Small Airways Disease and Pneumoconiosis among California Farmworkers

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Introduction & Methods: Lung autopsy specimens were obtained on consecutive coroner's cases of Hispanic males in Fresno County, California (n=86) to determine the prevalence of lung disease. Specimens were fixed by standardized protocol. Airway pathology and dust content were scored. Histological changes in lung tissue samples of farmworkers were compared to non-farmworkers.

Results: Of the first 86 cases, farmworkers comprised 51% (51% smokers) and non-farmworkers 49% (49% smokers). Microscopic exam to the sixth airway generation demonstrated little mineral dust accumulation, but respiratory bronchioles showed evidence of wall thickening and remodeling associated with heavy carbonaceous and mineral dust accumulation. Increased collagen and interstitial cells including dust-laden macrophages were also present with the wall changes. These changes were associated with agricultural work history, and were independent of cigarette smoking. Independently-rated mineral dust small airways disease, pneumoconiosis, and lymph node fibrosis predominated in the farmworkers compared to the non-farmworkers; 71% vs. 29%, 19% vs. 5%, and 69% vs. 31%, respectively. There was also an association between increasing age and dust concentration present in the lungs.

Conclusions: Hispanic males in Central California show early, subclinical histopathological changes consistent with silicosis and mixed-dust pneumoconiosis. Agricultural dust exposure is associated with mineral dust airways disease independent of age and cigarette smoking. The natural history and clinical significance of these changes remains to be determined.

This Abstract is Funded by: NIOSH

Single and Repeated Zinc-Oxide Exposure in Asthma: Effect on Airway Inflammation

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Single and repeated exposure to zinc-oxide (ZnO) results in an increase in inflammatory cells and cytokines in healthy individuals. The chronic airway inflammation in asthma could increase ZnO-induced inflammation, however this is unknown. This experiment was designed to test the hypothesis that exposure to ZnO on two consecutive days would decrease both the cellular and cytokine responses, compared to one exposure, in individuals with asthma. Utilizing a repeated measure, counter-balanced, single-blind design, 10 subjects with asthma (5 females; age range 22-47 yr; methacholine $PC_{20} < 5$ mg ml) were exposed for 30 min, at rest, to: 1) filtered-air (FA); 2) ZnO; one exposure (ZnO-1: 10 mg m³); 3) ZnO; two exposures (ZnO-2: 10 mg m³). Sputum induction (3% saline, t = 20 min) was performed 65 h pre- and 6 h post-exposure. Comparisons were made with-in (pre- vs post-exposure), and between-conditions (post- minus pre-exposure delta). Within ZnO-1, there was a significant ($P<0.05$) increase in the neutrophil percent (median; 25-75% range: 67.3; 58.9-74.6 vs 38.1; 26.7-68.5%), the delta of which, compared to FA, was increased (18.6; 5.7-26.7 vs -1.8; -7.7-7.7%). In ZnO-2, compared to FA, there was a significant increase in the total leukocyte concentration (175; 125-240 vs 89; 61-133 x 10^4 cells ml), and TNFα (5.9; 3.6-25.0 vs 0.; 0.0-4 pg ml). There were no significant differences in any variables between ZnO-1 and ZnO-2. These results indicate that in individuals with asthma, both single and repeated exposure to ZnO causes an increase in indices of inflammation, but that the specific cell and protein changes could be different as a function of the exposure format.

This Abstract is Funded by: COEH/NIOSH: T421/CCT910427

Documentation of Occupational History in Adults with Recently Diagnosed Asthma: A Structured Retrospective Analysis

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Objective: The most effective instrument for detecting occupational asthma (OA) is the health care provider (HCP) derived history. The purpose of this investigation was to assess the quality of the occupational history (OH) obtained by HCP's who manage adults with recently diagnosed asthma. **Methods:** We identified by computer search, patients age 18-55 with asthma newly reported between 1999-2002. We conducted structured chart abstraction to assess the OH elements documented by HCP's. We also reviewed self-administered patient pulmonary function test (PFT) questionnaires that were not available to HCP's as well as PFT data to assess respirable agent exposure history and pulmonary physiology. **Results:** Occupational status was documented in 94 of 119 (79%) charts. Occupational duties, presence or absence of exposures at work or home, and status of protective equipment use at work were identified in only 3%, 27%, and 3% of the group, respectively. HCP's made a diagnosis of OA in 3 (3%) patients. 71 (60%) patients documented a history of exposure to gas, dusts, or fumes at work in their PFT questionnaire. Bronchodilator response was present in 26%, 77% used short acting bronchodilators. **Conclusion:** In this population of working-age adults with newly diagnosed asthma, patient self-reports of occupational respirable exposure were common. Occupational status was the only OH element frequently documented by HCP's. Fewer than expected cases of OA were diagnosed by HCP's based on prior prevalence studies. OH is likely underdiagnosed by HCP's

