

**PSYCHOSOCIAL IMPACT OF FARMER'S LUNG (FL): ROLE OF STRESS ADAPTATION IN THE DECISION TO QUIT FARMING.** E Morin, S. Bouchard, G. Bédard and Y Cormier. Unité de Recherche, Centre de Pneumologie, Hôpital and Université Laval, Quebec City, Canada.

Although farmers with FL can usually continue farming without the risk of further lung function deterioration, 50% of FL subjects quit the farm, half despite normal lung functions (ARRD, 148: 216-221; 1993). In attempt to better understand why some farmers with FL leave their work, we evaluated the psychological impact of the disease and its contribution to the decision to quit farming. 249 farmers: 125 with a history of FL (48 who quit because of their disease (FLq) and 75 who stayed (FLs)) and 124 farming neighbor controls were studied. All subjects answered a questionnaire on their farm practices, their current state of anxiety, and for those with the disease, its psychosocial impact. Subjects of all three groups were similar for age, sex, type and size of farm. All groups had similar interest in the farm profession (high interest in 88% controls, 81% in the FLq and 88% in FLs groups). The degree of lung impairment at diagnosis was similar in FLq and FLs. The level of anxiety and depression was similar for both groups of FL patients (Mean $\pm$ SD anxiety score of 38.9 $\pm$ 8.2 and 38.1 $\pm$ 7.2 respectively). This was slightly higher than in the controls (35.9 $\pm$ 6.3), the difference was significant only between controls and FLq. Patients had a good understanding of FL (FLq 88%, FLs 87%). FLs were much less scared of the disease and had a higher confidence (87%) that they could cope with it and continue farming compared to the FLq group (21%). The opinions of family, friends and family physicians, in relation to the potential impact of FL on their future health, were also more negative in FLq (84%, 74% and 87%) compared to the FLs (51%, 46% and 52%). We conclude that psychological and psychosocial adaptation influences the decision of some farmers to continue or quit farming. Awareness of these variables will help physicians understand why some farmers with LF quit their work and help us guide them in their decision.

**AIRBORNE CONCENTRATIONS OF DUST AND ENDOTOXIN IN SELECTED U.S. COTTON TEXTILE MILLS.** R.M. Castellan, B.T. Day, S.A. Olenchok. Division of Respiratory Disease Studies, National Institute for Occupational Safety and Health, Morgantown, WV

Occupational exposure to cotton dust is associated with acute and chronic respiratory effects. The Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) for yarn production areas--200  $\mu$ g/m<sup>3</sup> airborne cotton dust collected by the vertical elutriator cotton dust sampler--was established in the 1970's, prior to publication of results of more recent studies which have implicated Gram-negative bacterial endotoxin as a contaminant of cotton dust possibly responsible for adverse respiratory effects following inhalation. The most convincing evidence implicating endotoxin derives from experimental exposure studies in which endotoxin levels and dust levels were not correlated with each other. In order to understand variabilities in airborne levels of endotoxin in commercial mills, and to assess correlations between airborne endotoxin and airborne dust concentrations, the current study evaluated exposures in six selected U.S. textile mills. A total of 794 vertical elutriator dust samples were obtained from three "Western" mills processing cotton grown in California and Arizona region, and from three "Delta" mills processing cotton grown in the Mississippi River region. At four of these mills, dust samples were obtained from surveys conducted at annual intervals during two consecutive years; at two mills, dust samples were obtained only from surveys conducted during the first of these two years. From mills in each region, at least 20 samples were collected in each of six designated work areas; the remaining 208 samples were aggregated into a miscellaneous category. After gravimetric weighing, these filters were assayed for endotoxin activity in terms of endotoxin units (EU) using a chromogenic modification of the *Limulus* amoebocyte lysate test. All data was log-transformed prior to analysis. By work areas, geometric mean dust levels ranged from 76  $\mu$ g/m<sup>3</sup> in Western spinning areas to 257  $\mu$ g/m<sup>3</sup> in Delta opening areas, and geometric mean endotoxin levels ranged from 6.4 EU/m<sup>3</sup> in Western spinning areas to 225.7 EU/m<sup>3</sup> in Delta carding areas. In analyses of variance which excluded the miscellaneous category, region, mill-within-region, work area, year, and a mill-year interaction term were all significant ( $p < 0.0001$ ) factors accounting for approximately 75% of total variability in the level of endotoxin contamination in airborne dust (i.e., EU/mg). Region alone accounted for approximately half the total variability. Overall, Spearman's rank correlation between endotoxin and dust concentrations was 0.72 ( $n = 794$ ;  $p < 0.0001$ ). However, by work area within each mill, this correlation was as low as 0.15 ( $n = 25$ ;  $p = 0.47$ ) for the spinning area in one of the Delta mills. These results provide information useful for evaluating the adequacy of the gravimetric cotton dust PEL with respect to protecting cotton textile mill workers from potentially hazardous levels of airborne endotoxin.

**PERSISTENT WHEEZE AND DUST EXPOSURE AMONG CALIFORNIA FARM OPERATORS.** Marc Schenker, Jeff Farrar, Shelley Green, Steve McCurdy, Bob Lawson. Div. of Occupational/Environmental Medicine and Epidemiology, University of California, Davis, CA. U.S.A.

