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P-744 ASSESSMENT OF THE BERYLLIUM LYMPHOCYTE PROLIFERATION TEST: LESSONS LEARNED FROM A LONG-TERM OCCUPATIONAL SURVEILLANCE PROGRAM

E MORINELLO¹, M KOLANTZ², E DONOVAN¹, P CHAPMAN¹, D GALBRAITH¹, D PAUSTENBACH¹
 (1) ChemRisk, San Francisco, CA. (2) Brush Wellman, Inc., Cleveland, OH.

Introduction:

Chronic beryllium disease (CBD) is a hypersensitivity disorder that has been studied among workers in the beryllium manufacturing industry for over 50 years. Immunological sensitization to beryllium can be detected in peripheral blood cells by the beryllium blood lymphocyte proliferation test (BeBLPT). Within the past 15 years, a confirmed positive BeBLPT result (two abnormal tests) has become synonymous with the term beryllium sensitization even though a number of studies have indicated that the assay often yields false negative results and is subject to intra- and inter-laboratory variability.

Methods:

Data from a worker surveillance program at a major beryllium manufacturing company were used to evaluate the performance characteristics of the BeBLPT. Over 10,000 BeBLPT results obtained from nearly 2,400 participants over a 12-year period were analyzed to determine the overall prevalence and cumulative incidence of positive BeBLPT results and to characterize the relationship between BeBLPT positivity and time worked. Over 500 test results from a new employee testing program involving serial testing at pre-employment, and 3, 6, 12, 24, and 48 months after hire were also evaluated.

Results:

The prevalence of positive BeBLPT results was greatest during the first year of exposure, with an apparent peak among workers with 4 – 8 months of employment (22% vs. 8.8% after the first year of employment, $p < 0.05$). Among new hires that were serially tested, positive BeBLPT results usually occurred within weeks or months of initial exposure (median time=five months). Normal test results were frequently observed in workers who had previously been confirmed to be BeBLPT positive. There was no correlation between time of employment and the prevalence of confirmed BeBLPT positive results in individual surveys; however, the cumulative incidence of positive BeBLPT results among workers that participated in multiple surveys increased over time. One percent of newly hired workers with no known occupational exposure to beryllium were confirmed to be BeBLPT positive upon hire.

Discussion and Conclusions:

Serial testing of new employees revealed that positive BeBLPT results occur early in employment. Reversions to "normal" status among BeBLPT positive individuals upon repeat testing may be a result of changes in the responsiveness of the circulating lymphocyte population over time. This variability and the observation of BeBLPT positive results in a population with no known beryllium exposure have important implications for research and industrial practice.

P-745 EXPOSURE TO SO₂ AND OBSTRUCTIVE BRONCHITIS IN SMOKERS AND NONSMOKERS

L FAT¹, L GYORFFY², S ROMAN²
 (1) INSTITUTE OF PUBLIC HEALTH, CLUJ-NAPOCA. (2) DISTRICT HOSPITAL, BAIA-MARE.

Introduction. The medical literature shows that the irritant vapours, especially SO₂ has a very strong irritative effect on the respiratory system, the long-term and repetitive exposure generating functional alterations and anatomic lesions, often irreversible and apt to aggravate. The knowledge of these manifestations is very important, taking into account the spreading of SO₂ in industry and the frequency of the chronic bronchitis and emphysema. Often, the irritants affect all the working people from a great plant and their effects spread outside the working places. In this study we tried to evaluate the presence of obstructive bronchitis in smokers and non-smokers occupationally and environmentally exposed to SO₂.

Methods. We investigated 242 workers from a non-ferrous metallurgical plant and 134 workers from a neighbouring area, a village situated in the proximity of a city, where the direction of the dominant wind promotes the spreading of the pollution and the dispersion of the SO₂. Clinical and X-ray examination, respiratory tests and standard questionnaire regarding the respiratory symptoms were made. The concentration of irritant vapours and SO₂ exceeded 9 times the admissible concentrations in the metallurgical plant and 1,6 times in the neighbouring areas.

