

break, a survey was conducted to determine Occupational Health Physicians (OHP's) perceptions of risk and likelihood of seeking information regarding these issues. A post September 11 survey is presently being performed.

**Method:** The survey was distributed to OHP's in the Midwest attending an annual meeting. The survey consisted of likert scale questions related to the perception of risk for a BT or EI event, the likelihood that current surveillance methods could identify the incident, and the likelihood that an OHP would seek-out training on these issues. The post-survey has been mailed to all OHP's attending that meeting.

**Results:** Response rate was 58% (n=56). 61% reported BT was very to somewhat likely to occur in the US, but only 21% felt that this would occur near their work place. Results for EI were similar for the US, however 43% felt that this is likely to occur near work. 61% indicated they were very to somewhat likely to seek out information on BT preparedness. Over 80% indicated interest for EI. Only 38% felt confident that current public health surveillance systems (PHS) could quickly identify a BT event, while 70% responded that an EI outbreak would be quickly identified. Over 50% reported in a crises situation they would rely on the internet and hotlines to obtain relevant information.

**Conclusion:** Occupational physicians are more likely to prepare themselves for an EI than BT event. In a crises situation most OHP's would rely on methods that have been shown to be unreliable at those times (i.e., internet and phone). This indicates that there is a need for providing information and education materials targeted to OHP's. Changes in response and perceptions following September 11 will be reported.

**149. EXPOSURE ASSESSMENT FOR RESPIRATORY SENSITIZERS AND IRRITANTS: EXPERT ASSESSMENT VERSUS SUBJECT ASSESSMENT OF EXPOSURE BASED ON TELEPHONE QUESTIONNAIRE RESPONSES IN AN HMO-BASED STUDY OF OCCUPATIONAL ASTHMA.** P. Hunt, R. Herrick, A. Marx, S. Sama, D. Milton, Harvard University, Boston, MA; M. Hallock, Massachusetts Institute of Technology, Cambridge, MA; E. Pechter, Massachusetts Department of Health, Boston, MA; R. Boylstein, A. Dieffenbach, NIOSH, Morgantown, WV

Occupational exposures to respiratory sensitizers and irritants were assessed based on telephone questionnaire responses in an ongoing case-control study of adult onset asthma. An expert panel of six industrial hygienists evaluated exposures using text descriptions of job title, industry, job tasks, tools and chemicals used, and workplace conditions elicited in open-ended questions during the telephone interview. Job descriptions were elicited for

jobs held in the past year only, minimizing bias due to subject recall. Six hundred eleven jobs held by 93 cases and 372 controls were evaluated. Each job description was evaluated by two experts for three sub-scores (probability, intensity, and frequency of exposure) and an overall exposure score on a three-point scale (0 - none, low; 1 - moderate; 2 - high). Exposure prevalence across all jobs was 16% to 29% for sensitizers and 15% to 33% for irritants using strict and lenient exposure definitions, respectively. Agreement on the three-point scale among the experts was moderate, with weighted kappa's for main and sub-scores ranging from 0.40 to 0.55. For dichotomized exposure measures simple kappa's ranged from 0.37 to 0.58. Agreement on positive exposure ranged from 40% to 75% using strict and lenient definitions; agreement on unexposed ranged from 75% to 95%. Subject assessment of exposure was measured with questions on the presence, intensity, and frequency of exposure to "dusts" and "gas or chemical fumes." Agreement between experts and subjects was poor, with kappa's ranging from 0.0 to 0.20. Subjects' assessment of dust exposure greatly over-estimated sensitizer and irritant exposure (Sensitivity: 0.75 to 0.78; specificity: 0.30 to 0.32). Subject assessment of chemical exposure and dust exposure based on secondary question responses (e.g., exposure intensity) showed improved specificity, but agreement with experts was still poor. Agreement among experts and subjects was generally better for cases.

**150. DEVELOPMENT OF A SCREENING TEST FOR ZIRCONIUM SENSITIVITY.** T. Takaro, K. Ertell, B. Stover, University of Washington, Seattle, WA; L. Newman, E. Barker, National Jewish Medical and Research Center, Denver, CO

Zirconium is implicated as a causative agent in rare cases of immunologically mediated granulomatous lung disease that appears similar to chronic beryllium disease. Medical surveillance of beryllium-exposed workers uses the beryllium lymphocyte proliferation test (BeLPT) which can detect sensitization prior to disease. Genetic predisposition is likely, and 3-5% of exposed workers generally become sensitized. If the mechanisms of zirconium and beryllium-induced lung disease are similar, the LPT might also be useful in the preclinical and definitive diagnosis of zirconium-induced lung disease. The purpose of this study is to investigate the performance of the blood LPT in the presence of zirconium salts in a small group of zirconium-exposed workers, and establish laboratory test protocols. Using existing exposure information from U.S. Department of Energy's Hanford site, where zirconium was used in the production of nuclear fuel rods, fifty retired workers with probable zirconium exposure were identified and invited to participate in the study. Twenty-two participated in a structured medical and work history interview.

Zirconium-exposed jobs were coded for task and exposure potential (high, medium, low). Twenty workers were determined to be zirconium-exposed and were invited to donate a blood sample for test development; ten usable samples were obtained. Samples were analyzed at the National Jewish Medical and Research Center using methods similar to the BeLPT but with zirconium salts as a proliferative stimulus. Of the ten samples, one showed a clear difference in proliferation response. This worker had eighteen years of zirconium exposure rated as high. The other nine workers had an average nine years of high exposure (range: 0-30 years). Although further work on test reliability and validity needs to be done, it appears that the LPT may be useful for detecting zirconium sensitization, and may have future utility in medical surveillance for zirconium-exposed workers.

