currently ~2300 cases and ~4200 controls), to study risk factors and possible gene-environment interactions; international pooling of case-control studies; using existing cohorts (e.g. EPIC); and aiming to register all Dutch ALS cases. Consistent positive associations between smoking and ALS were observed within PAN and EPIC, indicating that a similar approach for occupational risk factors would be informative.

Because each study design has its advantages and disadvantages, neurodegenerative disorders should be looked at more in a range of (occupational) studies to gain better understanding of the aetiology.

Oral Presentation

Exposure Assessment

0326 A SWEDISH JOB EXPOSURE MATRIX FOR PHYSICAL WORKLOAD

1,2Katarina Kjellberg*, 1,2Gun Johansson, 1,2Magnus Alderling, 1,2Tomas Hemmingsson. 1Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; 2Centre for Occupational and Environmental Medicine, Stockholm County Council, Stockholm, Sweden; 3Centre for Social Research on Alcohol and Drugs, Stockholm University, Stockholm, Sweden

Background To study associations between physical workload and health outcomes, valid and feasible exposure assessment methods are needed. Physical workload can be assessed by technical measurements, observations and questionnaires. Measurements and observations are often too costly in large epidemiological studies. Response rates to surveys are decreasing. Also, self-reported exposure is prone to bias since it may be influenced by e.g. health. Alternatives are to use job exposure matrices (JEM) where each job is attributed exposure measures. This enables large epidemiological studies to be conducted on registers and cohorts that include job titles. The aim was to construct a Swedish JEM for physical workload.

Methods Data from the Swedish Work Environment Surveys conducted every second year 1997–2013, including 90 077 working Swedes, were used. The JEM was based on eight measures and observations. Participant responses were used to estimate occupational lifting exposures in three ways: 1) self-reports; 2) a job exposure matrix (JEM) linking job titles with O*NET exposure data; and 3) combining 1 and 2 with Empirical Bayes Estimators (EBE). EBE provide a formal method for optimising the two types of data. All recruited participants were mailed a questionnaire including questions on the magnitude and frequency of lifting, pushing and pulling in all previous jobs. To help patients recall physical exertion across their lives, photos of lifting common objects were included. Participant responses were used to estimate occupational lifting exposures in three ways: 1) self-reports; 2) a job exposure matrix (JEM) linking job titles with O*NET exposure data; and 3) combining 1 and 2 with Empirical Bayes Estimators (EBE).

Results Study recruitment will continue through 2017, enrolling at least 150 cases and 250 controls. Preliminary analyses from half of the participants indicate an average of four jobs/person. Self-reports and job-title based exposures from O*NET were moderately correlated for lifting (Spearman rank correlation=0.48, p<0.0001). Frequent reports of whole body vibration exposures were uncommon (<5% of all jobs), suggesting the study will have less power to evaluate this exposure.

Conclusions By combining strengths of JEMs with personal recall, this study sought to improve on previous investigations. EBE provide a formal method for optimising the two types of data.

Oral Presentation

Cancer

0328 EXTENDED MORTALITY FOLLOW-UP OF A COHORT OF WORKERS EXPOSED TO ACRYLONITRILE

1Stella Koutras*, 2Aaron Blair, 3Barry Graubard, 1Jay Lubin, 4Patricia Stewart, Laurie. 1Beane Freeman, 2Debra T Silverman. 1US National Cancer Institute, Bethesda, MD, USA; 2Stewart Exposure Assessments, LLC, Arlington, VA, USA

Objectives To support a case-control study investigating the association between occupational lifting and retinal detachment (RD) in Massachusetts, we estimated and compared self-reported lifting exposures to those documented in O*NET, a government database that characterises physical exposures such as manual material handling and vibration for hundreds of U. S. job titles.

