, accident, or fire. Most of the HEI in both groups had occurred > 2 years prior to interview. The odds ratio for WEA given an HEI was 3.1 (95%CI 1.8-5.6), from logistic regression controlling for gender and smoking. **Conclusions:** Few differences existed between adults with and without WEA regarding potential risk factors. However, adults with asthma who had a history of a high-level exposure incident were at increased risk for having work-related exacerbation of symptoms.

This Abstract is Funded by: CDC

Respiratory Health Impact of Exposure to Theatrical Smokes and Fogs

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Respiratory health impacts of theatrical smokes and fogs in the entertainment industry (glycol and mineral oil aerosols) have raised concern among employees and performers and given rise to compensation claims and lawsuits. We studied 101 workers in live theatre, film production, concerts and other venues where theatrical smoke or fog was being generated on the study day. Sites were a convenience sample; participation at sites was over 70%. Methods included an ATS questionnaire, exposure history, cross-shift spirometry, and exposure monitoring. Monitoring data and histories were used to estimate cumulative exposure to theatrical smoke over the past 2 yrs. The mean aerosol concentration was 0.70 mg/m3 (sd: 0.92, n=111 personal samples), with 61% of the aerosol mass in the < 3.5 micron range. Compared to controls, entertainment industry subjects had reduced FEV1 ($p<0.05$) and increased dyspnea ($p<.05$), work-related wheeze ($p=0.1$), chest tightness ($p<0.05$), and nasal symptoms ($p=0.06$). Internal analyses to assess relationships with cumulative exposure over the previous 2 yrs showed the following for work-related symptoms (OR, 95% CI, for 1000 mg/m3 - hrs): cough, 2.0 (1.2, 3.0), phlegm, 2.1 (1.1, 3.8), wheeze, 1.4 (0.9, 2.2), chest tightness, 2.2 (1.1, 4.2). Reduced FEV1 was significantly associated with working within 10 feet of the smoke generating machine ($p<0.05$), but not with quantitative estimates of cumulative exposure. We conclude that exposure to glycol and/or mineral oil aerosols in the form of theatrical smoke or fog may give rise to increased respiratory symptoms and airflow obstruction. Further work is needed to determine if this is a short-term or chronic effect.

This Abstract is Funded by: Workers' Compensation Board of BC

Response to Irritant Provocation in Vocal Cord Dysfunction

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Vocal cord dysfunction (VCD) is a condition characterized by episodic dyspnea, hoarseness, stridor, and a globus sensation. The "gold standard" for the diagnosis of VCD is visualization of paradoxical vocal cord motion, but definitive diagnosis is often hampered by the intermittent nature of symptoms and the lack of dependable provocation maneuvers. We wished to apply the forced oscillation technique for real-time respiratory impedance measurement ("FOT"), along with irritant provocation with inhaled CO2, to compare the glottic response of VCD patients with that of normals. We hypothesized that VCD patients, compared to controls, would have lower thresholds for transient irritant- associated increases in respiratory impedance, and would report more respiratory / glottic symptoms. A provocation sequence was devised, consisting of two 3-sec. breaths of progressively increasing concentrations of CO2 (10-70% vol/vol, in 10% steps) at 10 min. intervals. Respiratory impedance by FOT (ZFOT), symptoms, acoustic recordings and flow-volume loops measurements were repeated after each pair of stimuli. Four VCD patients (diagnosed by rhinolaryngoscopy) and three healthy controls were studied. VCD patients, compared with controls, showed a non-significant trend toward greater symptom reporting at high (>50%) inspired CO2 levels. Patients also showed a non-significant trend toward in increased RFOT and FEF50 / FIF50 ratio with increasing CO2 exposure concentrations. Transient stimulus-related "spikes" in RFOT were documented in some cases, but not with sufficient regularity to have a response threshold. The combination of irritant (CO2) provocation and FOT holds some promise in the objective diagnosis of VCD.

