

an expert assessment. P2 was a multiple exposure assessment (15 scenarios) anchored by a recent measurement series (1375 personal measurements of inhalable SAS dust concentration) and used expert assessments.

**Results** Cumulative exposure estimates for P1 averaged 56.9 mg/m<sup>3</sup>-years (range: 0.1 to 419); for a selected P2 scenario the mean was 31.8 mg/m<sup>3</sup>-years (range: 0.4 to 480), ( $p < 0.0001$ ). Averages varied between the 15 P2-scenarios from 12.6 to 109.6 mg/m<sup>3</sup>-years. Different time trends for SAS concentrations were observed.

**Conclusions** Both approaches suffer from considerable uncertainties that need to be considered in the epidemiological morbidity study.

#### 0026 PSYCHOSOCIAL STRESS OF NURSES IN ONCOLOGY: EFFORT-REWARD IMBALANCE SCALE

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##### Objectives

- To identify sociodemographic variables associated with psychosocial stress in oncology nurses;
- Assess the associations between occupational variables and stress in the work environment of nurses in oncology;
- Discuss the impact of psychosocial stress in nursing work in oncology.

**Method** This is a cross-sectional epidemiological study, which will be used part of the Database of research - Nurses' Health Study, the 18 largest hospitals in the city of Rio de Janeiro / Brazil held in 2011. Permission to use the database of the National Cancer Institute was provided by the research coordinator. From a total of 234 nurses, 94% (211) have joined the research. A questionnaire was used Effort-Reward Imbalance and variable exposures (demographic, occupational and health) for the verification of statistical association. Were included in the logistic regression analyses and the variables in the bivariate analysis were associated with a lower level of significance ( $p < 0.20$ ). Was defined as the reference category that with the lowest expected risk for the High Effort-Reward Imbalance. Presented outside the adjusted odds ratios and their respective 95% confidence in the multiple model.

**Results** Variables that showed statistical association after logistic regression analysis were age and intent into abandonar nursing. The younger nurses is approximately three times higher chance of having the High Effort-Reward Imbalance when compared to older, and who had the intention to leave nursing had increased odds for the High Effort-Reward Imbalance.

**Conclusions** Stressors at work are health risks, so many individual and organisational efforts should be considered to deal with such a situation in oncology.

#### 0027 LIFE EVENTS AND PSYCHOLOGICAL DISTRESS AMONG POLICE OFFICERS SIX YEARS POST HURRICANE KATRINA

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**Objectives** To investigate if organisational support modifies associations between life events and psychological symptomatology among police officers post Hurricane Katrina.

**Method** Complete data on depression [Centre for Epidemiological Studies Depression scale (CES-D)], PTSD [Posttraumatic Stress Disorder Checklist - Civilian version (PCL-C)] and life change events [Recent Life Changes Questionnaire] were available for 98 police officers assessed 6 years after Katrina. The Survey of Perceived Organisational Support scale was used to assess organisational and supervisory support. Linear regression and ANOVA/ANCOVA were used to compare mean levels of depression and PTSD across quartiles of total life change events score.

**Results** Mean age was 42.5 years; 27% were female. Mean levels of CES-D and PCL-C did not differ significantly between male and female officers. Total life events score was positively and significantly associated with depression and PTSD in both unadjusted and multivariable adjusted models ( $p < 0.001$ ). Among officers who scored low on organisational support, mean levels of CES-D and PCL-C increased significantly with the increasing quartiles of total life event score ( $p = 0.005$  and  $p = 0.001$ , respectively) in fully adjusted models. Associations were not significant among officers who scored high on organisational support.

**Conclusions** Our findings suggest that a higher number of life change events is significantly associated with increasing symptoms of depression and PTSD among officers, and these associations are modified by organisational support. Previous studies suggest that stressful life events are associated with chronic depression. Future studies are warranted to investigate independent contributions of individual life events in associations involving depression, PTSD and support.

#### 0029 A STUDY OF BLOOD MULTI-ELEMENT CONCENTRATIONS IN LEAD-EXPOSED AND NON-EXPOSED WORKERS

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**Objectives** Both lead recycling and lead-containing paint are the main source of lead exposure. During the lead industrial processes, the workers exposed to many elements including non-essential elements and essential elements. The aim of this study was to compare lead (Pb) with cadmium (Cd), arsenic (As), selenium (Se), cobalt (Co), copper (Cu), zinc (Zn) in blood between lead-exposed and non-exposed workers.

**Method** There were 109 lead workers and 329 non-exposed workers enrolled. The whole blood concentration of Pb was determined by graphite atomic absorption spectrometer (AAS), while the others (Cd, As, Se, Co, Cu and Zn) were determined by inductively coupled plasma mass spectrometer (ICPMS). We analysed the associations between the seven elements and the worker health examination data. Finally, multiple linear regressions were used to analyse elements interactions.

**Results** The mean age of all workers was 40.13 years and mean BMI was 24.81. Mean concentrations (ug/L) of blood elements in Pb-exposed workers were Pb 143.5 ug/L, Cd 1.28, As 9.45, Se 251.46, Co 0.57, Cu 1044.4, and Zn 9706.92. While concentrations in non-exposed workers were Pb, 26.18 ug/L, Cd, 0.98, As, 5.28, Se, 255.40, Co, 0.42, Cu, 880.07, and Zn, 6891.52. To find the relationship of Pb and the other elements, using the interaction variables, showed that there were interactions between Cd and As, As and Co, As and Cu.

