

[124.3 (3.9)] compared to the non-Mn miners [113.1 (5.1)] ($p = 0.11$). Mn miners had lower mean (standard error) neuron density in the caudate [203.1(24.9) cells per high powered field (hpf)] compared to non-Mn miners [276.9 (22.3) cells per hpf] ($p = 0.016$). Mn miners also had lower astrocyte density in the caudate [181 (22.0) cells per hpf] and putamen [225.6 (28.5) cells per hpf] than non Mn miners [caudate 252.9 (19.6) cells per hpf and putamen 300.9 (25.4) cells per hpf] ($p = 0.011$ and $p = 0.024$, respectively). There were no significant differences in microglial cell density or in astrocyte, microglia or neuron cell counts in the globus pallidus between the two groups. There were no HIV-defining pathologies and no microglial nodules in any of the miners.

Conclusions This study demonstrates that chronic Mn exposure is associated with selective toxicity to striatal astrocytes and caudate neurons. We speculate that the initial neurotoxic injury in humans with chronic Mn exposure involves the astrocytes and that neuronal injury may be secondary to loss of astrocytes.

233 THREATS AND VIOLENCE AT THE WORKPLACE AND THE RISK OF DEVELOPING ANXIETY SYMPTOMS AND DEPRESSION

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Objectives Workplace threats and violence are common within certain professions. In the European countries, 5% of workers report having been subjected to violence. The health consequences are both physical and mental. This study analyses if repeated threats and violence or serious violence may lead to an increased risk of anxiety symptoms and depression.

Methods In 2007 and 2009 we examined 3224 civil servants employed in hospitals, schools, social centres etc. Exposure at baseline was self-reported number of times the last 12 months subjected to threats or non-serious physical violence or to mobility- or life-threatening violence. In 2007 and 2009, anxiety symptoms were scored (range 0–4) with the Symptom Check List and clinical depression with a psychiatric interview (SCAN). Cases of anxiety symptoms (score >2) and clinical depression at baseline were excluded. We used logistic regression analyses with estimates adjusted for potential confounders.

Results In 2007, 1079 (34%) reported that they had been subjected to threats or non-serious physical violence 1–5 times the last year and 170 (5%) more than 5 times. Fifty-nine (2%) had been subjected to mobility- or life-threatening violence. 173 developed symptoms of anxiety and 62 clinical depression. The adjusted odds ratios (ORs) for incident anxiety symptoms because of threats or non-serious violence 1–5 times were 1.69 (95% confidence interval 1.18–2.42) and more than 5 times 2.53 (1.34–4.77). The corresponding ORs for incident clinical depression were 1.32 (0.73–2.38) and 1.85 (0.71–4.83), respectively. There were too few cases among the exposed to analyse for the effect of mobility- or life-threatening violence.

Conclusions Exposure to threats and non-serious violence predicted anxiety symptoms. The risk increased with increasing number of episodes. The same pattern was found for depression though not significant. The results indicate the importance of considering the less serious but more frequent episodes when planning prevention.

Session: 2. Exposure assessment I

234 CHARACTERISATION OF WORK TASKS AND EXPOSURES TO CLEANING AND DISINFECTING CHEMICALS IN HEALTHCARE OCCUPATIONS

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Objectives Cleaning and disinfecting products have been identified as important risk factors for asthma, and are used extensively in healthcare; however, quantitative measurements of these etiologic agents are not well characterized. The objective of this study was to characterize personal exposure to cleaning and disinfecting compounds and quantify the frequency and duration of cleaning tasks performed in healthcare occupations.

Methods Exposure assessments were conducted for volatile organic compounds (VOCs) at 5 hospitals targeting 13 healthcare occupations. A wide range of specific VOCs ($n = 15$) were quantified and an additional 97 VOCs were identified but not quantified.

Results The geometric mean (GM) concentrations for total VOCs were highest among nursing assistants, licensed practical nurses and medical equipment preparers (GM range: 4367–3809 ppb), followed by respiratory therapists, pharmacy technicians, registered nurses, floor strippers/waxers, dental assistants and housekeepers (GM range: 2119–1501 ppb); the geometric standard deviations (GSD) varied from 1.8 to 7.5 across occupations. The GM and GSD of specific VOCs were also variable across occupations. The average amount of time per day spent on cleaning tasks using cleaning and disinfecting products also varied by occupation with medical equipment preparers, housekeepers, floor strippers/waxers and licensed practical nurses spending the most time (range: 165–110 minutes/day), followed by endoscopy technicians and dental assistants (range: 70–60 minutes/day); the remaining occupations spent on average <15 minutes/day on cleaning tasks.

Conclusions The chemical agents, levels of total and specific VOCs, and cleaning-task durations varied between- and within-occupations indicating that task may be an important exposure determinant.

235 AIRBORNE AND INTERNAL EXPOSURE TO CHROMIUM AMONG WELDERS

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Objectives The objective of this analysis was to investigate levels and determinants of exposure to respirable and urinary