Methods Cases of RD were identified based on recent surgical treatment and controls based on a recent routine eye exam. All recruited participants were mailed a questionnaire including questions on the magnitude and frequency of lifting, pushing and pulling in all previous jobs. To help patients recall physical exertion across their lives, photos of lifting common objects were included. Participant responses were used to estimate occupational lifting exposures in three ways: 1) self-reports; 2) a job exposure matrix (JEM) linking job titles with O*NET exposure data; and 3) combining 1 and 2 with Empirical Bayes Estimators (EBE).

Results Study recruitment will continue through 2017, enrolling at least 150 cases and 250 controls. Preliminary analyses from half of the participants indicate an average of four jobs/person. Self-reports and job-title based exposures from O*NET were moderately correlated for lifting (Spearman rank correlation=0.48, p<0.0001). Frequent reports of whole body vibration exposures were uncommon (<5% of all jobs), suggesting the study will have less power to evaluate this exposure.

Conclusions By combining strengths of JEMs with personal recall, this study sought to improve on previous investigations. EBE provide a formal method for optimising the two types of data.
Background/Objectives We extended the mortality follow-up of a cohort of 25,460 workers employed at eight acrylonitrile-producing or using facilities in the U.S. by 21 years. Based on 8,124 deaths and 1,023,921 person-years of follow-up, we evaluated the relationship between occupational exposure to acrylonitrile and mortality.

Methods Standardised mortality ratios using deaths through December 31, 2012 were calculated. Personnel records, work histories, and monitoring data were used to develop quantitative estimates of exposure to acrylonitrile. Adjusted hazard ratios (HR) were estimated by Cox proportional hazards regression.

Results All-cause mortality and mortality from all cancer was significantly less than expected compared with the general population. Internal analyses by cumulative and average exposure revealed elevated risk of cancer of the lung and bronchus (n=808 deaths) and bladder (n=55 deaths). The HR for lung cancer was significantly elevated in the highest quintile of cumulative exposure (1.40, 95% CI 1.11–1.78, p-trend=0.09) compared to unexposed workers, peaking at ≥20 years since first exposure/hire HR=1.49, 95% CI 1.17–1.91; average exposure was associated with a small non-significant increased risk (HR=1.20, 95% CI 0.95–1.52). Average exposure was associated with a significantly elevated risk of bladder cancer; workers in the top tertile had an HR=2.89, 95% CI 1.35–6.18, p-trend<0.01 compared to the unexposed, while there was non-significant increase between cumulative exposure and risk (HR=1.37, 95% CI 0.65–2.90). Significant HRs were not observed for other smoking-related outcomes.

Conclusions Extended mortality follow-up of the largest cohort of acrylonitrile exposed workers provides some evidence of a possible association between high exposure to acrylonitrile and lung and bladder cancer.

Oral Presentation

Cancer

BAYESIAN APPROACH WITHIN, BETWEEN-WORKER, AND BETWEEN-GROUP VARIABILITY INTO EXPOSURE ASSESSMENT USING A BAYESIAN APPROACH

Harrison Quick*, Tran Huynh, Igor Burstyn. Drexel University, Philadelphia, PA, USA

Occupational exposures can vary substantially within- and between-workers in an exposure group as well as between groups. In prospective studies, due to resource constraints, it can be difficult to estimate these sources of variation reliably through repeated measurements on individuals from all groups. In retrospective exposure reconstructions, measurements required for evaluation of these sources of variability may be highly imbalanced or missing. To help address these issues, we propose a Bayesian statistical modelling framework for incorporating historical information for occupational exposure assessment studies with repeated measurements. More specifically, we provide guidance for constructing informative prior distributions for the within- and between-worker, as well as between-group geometric standard deviations. These priors can be anchored in either historical data or expert judgments, are intuitive to specify, and transparent in their underlying assumptions. Our approach accommodates unequal numbers of samples per worker, varying numbers of workers per group, and situations where some workers do not have repeated measurements. In addition to yielding standard output such as posterior distributions of the variance components, our approach can yield posterior distributions of