Results. The obtained data were discussed, evaluated and we concluded that in the metallurgical plant 54.5% workers had ventilatory dysfunctions (VD): 50.4% easy VD, 3.7% medium VD, 0.4% severe VD. From these workers 55.3% were smokers and 44.7% nonsmokers. Obstructive bronchitis was found in 52 (21.4%) smokers and 40 (1.5%) nonsmokers in the generating plant and in 15.67% smokers and 15.67% nonsmokers from the neighbouring area. Outside the metallurgical plant 42.5% people had ventilatory dysfunctions, 42.1% smokers and 57.9 nonsmokers. Pulmonary fibrosis was found in 25.1% workers from the metallurgical plant: 47.5% smokers and 52.5% nonsmokers; 46.2% smokers and 53.8% nonsmokers having ventilatory dysfunctions.

Conclusions. The results suggest that SO₂ induce alterations of the respiratory tests and obstructive bronchitis in smokers and nonsmokers occupationally and environmentally exposed (² test significant regarding the differences between smokers and nonsmokers in the generating plant, $p < 0.05$, and no significant in the neighbouring area). There were significant differences regarding the presence of obstructive ventilatory dysfunctions in smokers and nonsmokers without pulmonary fibrosis ($p < 0.01$) and also in the presence of obstructive ventilatory dysfunctions in workers with and without fibrosis ($p < 0.001$).

P-746 THE WORLD TRADE CENTER CLEAN UP AND RECOVERY WORKER COHORT STUDY: RESPIRATORY HEALTH AMONG CLEAN UP WORKERS APPROXIMATELY 20 MONTHS AFTER INITIAL EXPOSURE AT THE DISASTER SITE

X TAO¹, J MASSA², L ASHWELL³, K DAVIS², M SCHWAB², A GEYH²
 (1) Johns Hopkins School of Medicine, Baltimore. (2) Harvard School of Public Health, Boston. (3) Johns Hopkins Bloomberg School of Public Health, Baltimore.

Introduction: The terrorist attacks of September 11, 2001 resulted in the complete destruction of the World Trade Center (WTC) complex in New York City. Almost immediately an enormous workforce was mobilized to conduct rescue and recovery and begin the process of cleaning up the 16-acre field of debris. Early in the clean up effort, evidence began to accumulate that inhalation exposure to contaminants at the disaster site was hazardous to the respiratory system. This study was conducted to address concerns that construction workers involved in the clean up operation were at risk for respiratory health effects that persisted after completing work at the WTC. The goal of this study was to test that hypothesis that workers involved with the clean up operation at the WTC are at elevated risk for persistent respiratory health effects, and that the risk is related to duration of work at the site, location of work, and the intensity of their exposure.

Method: Respiratory health among workers involved in the clean up at WTC was evaluated approximately 20 months after the initial exposure to assess the risk of persistent lower respiratory symptoms (LRS). In 2003 a self-administered questionnaire requesting information on site experience, current respiratory health, historical health, and smoking was sent to 4546 workers identified by their union or employer as having worked at the site (25% responded), and 2103 workers who were never at the WTC (11% responded). Workers contacted to participate in this study included truck drivers, heavy equipment operators, laborers, and sanitation workers represented by the International Brotherhood of Teamster, the International Union of Operating Engineers, the Laborers International Union of North America, and the New York City Department of Sanitation.

Results: As compared to workers who were never at the site, WTC workers were more than twice as likely to report any LRS (Odds Ratio (OR)= 2.86, 95% Confidence Interval (CI): 2.03, 4.04). Workers who spent greater than 240 days at the site were more than 4 times as likely to report any LRS as compared to those never exposed (OR=4.87, 95% CI: 2.93, 8.08). WTC work location was also an important predictor of LRS. The OR for workers who spent time outdoors directly in the debris was 1.61 (95% CI:1.12, 2.32).

Discussion and Conclusions: These results suggest a persistent impact on respiratory health related to work experience at the WTC and indicate a need for further monitoring to address potential long term effects.