**Conclusions** From the above results, the positive effect of essential elements to health examination values were not clear, little does the influence to the other non-essential elements. However, the damage from occupational non-essential elements exposure still needs to be concerned. Interaction to multi-elements also needs further research.

**0032 POLYMORPHONUCLEAR LEUKOCYTES PHAGOCYtic CAPACITY IN WORKERS OCCUPATIONALLY EXPOSED TO BENZENE**

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**Objectives** To determine phagocytic capacity of PMN leukocytes in workers occupationally exposed to benzene.

**Method** Cross-sectional study that included 54 workers of a paint manufacture company in Mexico City; exposure to benzene was determined through S-phenylmercapturic acid (SPMA) presence in urine. The PMN phagocytic capacity analysis included three parameters: 1) nitro-blue tetrazolium (NBT) reduction, 2) hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) production, and 3) cell adhesion (CAD)

**Results** In the whole of workers included in the study, NBT reduction =  $0.419 \pm 0.075$ , H<sub>2</sub>O<sub>2</sub> production =  $6.7 \pm 1.4$  ng, and CAD =  $58.3 \pm 6.2$  µg. SPMA was identified in all workers although 24 of them are not in occupationally exposure to organic solvents ( $2.3 \pm 0.81$  µmol/mol creatinine), while the remaining 30 handle these substances ( $3.2 \pm 1.8$ ,  $p = 0.02$ ). Among these exposure groups, there were not statistically differences in any of the parameters analysed. Although the simple regression analysis of these parameters with the concentration of SPMA identified in urine, a decrease was observed in NBT reduction ( $\beta = -0.009$ ,  $R^2 = 0.01$ ), in H<sub>2</sub>O<sub>2</sub> production ( $\beta = -0.16$ ,  $R^2 = 0.02$ ), and in CAD ( $\beta = -0.53$ ,  $R^2 = 0.01$ ), none was statistically significant ( $p \geq 0.05$ )

**Conclusions** PMN phagocytic capacity in the workers studied seems to be intact. Attract attention the consistently decrease of the three parameters in relation to the concentration of SPMA identified in urine even when there was no statistical significance. Some limitations do not allow a more complete analysis, so it is encouraged to make further studies.

**0033 EARLY PREDICTORS OF NOISE-INDUCED HEARING LOSS**

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**Objectives** Noise-induced hearing loss (NIHL) is the most prevalent occupational disease in Austria and among the most frequent in many other countries. Because of the large inter-individual variation in hearing loss after equal exposures it has long been assumed that some individuals are more vulnerable to NIHL. Earlier attempts to define predictors of NIHL before commencing occupational noise exposure have largely failed.

From a preventive point of view it would be essential to study predictive factors.

**Method** Between 1982 and 1989 overall 311 apprentices were included into a prospective study during their initial health screening visit. At this occasion a standardised noise exposure was applied (20 min 200–500 Hz, 100 dBA) and the temporal threshold shift (TTS) at 4 kHz was determined during 2–10 min after exposure. Hearing loss was monitored at follow-up visits every 3–5 years. Follow-up was 13 years on average. Permanent threshold shift was predicted by noise years, frequency of wearing noise protectors, but also by the initial TTS at 4 kHz.

**Results** In this longitudinal study again the importance of personal protective measures was documented, it was also established that individual susceptibility plays an important role. The TTS peak at 4 kHz occurring independent of exposure frequency but especially after low-frequency exposure is a predictor of long-term hearing loss.

**Conclusions** Considering the importance of individual susceptibility current occupational limit values are likely not protective for everybody. This underlines the necessity of individualised screening programs and a strong commitment towards personal protection measures.

**0034 OCCUPATIONAL EXPOSURE TO MINERAL DUST: EFFECTS OF ON LUNG FUNCTION IN A NINE-YEAR STUDY**

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**Objectives** Occupational mineral dust exposure is a well-known risk factor for numerous respiratory and systemic diseases. Stone work with high quartz exposure in quarries and in consecutive industries is a common situation in Austria. The aim of the present study employing a longitudinal design was to assess the influence of occupational dust exposure on lung function results. Further, the impact of implementation of stricter limit values for work-related contact with Quartz dust on lung function was evaluated.

**Method** Anthropometric data (age, gender, BMI), smoking behaviour, and lung function parameters (FVC, FEV1, MEF50) of 7204 medical examinations of 3229 female and male workers during the years 2002 to 2010 were analysed following Austrian standards for occupational medicine and ERS guidelines. Analysis of data was performed using models of linear regression.

**Results** Lung function parameters decreased with duration of occupational dust exposure and smoking. Occupational quartz exposure negatively influenced lung function parameters (FVC -173.98 ml, FEV1 -127.94 ml, MEF50 -200.44 ml/s; all  $p < 0.001$ ). Implementation of stricter Austrian occupational limit values for dust exposure resulted in a highly significant deceleration of annual respiratory decrease.

**Conclusions** The decrease of lung function is correlated with individual smoking habits and the duration of occupational dust exposure. Smoking cessation is especially recommended to workers exposed to Quartz dust to reduce the risk of increase of poor lung function. Adaptation of current limit values towards stricter limit values could decrease chronic occupational damage of the respiratory system.