This Abstract is Funded by: NIEHS

Building-Related Respiratory Disease in College Employees

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Rationale. Recurrent complaints of new-onset asthma and building-related symptoms persisted among college employees after 14 environmental investigations occurred over 20 years. We undertook a survey to assess symptom and diagnosis excesses in relation to environmental indices of water damage in rooms of buildings. **Methods.** Participants (N=393) completed health questionnaires. Occupied rooms (N=721) were scored for mold odor, visible mold, stains, and moisture and exposure indices were computed. Respiratory symptom prevalences were examined by building characteristics and exposure indices. Odds ratios were computed for symptoms in relation to exposure indices, adjusting for job status, gender, age, smoking, allergies, latex glove usage, and year of hire. **Results.** About half of the participants reported wheeze, chest tightness, or shortness of breath, and 60% of those noted them to be less severe or to require less medication away from work. Overall, 17% reported physician-diagnosed asthma, about half of whom noted work-exacerbation. Occupants of water-damaged buildings had statistically higher prevalence of any post-hire chest symptom (44%) compared to occupants of other buildings (17%). Work-related chest symptoms followed the same pattern (34% and 10%, respectively). The presence of visible mold, water stain, or mold odor significantly increased the odds (1.7 to 4.4) of work-related chest symptoms, work-related upper respiratory symptoms (sinus or nasal symptoms, or throat irritation), and work-related eye irritation. **Conclusions.** Building-related excesses of chest symptoms occurred in water-damaged buildings and were associated with indices of potential mold exposure. Exposure indices from visual and olfactory scoring may be useful in predicting risk and the need for remediation.

This Abstract is Funded by: None

Nonatopic Research Scientists and Mice Are Exposed to Higher Conc Than Are Atopic Symptomatic W

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Rationale: Work-related chest, nose, and skin symptoms from exposure to laboratory mice occur in 30% to 50% of laborat to mice. We hypothesized that high symptoms in nonatopic LA workers 269/310 researchers and LAW with q mental and workplace allergens. We r and mouse allergen (MA) by inhibiti compared daily ET and MA in atopi Significantly higher daily ET and MA were associated with symptoms in nonatopic vs. atopic workers. In nonatopics, higher ET was associated with symptoms, but MA was not. In between those with and without symptoms. Conclusions: Higher airborne ET predicted symptoms in nonatopic LA workers, but not in atopic workers. Controlling both ET and MA exposures in LAW may be important in minimizing work-related symptoms.

Symptoms to mice	Daily Endotoxin	Daily Mouse Allergen
	No	
Yes	6	
No	4	
	p=	

This Abstract is Funded by: NIAID 1 F32 AI10622-01, NJMRC institutional funds.

Pharmacologic Effects of Grain Weevil Extract on Isolated Guinea Pig Tracheal Smooth Muscle

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Agricultural farm workers exposed to aerosols of organic compounds are at risk of developing respiratory abnormalities. The Grain Weevil, a parasite infecting grain, is a frequent contaminant of processed wheat. We studied the effect of grain weevil extract (GWE) on isolated guinea pig trachea (GPT) smooth muscle in order to investigate the potential bronchoconstrictor properties of this organic agent. GWE was prepared as a 1:10 w/v solution. The extract was added to GPT in a series of 12 organ baths, in parallel, in 1/2 log dose increments. Dose related contractions of GPT were demonstrated using GWE. Tissue response was measured as a percent of the tissue's maximal contraction to carbachol. The effects of mediator modifying drugs including atropine, indomethacin, pyrilamine (H1 antagonist), acivicin, NDGA, and BPB (which block segments of the arichidonic acid cascade),TMB8 (blocks intracellular calcium mobilization) capsaicin (depletes irritant nerve mediators) and captopril (ACE inhibitor) were tested by pre-treating the tissues with these agents. Endotoxin content of the dust extract was, 2014 EU/mg. Protein analysis revealed 55 mcg/mg of extract. Atropine completely blocked the contractile response of GWE. Pyrilamine, acivicin, BPB, capsaicin, captopril and TMB8 significantly reduced the contractile effects of GWE ($p<0.05$). As with other organic dusts previously studied, GWE appears to cause a non-immunologically mediated constriction of airway smooth muscle modulated by mediators of inflammation. The cholinergic receptor is prominently involved in this effect. These findings may be related to respiratory abnormalities seen in agricultural workers processing grain.

This Abstract is Funded by: NONE

AMERICAN JOURNAL OF

Respiratory and Critical Care Medicine

Volume 167 • Number 7 • April 2003

Abstracts

2003 INTERNATIONAL CONFERENCE

May 16–21, SEATTLE, WASHINGTON
AMERICAN THORACIC SOCIETY

This is a supplement of the *American Journal of Respiratory and Critical Care Medicine*

AN OFFICIAL JOURNAL OF THE AMERICAN THORACIC SOCIETY