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SHOULDER IMPINGEMENT IN A WORKING POPULATION. *M S Thiese, K T Hegmann, A Garg, G Deckow-Schaefer, G Groth, D Drury (University of Utah, Salt Lake City, UT 84108)

Epidemiological studies investigating the risks associated with shoulder impingement are non-existent. Baseline data of prevalence are reported from a large cohort of workers (n=860) in 12 diverse plants in Wisconsin and Utah. The workers are 67.3% female, 28.4% current smokers, 22.7% former smokers, with a mean age of 41.4 ± 11.2 years and mean Body Mass Index (BMI) of 29.5 ± 6.9 kg/m². All workers underwent a questionnaire, structured interview, and two standardized physical examinations. Findings herein are for the right shoulder only. At baseline, a total of 25.9% had complaints of glenohumeral pain in the prior month and 11.4% had a positive impingement (Neer's) sign. Using the impingement case criteria of glenohumeral pain and a positive impingement sign, the one month period prevalence of right shoulder impingement in this population is 8.7%. Univariate and multiple logistic regression analyses were performed. Univariate analyses yielded statistically significant associations with age [Odds Ratio (OR)=1.04, 95% Confidence Interval (CI) 1.02, 1.07], diabetes mellitus (OR=3.00, 95% CI 1.27, 7.07) and job dissatisfaction (OR 3.73, 95% CI 1.39, 10.07). After adjustment for age, BMI, gender, smoking status, diabetes mellitus, a question on familial psychosocial problems, and job dissatisfaction these data demonstrated similarly robust findings. Age (OR=1.05, 95% CI 1.02, 1.08), diabetes mellitus (OR=2.63, 95% CI 1.03, 6.72) and job dissatisfaction (OR=4.47, 95% CI 1.59, 12.57) were statistically significant. The findings concerning age are comparable with other published necropsy studies on shoulder tendinitis, however the relationship with diabetes mellitus is new. The relationship with job satisfaction is similar to one prior report on shoulder pain. These results suggest that there are personal factors that are strongly associated with shoulder impingement after adjustment for known and suspected risk factors.

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IS THERE A CORRELATION BETWEEN VARIABILITY AND LEVEL OF EXPOSURE THAT BIASES RISK ESTIMATES IN OCCUPATIONAL EPIDEMIOLOGY? *I Burstyn, H-M Kim, H Kromhout, N Cherry, Y Yasui (University of Alberta, Edmonton, AB Canada)

Use of quantitative group-level exposure as the exposure level of all individuals in the group can bias exposure-response relationship in logistic regression, even when the measurement error introduced by the use of group-level exposure is of Berkson type. It was previously suggested that this could occur in occupational settings, when there is dependence between measurement error variance and mean level of exposure. It was also proposed that this condition could be examined by assessing correlation between observed variance and mean of exposure levels across groups. Are occupational cohort and case-control studies of rare diseases (e.g. cancer) that use group-based exposure assessment prone to this type of bias? We examined measurements of occupational exposure from a large database to determine whether there generally exists a correlation between mean exposure and variance components (between-worker and day-to-day) across groups. There was little evidence of strong correlation between logarithmic means and variances in the exposure groups assembled using methods typically employed in occupational hygiene. However, there was a positive correlation between logarithmic mean and between-worker logarithmic standard deviation for inhalable dusts ($r=0.34$, $p=0.008$, 61 groups). In simulations of logistic regression, heterogeneity of variance across exposure groups did not produce significant biases in odds ratio estimates when between-worker variance was small or there were many workers sampled in a group. Reduction of between-worker variance still appears to be the key aspect of group-based exposure assessment, even in presence of heterogeneity of variance among exposure groups. Increasing the number of measured workers can further reduce the bias.

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SEARCH FOR THRESHOLDS AND OTHER NON-LINEARITIES IN THE HEXAVALENT CHROMIUM - LUNG CANCER EXPOSURE RESPONSE. *R Park, L Stayner (National Institute for Occupational Safety and Health, Cincinnati, OH, 45226, USA)

This study investigated non-linear features of the exposure response including threshold and dose rate effects, and other attributes, in a cohort of 2357 chemical workers with 122 lung cancer deaths. Variations in the construction of the cumulative exposure metric were investigated corresponding to cumulative exposure thresholds, exposure intensity thresholds, variable dose-rate effects, and a declining burden of accumulated future risk. Using Poisson regression, a simple two-stage carcinogenesis model was rejected. The best fitting models had no threshold for exposure intensity and the study had sufficient power to rule out thresholds as large as $50 \mu\text{g}/\text{m}^3$ CrO₃ (likelihood ratio test, $p<.03$) (the current OSHA standard permits exposures up to $100 \mu\text{g}/\text{m}^3$ CrO₃). For cumulative exposure, slightly better fitting models were observed for thresholds of $0.05\text{--}0.5 \text{ mg}\cdot\text{yr}/\text{m}^3$ (as CrO₃) but the fits were not statistically significantly better than a model without a threshold. Cumulative exposure thresholds as large as $1.5 \text{ mg}\cdot\text{yr}/\text{m}^3$ CrO₃ were excluded (likelihood ratio test, $p<.01$) (current standard permits lifetime cumulative exposures up to $4.5 \text{ mg}\cdot\text{yr}/\text{m}^3$ CrO₃). Departure from linearity of the dose rate effect was negative, corresponding to intensity raised to the 0.8 power but this was not statistically significant. Models with declining risk burdens based on half-lives ranging 0.1 to 40 years fit less well than assuming a constant burden. This examination of non-linear features of the hexavalent chromium - lung cancer response supports the use of the traditional (lagged) cumulative exposure paradigm: no threshold, linearity in intensity, and constant increment in risk following an exposure.

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VITAMIN OR SUPPLEMENT USE AMONG ADULTS, BRFSS, 13 STATES, 2001. *L Balluz, C Ookoro, B Bowman, M Serdula, A Mokdad (CDC, Atlanta, GA 30341)

To examine vitamin or supplement (V/S) use and its relationship to sociodemographics, health behaviors and health conditions among adults in 13 states. We used 2001 data from a cross-sectional study of non-institutionalized adults aged 18 and older. Data were weighted to the most current census data. For all analysis, p -values <0.05 were considered statistically significant. Of 45,415 respondents, 56.5% reported current V/S use. After adjusting for age, sex, race/ethnicity and education, we found statistically significant association between V/S use and positive health risk behavior (OR=1.46, $p<0.001$). Also V/S use was found to increase with age ($p<0.001$). No association was found between V/S use and the absence of specific chronic disease conditions (OR=0.93, $P=0.052$). Thus it appears that individuals who are most likely to use V/S are least likely to need V/S. It is crucial that individuals report quantity and frequency of V/S use when providing medical or diet histories to health care providers.

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