

associations between personal, psychosocial and biomechanical factors and incident CTS. However, biased estimates of association due to the healthy worker survivor effect (HWSE) have not been fully investigated. The HWSE results in left truncation bias when affected workers are lost from the population of more highly exposed workers before study participants are sampled. Right truncation bias occurs when affected workers are lost disproportionately from higher exposure strata after enrollment in a prospective cohort study. This study evaluated the effects of right truncation bias on risk estimates for biomechanical factors.

Between 2001 and 2010 five research groups in the US conducted coordinated prospective studies of incident CTS among workers from various industries. Hazard ratios (HR) were estimated using Cox proportional regression analyses with adjustment for personal and workplace psychosocial factors. Inverse probability censoring weight (IPCW) values were created using a cross-validated approach analogous to the lasso method for variable selection and parameter regularization. The weighting model predicted the probability of exit from the cohort in the next 3 months.

The final models included 2520 workers and 166 incident CTS cases. IPCW models with adjustment for right truncation bias were used to predict incident CTS. Effect size estimates for the workplace biomechanical factors of Peak Force, HAL Scale, Forceful Repetition Rate and the ACGIH TLV for HAL increased by 11% to 71% in comparison to models without adjustment for right truncation bias. After adjusting for right truncation bias the predicted incidence of CTS in highly exposed workers increased up to 3-fold.

Bias from symptomatic workers disproportionately leaving the workplace was identified in this cohort. Adjusting for this bias has likely produced more accurate dose-response relationships than those previously reported.

#### 08D.8 SEVERITY OF CARPAL TUNNEL SYNDROME AND MANUAL WORK: FINDINGS FROM A CASE-CONTROL STUDY

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**Objective** Carpal tunnel syndrome (CTS) is a socially relevant condition. This case-control study aims to investigate the association between CTS severity and manual work considering personal anthropometric risk factors as well.

**Methods** We consecutively enrolled one CTS case for two controls (subjects without clinical and electrophysiological CTS signs) regardless of age and gender who were admitted to the same three outpatient electromyography labs.

CTS cases were grouped in three classes of progressive clinical and electrophysiological severity according to two validated five-stage scales. Anthropometric measures and occupational history were collected. Job titles were coded according to the International Standard Classification of Occupations (ISCO 88) by two occupational physicians who were blind to case/control status. Job titles were grouped in two main occupational categories: manual workers and non-manual workers.

To assess the association between CTS severity and manual work, ordered logistic regression models (adjusted for age, sex, wrist-palm ratio and waist-stature ratio) were performed. Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated.

**Results** This case-control study enrolled 370 cases and 747 controls. After the exclusion of retired subjects, subjects older than 65 years and subjects with no information about occupational history, we included 183 cases and 445 controls in the main analysis.

For manual workers with respect to non-manual workers, the OR for the electrophysiological severity scale was 2.4 (95%CI 1.5–3.7). Regarding the clinical severity scale, the OR for manual workers compared to non-manual workers were 2.3 (95%CI 1.5–3.7).

**Conclusion** This study confirms that manual work is an important risk factor for CTS. The association between manual work and CTS severity tends to increase from mild to severe stage of both electrophysiological and clinical scale.

#### P.1.01 A NATIONWIDE, LONGITUDINAL STUDY OF CROHN'S DISEASE AMONG KOREAN WORKERS EXPOSED TO TOLUENE

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The pathogenesis of inflammatory bowel diseases (IBD) probably involves an interaction between genetic and environmental factors. Recent studies have shown that air pollution and PFOA (perfluorooctanoic acid) are associated with IBD. It is presumed to be related to inflammatory response. Immunoreactivity and inflammatory response are known to be major important mechanisms that causes toluene induced toxicity. So we evaluated the Crohn's disease morbidity among Korean workers exposed to toluene.

**Methods** Data were collected from toluene-associated specialized medical check-up 2000 and 2004 in Korea. The number of workers admitted to hospital because of clinically diagnosed Crohn's disease was analyzed in male workers exposed to toluene (n=149,183). As a control reference population, 2% of Korean men were randomly selected and their hospital admission data were analyzed. For toluene exposed workers, Standardized admission ratios (SARs) for Crohn's disease, as determined by ICD-10 classifications, were estimated in reference to the control population.

**Results** During follow up, 46 workers admitted because of Crohn's diseases. Occupational exposure to toluene (5 63 852 person-years) was significantly associated with the SAR of Crohn's disease (SAR: 1.60, 95% CI: 1.17–2.13), in particular, SARs of workers with 3rd quartile hippuric acid level was significantly increased (SAR: 1.95, 95% CI: 1.21–2.99).

**Conclusion** In conclusion, toluene-exposed workers exhibited significantly elevated SARs for Crohn's disease, especially workers with high level of hippuric acid, compared to the age-matched reference population, suggesting a relatedness with toluene exposure. This work was supported by Korea Environmental Industry and Technology Institute (KEITI) through 'The Chemical Accident Prevention Technology Development Project' funded by Korea Ministry of Environment (MOE) (2017001970001).