Many respiratory health outcomes have been associated with farm-related exposures, but few studies have examined the respiratory status of farm operators in California, where the agricultural environment differs greatly from other areas of the country. As part of a larger health and safety study, we conducted a cross-sectional telephone survey of California farm operators looking at the relationship between various farm-related exposures and 1) persistent wheeze (PW) 2) chronic bronchitis (phlegm for  $\geq 3$  months) 3) physician-diagnosed asthma and 4) chronic cough. A systematic sample of 4500 operators was selected from the California Agricultural Statistics Service list frame of approximately 58,000 farm operators. Surveys were completed for 1947 operators (response rate = 60.6%, refusal rate = 13.8%) in early 1993. Among those contacted, 34.1% were ineligible (non-farm operators and deceased). Most respondents were white (88%), and the mean age ( $\pm$ SD) was 54  $\pm$  13.4 years. Approximately 90% of those surveyed were male, and one-third completed 16 years or more of education. The median duration of full-time farming was 15 years, and the median acreage farmed during the previous year was 60 acres. About 37% of the respondents worked at least 50% of the time at hands-on activities such as planting, harvesting or irrigating, whereas 22% reported no time spent in field work. The reported prevalence of smoking among farm operators was low (current = 12.0%, former = 32.3%, never = 55.6%) compared to state-wide smoking data. PW was reported in 8.5%, chronic bronchitis in 3.7%, asthma in 7.8%, and chronic cough in 4.1%. Among smokers, prevalence rates were significantly higher for wheeze, chronic bronchitis and chronic cough. PW showed a dose-response relationship with self-reported dust exposure. The prevalence of PW increased from 4.8% (for those reporting 0% time in dusty job) to 9.1% ( $\geq 50\%$  time in dusty job) among non-smokers and from 17% (0% time in a dusty job) to 27.6% ( $\geq 50\%$  time in a dusty job) among smokers. Similar increases were observed for chronic bronchitis in both smokers (2.7% vs. 4.0%) and non-smokers (9.4% vs. 15.5%). No such increase was observed for asthma or cough in either smokers or non-smokers. After controlling for smoking, age, sex and asthma in a logistic regression model, the odds ratios for PW in the low (1-49% of time) and high ( $\geq 50\%$  of time) dust exposed groups were 1.3 (95% CI = 0.82-2.1) and 1.9 (95% CI = 1.1-3.4). There was no significant interaction observed between dust and smoking in this preliminary model. Among California farm operators, there is a significant association between PW and dust exposure and a weaker association between chronic bronchitis and dust exposure. Follow-up studies will investigate biologic correlates of PW in this population and the specific composition of dust exposures.

**RESPIRATORY HEALTH IN A RURAL CALIFORNIA FARMWORKER COMMUNITY.** S.A. McCurdy, C. Saiki, K. Mobed, E.B. Gold, D. Runsten, M.B. Schenker. University of California, Davis, Calif., USA.

There have been few studies of respiratory health among farmworkers. We conducted a population-based cross-sectional pilot study of respiratory health in a California agricultural community. One hundred fifty randomly selected residents completed interviewer-administered standardized questionnaires (participation rate=75%); 132 (88%) of these underwent spirometry. All but 12 were Hispanic, and two-thirds of interviews were in Spanish. Mean  $\pm$  SD age was 36.2  $\pm$  13.2 years. Seventy-two (48%) were male. One hundred forty-two (95%) had a history of farm work, and 94 (66%) reported farm work within the last year; 57 (40%) were migrants. The prevalences of current, former, and never smokers were 15%, 16%, and 69%, respectively. Current smoking was more frequent among males (19% vs. 12% in females) and in older age groups. Among current smokers, median daily cigarette consumption was 8 cpd. Chronic cough (crude prevalence 3.3%) was more frequent in current smokers (17.4% vs. 0% in never smokers and 4.2% in former smokers) and males (5.5% vs. 1.3% in females). A similar pattern was seen for chronic bronchitis (3 months of phlegm production on most days for at least 2 years; crude prevalence 6.7%)--17.4% in current smokers vs. 4.9% in never smokers and 4.2% in former smokers, and 12.3% in males vs. 1.3% in females. Increased symptom prevalence among males persisted after stratification on smoking status. Among ever smokers, chronic bronchitis was increased among those reporting farm work within the past year (14.3% vs. 5.3%). Among never smokers, persons performing farm work within the past year had lower prevalence for chronic bronchitis than did persons not performing farm work within the past year (3.0% vs. 8.3%). Persistent wheeze (wheezing with colds and apart from colds OR wheezing most days and nights; crude prevalence 8%) was greatest among current smokers (22% vs. 5.8% in never smokers and 4.2% in former smokers); no association with farm work was noted. Pulmonary function testing showed mean FEV<sub>1</sub> was 100% of expected based on population norms [Gamsky, et al]; mean FVC was 101% and mid-expiratory flow rate (FEF<sub>25-75%</sub>) was 98% of predicted. The percentage of participants below 80% of predicted value for FVC and FEV<sub>1</sub> were 7.3% and 9.7%, respectively. Airflow obstruction (FEV<sub>1</sub>/FVC < 0.80 and FEV<sub>1</sub> < 65% of predicted) was present in 3.2% of the sample. Obstructive spirometry was more frequent among ever smokers; no effect was seen from farmwork within the past year. This pilot demonstrates the feasibility of conducting community-based respiratory health studies in California Hispanic farmworkers. Lower airway symptoms were increased over prevalences seen in workplace-based studies of California Hispanic farmworkers. Increases in symptoms associated with farm work among ever smokers suggests an interaction may exist between smoking and work exposures.



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