**151. DEPARTMENT OF ENERGY BERYLLIUM-ASSOCIATED WORKER REGISTRY.** D. Weitzman, B. Richter, U.S. DOE, Germantown, MD; P. Wallace, ORISE Center for Epidemiologic Research, Oak Ridge, TN

The Department of Energy (DOE) has included a Beryllium-Associated Worker Registry in its Chronic Beryllium Disease (CBD) Prevention Program regulation (10 CFR 850). The Registry is a database that will allow DOE to maintain surveillance of DOE workers' beryllium exposures, work activities, and health status. The Registry will be used to provide feedback on the effectiveness of the regulation, help DOE understand the risk factors for CBD, and help identify where beryllium exposures can be minimized.

The Registry designers worked with various partners. They proposed data fields, compared the fields to those recommended by the ACGIH-AIHA Task Group on Occupational Exposure Databases, obtained comments from occupational health professionals, and pilot tested the fields at DOE sites.

The Registry database consists of five tables named as Roster (15 fields), Beryllium-Related Medical Surveillance (27 fields), Beryllium Work History (8 fields), Beryllium Task 8-Hour Time Weighted Average (7 fields), and Beryllium Activities and Exposures (23 fields). Every record must contain a unique identifier for the worker, the worker's site code number, and must indicate whether the record is a "new" or "change" record. Additional fields that are necessary to provide logical relationships between the tables are designated as "required." DOE sites submitting data must encrypt the unique identifier so that it is impossible for users of the Registry to compromise the confidentiality of a worker's personal information. DOE sites also must exclude any data that could be used to reveal classified information. The Registry includes logic checks within and across tables to ensure the integrity and validity of the data.

The DOE regulation requires the first sub-

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## ABSTRACTS



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## PF 101 Agricultural Health and Safety

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### 1. RELATIONSHIPS BETWEEN WORK EXPOSURE AND RESPIRATORY OUTCOMES IN POULTRY WORKERS.

S. Kirychuk, J. Dosman, P. Willson, L. Dwernychuk, University of Saskatchewan, Saskatoon, SK, Canada; J. Feddes, A. Senthilselvan, C. Ouellette, University of Alberta, Edmonton, AB, Canada

A pilot study was conducted on 74 poultry barn workers in Western Canada during the winters of 1998-2000. General respiratory health, current, chronic and work related respiratory symptoms; general work duties, and work-site factors were ascertained, pre-exposure, by questionnaire. Personal airborne exposure levels and changes in symptoms and lung function were measured across the work-shift for all workers. Workers were classified according to the type of poultry operation (floor based, n=53; cage based, n=13) in which they worked. There was no significant difference in daily hours spent in the barn between those who worked with caged poultry (5.41±2.35 hours) and those who worked with floor-based poultry (4.42±2.48 hours). Age of birds was 47.10±58.36 days for floor based versus 155.91±63.01 days for cage based facilities.

There were no significant differences in personal environmental measurements between cage-based and floor-based facilities (ammonia 13.22±13.70 ppm, 17.34±16.35 ppm; total dust 5.74±4.85mg/m<sup>3</sup>, 10.01 ±8.84 mg/m<sup>3</sup>; endotoxin 6046±6089 EU/m<sup>3</sup>, 5457±5934 EU/m<sup>3</sup> respectively). There were no significant differences in across work-shift change in pulmonary function indices between workers from cage and floor-based operations. For the entire sample total dust dose (work hours/day x total dust) significantly correlated with across-shift change in FEV<sub>1</sub>, whereas endotoxin dose and ammonia dose did not. Stocking density was significantly correlated with average ammonia (ppm, p=0.002) and ammonia dose (ppm x work hours/day; p=0.004) in floor based operations and with total dust (particles/ml, p=0.002) in cage based populations. Stocking density was also significantly correlated with chronic cough (p=0.003) and across work-shift cough (p=0.05) and chest tightness (p=0.06) for workers from floor based operations; and with phlegm when working (p=0.018) and chest tightness across the work-shift (p=0.004) for workers from cage based operations. Type of poultry production operation and therefore type of work exposures appear to significantly impact symptoms experienced by workers exposed to these atmospheres.

### 2. DUST GENERATION SYSTEM FOR AGRICULTURAL SOIL DUST. K. Lee, R. Domingo-Neumann, R. Southard, UC Davis, Davis, CA

Agricultural workers are prone to exposure to mixed dust of inorganic and organic compounds. Diverse working conditions and operations in agriculture make direct measurements of the mixed dust exposure difficult. This study was conducted to develop a new dust generation system to determine possible exposure potency indicators of soil samples. The dust generator consists of a blower, a rotating chamber and a settling chamber. The rotating chamber has inner baffles to provide sufficient agitation of the samples while the chamber is rotating. A blower provides air into the rotating chamber, and the suspended dust is moved to the settling chamber through a perforated pipe. A small fan inside the settling chamber helps maintain suspension of the dust. Various size fractions of dust are sampled on filters suspended in the chamber via outlet ports and attached pumps. Air pressure is released through a filter plate mounted on the wall of the settling chamber. Various operating conditions were evaluated: air intake from blower, speed of rotation, soil mass and sampling time. To evaluate the characteristics of dust from the system, we collected dust samples from agricultural fields while the soil was prepared for