This Abstract is Funded by: None

Adaptation of an International Job Exposure Matrix To Assess Exposure to Occupational Asthmagens in the United States

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Rationale: We adapted a previously described (Kennedy et al., Occup Environ Med 2000;57:635-641) asthma-specific job exposure matrix (AJEM) so that it could be used reliably in the United States. The AJEM and limited expert judgment can estimate asthma exposure risk in occupational epidemiology studies. Methods: The Kennedy et al. AJEM uses the International Standard Classification of Occupations, 1988 edition (ISOC-88) coding system. A coder trained in the U.S. Bureau of Census (BOC) system mapped each ISCO-88 code to a corresponding BOC-2000 code(s). An industrial hygienist and an occupational health physician then created exposure ratings for those BOC-2000 jobs that did not get mapped or that had multiple, inconsistently rated mappings. Results: The mapping from ISCO-88 to BOC-2000 was surprisingly difficult. Of the 507 ISCO-88 codes in the Kennedy et al. AJEM, 133 (26%) could not be reliably mapped into BOC-2000 codes, and 224 (44%) of the 509 BOC-2000 codes had no mapping. An additional 74 BOC-2000 codes had multiple, inconsistent ISCO-88 mappings. Accordingly, we created new exposure ratings for over half of those in the new AJEM. Factors that made the mapping from ISCO-88 to BOC-2000 difficult included distinctions in education/skill level and in company size in ISCO-88 that are not present in BOC-2000. Conclusions: We have successfully adapted the Kennedy et al. AJEM to a tool that is more suitable for use in the U.S., where jobs are commonly coded using the U.S. BOC coding system. This will enable efficient assessment of occupational exposures to agents associated with asthma.

This Abstract is Funded by: CDC-NIOSH

Utility of Pulmonary Function a
Settings

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RATIONALE: Previous studies l
exposure on spirometry; however, p
acute high-dose exposure. The stud
measures of restrictive lung disease
Rica. METHOD: Paraquat exposure
workers (mean age 37 yrs, SD=10.5). We measured single breath diffusion capacity (DLCO), cardiopulmonary exercise testing (CPET), and spirometry. Data collection was done at farms by technicians following ATS guidelines. CPET
screened for cardiovascular disease ac
cine criteria. Eligible participants we
acceptability according to previously
modeling assessed relationships betw
RESULTS: 4% were unable to comple
failed to meet ATS reproducibility criteria. DLCO was completed in 293 of 305 subjects. Reasons for failure to complete DLCO included inability to hold
secs, lack of gas mixture in the field
130 subjects were excluded from C
(4%) or back and knee problems (19
values were seen between FVC and I
of CPET. CONCLUSIONS: CPET n
lung disease than spirometry but has more limited use in population-based field studies.

This Abstract is Funded by: Syngenta, Research Agreement 002994

Portable Spriometer for Occupational Respiratory Epidemiology

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Introduction: Workplace challenge tests are a gold standard for diagnosis of work-related asthma. A highly accurate portable electronic spirometer is needed to facilitate research and clinical diagnosis. **Methods:** Detailed specifications were developed, including adherence to ATS spirometry recommendations, an algorithm to collect basic data on workers' activities regardless of shift, and incorporation of an investigator-defined questionnaire. The instrument passed all ATS waveforms when tested at NIOSH. Features include: user feedback on maneuver quality; storage of flow-volume curves and parameters for the three best blows within session; pre- and post-bronchodilator test capability; and award of incentive points. The data can be downloaded via modem. The algorithms were tested with simulated work schedules and by workers with asthma. The algorithm collects activity information necessary for analysis in the OASYS-2 software package. Data is stored in Microsoft Access format. **Results:** Standard diagnostic software was successfully modified to adapt a lightweight highly accurate portable spirometer for use in occupational respiratory epidemiology. The final software is accurate, user-friendly, and customizable to various research settings. **Conclusion:** Use of the small lightweight portable hand-held spirometer enables researchers and health care professionals to observe workers, in their workplace and home environments over a period of weeks, to establish work-related asthma status.

This Abstract is Funded by: CDC, NHBLI

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