

that the operator change to a shorter vibrator with a handle when reaching the top layer during wall casting.

SR-404-11

Organophosphate Exposure and Depression in U.S. Air Force Aircraft Maintainers

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Objective: Previous studies found that aircraft maintenance workers may be exposed to organophosphates in hydraulic fluid and engine oil. Studies have also illustrated a link between long-term low level organophosphate pesticide exposure and depression. The aim of this study was to measure association between self-reported workplace exposure to hydraulic fluid and engine oil and major depressive disorder.

Methods: A questionnaire containing the Patient Health Questionnaire 8 depression screener was emailed to 52,080 aircraft maintenance workers (with n=4,801 complete responses) to determine depression prevalence, severity, and descriptions of their occupational exposures. Based on a record review of workplace duties and authorized chemical usage, workers were separated into four similar exposure groups (SEGs)—propulsion, hydraulics, crew chiefs, and other workers.

Results: There was no significant difference between reported depression prevalence or severity in SEGs in which aircraft maintenance workers were exposed or may have been exposed to organophosphate esters compared to SEGs in which they were not exposed to them. However, a dichotomous measure of the prevalence of depression was significantly associated with self-reported exposure levels and with each exposure route (contact, inhalation, and ingestion). A four-level measure of depression severity was also associated with self-reported four-level categorical exposure.

Conclusions: Based on self-reported exposures and outcomes, we cannot assume that the associations we observed are causal because some workers may have been more likely to report exposure to organophosphate esters and also more likely to report depression. Future studies should consider using a larger sample size, better methods for characterizing SEGs, methods for quantifying ingestion exposure, and bioassays to measure dose rather than exposure.

SR-404-12

An Updated Evaluation of Reported Chrysotile Asbestos: No Observed Adverse Effect Levels (NOAELs) For Lung Cancer and Mesothelioma

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Objective: Historically, Chrysotile asbestos was used in thousands of products in the U.S. and is still used today in many countries. Therefore, it is important to understand the exposure response relationship between chrysotile and asbestos-related health effects. The purpose of this evaluation was to update an analysis published in 2008 in

which we characterized chrysotile NOAELs for lung cancer and mesothelioma.

Methods: A literature search was performed to identify all epidemiology studies that described the health experience of cohorts predominantly exposed to chrysotile (< 10% amphiboles). All studies that provided risk estimates for mesothelioma or lung cancer, stratified by at least two levels of cumulative exposure, were included in our analysis. For each study, the NOAEL was defined as the highest exposure group at and below which there was no statistically significant increased risk for lung cancer and/or mesothelioma. An overall best estimate NOAEL range was estimated for each disease using the geometric mean of the lower-bound and upper-bound of the range of the NOAELs derived from each study.

Results: Sixteen lung cancer NOAELs were obtained from 14 published studies. The best estimates of the lower- and upper-bound of the NOAELs for lung cancer were 89 fibers per cubic centimeter per year (f/cc-yr.) and 168 f/cc-yr., respectively. Notably, none of the six cohorts of workers primarily exposed to medium or short fiber chrysotile exhibited an increased risk of lung cancer at any cumulative exposure level. Three cohorts were identified in which pleural mesothelioma risk was stratified according to cumulative chrysotile exposure. The best-estimates of the lower- and upper-bound of the NOAELs for pleural mesothelioma were 208 f/cc-yr. and 415 f/cc-yr., respectively.

Conclusions: This updated review reinforces our previous findings that support the existence of a cumulative exposure level for chrysotile below which lung cancer and mesothelioma risks are not appreciably raised.

CS-404-13

Improving Safety Eyewear Fit for the US Workforce

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Situation/Problem: Safety glasses or eyewear are critical to protecting the eyes and vision of countless employees in the workplace. Safety glasses protect users from hazards such as flying objects, dust and particulate matter, and thermal energy. The protective eyewear needs to fit well and be worn consistently in order to provide adequate protection for the user. However, ill-fitting safety glasses are a common problem. The current size offerings of safety glasses do not afford protection to all the different face shapes found in the workforce.

Resolution: In 2003, NIOSH conducted a nationwide anthropometric survey of nearly four thousand subjects. The subjects' facial features were measured using surface scans and traditional anthropometric techniques. These measurements were utilized to create five symmetric headforms that represent the facial size and shape distribution of current U.S. respirator users. The NIOSH headforms can be used to improve the fit of safety glasses by adapting safety glasses size dimensions to the shape of the headforms. Key dimensions such as temple width, earpiece length, and nose bridge height were extracted from each of the headforms and incorporated into new designs of safety glasses. Five prototype safety glasses were modeled to match the features of the NIOSH headforms and the prototypes were then manufactured using stereolithography.

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