Session: 18. Exposure assessment III

316 FIT OF N95 FILTERING FACEPIECE RESPIRATORS INFLUENCED BY GENDER, DESIGN OF FACEPIECE, AND ACTIVITY ENGAGED IN USE

Y C Lin, C-P Chen. *China Medical University, Taichung, Taiwan*

Objectives The N95 filtering facepiece respirators are often used as the last line of defense protecting the workers against threats of airborne particulate contaminants, and its leakage around the faceseal could result in a direct exposure to the unfiltered air. This study investigated the fit of N95 respirators among young Taiwanese under the influences of gender, facepiece design, and activity engaged when the respirators were used.

Methods In the study, all participants (60 males and 60 females) were first characterised for 19 facial dimensions frequently applied in fit-test panel design using anthropometric equipments. The participants were then qualitatively fit-tested with N95 masks of three distinct facepiece designs (cup, flat fold, and liner with exhalation valve). During the fit-test, the participants were required to perform a series of seven exercises. The results were compared using Principle Component Analysis to identify key facial dimensions influencing the respirator fit as well as their distributions.

Results Only 27% of the participants passed all seven exercises without a leakage detected, with the proportion in males significantly higher than that of females. The percentage of participants failing all exercises was the greatest with the liner model and the least with the flat-fold model. When the flat-fold and cup models were tested, deep breathing and talking resulted in higher rate of leakage than the others activities. The facial dimensions identified as being significant to respirator fit included face width, interpupillary distance, nose breadth, face length, nose protrusion, and subnasale-sellion length.

Conclusions The facial dimensions significant to respirator fit among Taiwanese suggested a need for a Taiwanese-based respirator fit-test panel. The users should include the flexibility of facepiece and the activity engaged when using the respirator as factors to consider when selecting a respirator so to reduce potential exposure due to inappropriate fit.

317 DISEASE GROUP DIFFERENCES IN BENZENE EXPOSURE IN A POOLED ANALYSIS OF PETROLEUM WORKER CASE-CONTROL STUDIES

[1]D C Glass, [2]Armstrong, [3]Pearlman, [3]Schnatter, [4]Tang, [5]Rushton. *[1]Monash University, Melbourne, Australia; [2]TWA8HR Occupational Hygiene Consulting, LLC, Branchburg, NJ, United States of America; [3]ExxonMobil Biomedical Sciences, Inc, Annandale, NJ, United States of America; [4]University of Pittsburgh, Pittsburgh, PA, United States of America; [5]Imperial College, London, United Kingdom*

Objectives To compare exposure to benzene across different lymphohaematopoietic subtypes in a pooled nested cased control study.

Methods Cases of acute myeloid leukaemia (AML), chronic myeloid leukaemia (CML), chronic lymphocytic leukaemia (CLL) myelodysplastic syndrome (MDS) and myeloproliferative disease (MPD) were identified in petroleum industry cohorts from UK, Canada and Australia and pooled with matched controls into a single study. For each job held by participants, the intensity of full shift exposure to benzene (ppm), the certainty of the estimate, job duration, probability of dermal and peak exposure were estimated using study defined metrics. Cumulative benzene exposure was calculated for each participant.

Results Benzene exposure was low, 90% of participants accumulated < 20 ppm-years. Mean cumulative exposure was 5.15 ppm-years, mean duration was 22 years and mean exposure intensity was 0.2 ppm. 46% of participants were allocated a peak exposure and 40% had a high probability of dermal exposure at least weekly.

For AML, mean duration was slightly longer for cases but maximum exposure intensity was slightly higher for controls. The mean cumulative and maximum exposure estimates were higher for MDS cases than for controls or for AML cases. CLL and CML cases had slightly higher mean estimates of duration and cumulative benzene exposure than their controls. MPD cases had lower exposure estimates than controls. AML cases and controls had longer employment duration than other disease groups. Higher exposure certainty scores confirmed the MDS case/control and MDS/AML differences.

Conclusions Benzene exposure estimates were lower overall than those in previous studies for all the disease groups. There was little difference in exposure between AML cases and controls and in general the exposure was less than for MDS cases. Certainty scores for exposure assessments can be used in sensitivity analyses to strengthen interpretations of the observed associations between exposure and risk.

318 DETERMINANTS OF PERSONAL EXPOSURE TO INHALABLE DUST AND ENDOTOXIN AMONG DANISH DAIRY FARMERS

[1]I Basinas, [1]Sigsgaard, [2]Erlandsen, [3]Kromhout, [3]Heederik, [1]Schlünssen. *[1]Department of Public Health, Aarhus University, Aarhus, Denmark; [2]Department of Public Health, Institute of Biostatistics, Aarhus University, Aarhus, Denmark; [3]Institute for Risk Assessment Sciences (IRAS), Utrecht University, Utrecht, The Netherlands*

Objective To indentify working tasks which determine the level of personal exposure of dairy cattle farmers to inhalable dust and endotoxin.

Methods 124 personal full-shift inhalable dust measurements were performed in 77 farmers from 26 dairy operations. The concentration of collected dust on the samples was estimated gravimetrically and its endotoxin content by the kinetic chromogenic Limulus Amebocyte Lysate assay. During monitoring all tasks performed by the farmers were registered in self-administrated activity diaries, and walk-through surveys were performed in every compartment of the visited farm. Effects of working tasks on the log-transformed dust and endotoxin concentrations were examined in Linear mixed effects models. Worker and farm identity were treated as random effects, and working tasks as fixed effects.

Results Measured concentrations for inhalable dust ranged between 0.2 and 9.8 mg/m^3 and for endotoxin between 17.6 and 5890 EU/m^3. Preliminary models with 12 and 14 working tasks for endotoxin and dust respectively explained 27% and 23% of the overall variability in exposure. Preparation and spread of bedding, re-penning of animals and handling of feeding materials in storage areas were all strong predictors for both