

70 cancer-related proteins was analyzed in serum by proximity extension assay. Oxidative stress biomarkers 8oxodG (DNA oxidative damage) and 4-HNE (lipid peroxidation) were measured in urine by LC-MS/MS. Linear mixed models were used for the longitudinal analysis.

Results: Median respirable dust exposure was 0.7 mg/m<sup>3</sup> at both timepoints for the welders. Welders and controls had different protein expression of CD84. Dose response relationships were found for CD84, BOC and RAGE in association with welding years, and SRC and CXCL1 with respirable dust. These findings could be replicated when analyzing never-smokers. The above-mentioned proteins are involved in cell adhesion (CD84, SRC, BOC, RAGE), immune response (CD84, SRC, RAGE), inflammatory response (CXCL1, RAGE), proteolysis (SRC), and response to hypoxia (SRC). The analysis of oxidative stress biomarkers is ongoing.

Conclusion: Exposure to welding fumes at levels below the Swedish occupational exposure limit (2.5 mg/m<sup>3</sup>) was associated with changes in protein expression involved in biological processes related to carcinogenicity. Further research is warranted to evaluate if these proteins could serve as biomarkers for carcinogenesis in welders.

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### **Comparison of self-reported occupational exposure to solvents with a job exposure matrix (JEM) in a French case-control study of testicular germ cell tumors**

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Introduction: Some occupational exposures are suspected to be linked to testicular germ cell tumors. However, their retrospective assessment remains problematic for population-based case-control studies. To assess potential measurement bias, our objective was to compare self-reported (SR) exposures obtained by specific questionnaires to exposures obtained by job exposure matrices (JEMs). Material and Methods: Participants from the TESTIS national case-control study provided information on their job histories. SR exposure to solvents was obtained from 478 workers. Participants' job histories were coded (ISCO-1968, NAF-1993). JEMs from the French National Matgéne program were applied. Comparison between SR exposure and JEMs was calculated by sensitivity, specificity and predictive values.

Results: Overall, the analysis included 1124 subjects (454 cases, 670 controls) and was carried out for 4083 job periods. Preliminary results showed that using JEMs as a gold standard, sensitivity from SR exposure was low (0.00 to 0.39) whereas specificity was high (0.89 to 0.99). Positive predictive values ranged from 0.00 to 0.64 and negative predictive values ranged from 0.75 to 1.00.

Conclusions: Exposure assessment methods applied may over- or underestimate exposure prevalence. According to JEMs, a significant number of the subjects seems to underreport their exposures.

Our results suggest that combining JEM with SR exposure data could be an interesting approach to limit measurement bias. However, this process requires a specific analysis by an expert to rule on exposure assessment for subjects with disagreements between the two methods.

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### **Observed versus predicted mesothelioma cases in Lombardy, Italy, 2013-2017**

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Introduction: Lombardy is the most populated (10 million people) and industrialised Italian region, where asbestos had been extensively used until the national ban in 1992. Almost one fourth of malignant mesothelioma (MM) cases are recorded in Lombardy. Using data from the Lombardy Mesothelioma Registry (RML) we previously predicted trends and numbers of MM in men and women for the period 2013-2029 (Mensi et al. Occup Environ Med 2016;73:607-613). Aim of this work is to verify accuracy of projections in 2013-2017.

Material and Methods: RML is part of a national MM registry (ReNaM). It records MM cases among Lombardy residents using several sources, including hospital admissions, pathology records, mortality, and compensation claims. Confirmed cases are interviewed about past asbestos exposure. We extracted data for the period from 2013 to 2017 (year in which data collection and quality controls have been completed), and compared the number of predicted and observed cases.

Results: We had predicted 1303 cases in men (average 261/year) and 728 in women (146/year). The number of recorded MM cases was 1501 in men (300/year) and 726 in women. Occupational exposure to asbestos was reported by 1002 men (66.8%) and 129 women (30.2%). Non-occupational asbestos exposure was found in 47 (3.1%) of men and 84 women (11.6%).

Conclusions: In 2013-2017 there was perfect agreement between predicted and observed MM cases in women, while in men we recorded on average 198 more cases than predicted (40/year). The MM burden in Lombardy is still high 25 years after the asbestos ban.

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### **Prevalence of occupational burnout in Swiss workers: a systematic review and meta-analysis**

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Introduction: Occupational burnout (OB) has been associated with job dissatisfaction, lower productivity, intentions to leave the job, increased turnover and health-care costs, as well as other socio-economic issues. Despite such negative consequences, the prevalence of burnout among Swiss workers remains unknown.

**Material and Methods:** We interrogated international databases such as Medline (Pubmed), EMBASE, and PsycINFO, and 15 Swiss universities' databases from 2010 up to July 6, 2021 to identify studies reporting the prevalence of OB and/or emotional exhaustion (EE) - the core OB dimension- in Swiss workers. Data were summarized descriptively and quantitatively using random effects meta-analysis.

**Results:** We identified 23 studies that used different outcome assessment methods: hetero-assessment by physicians and self-reported, using a specific question or one burnout inventory scale (frequently used: Maslach Burnout Inventory (MBI) and Copenhagen Burnout Inventory (CBI)). We estimated the prevalence of clinical/severe burnout, overall burnout and emotional exhaustion (EE) at 4%, 18% and 18%, respectively, with considerable heterogeneity (I-square >90%, p < 0.00).

**Conclusions:** Despite between-study heterogeneity, our overall estimate of OB in Swiss workers is high enough to reinforce the current efforts to detect it better and earlier and reduce its negative consequences at individual and societal levels.

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***The AMINAVI database: a tool for knowing the presence of asbestos in ships and cases of seafarers' pathologies***

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**Introduction:** Nowadays for seafarers there is still exposure to asbestos/seafarers are still exposed to asbestos because asbestos was widely used for shipbuilding, both, in a friable and compact form 11% of the ships still in circulation were built before the law that banned the use of asbestos (Law 257/92), therefore they are potentially dangerous the seafarers' working environment matches with their living environment maintenance, removal and scrapping of ships is continuously increasing, and exported to developing countries. The AMINAVI database, still in progress, deepens the knowledge about asbestos in ships from 1900 to today: it collects, catalogues and reports the information about each vessel (launch, radiation, reclamation activities) also through the cases of asbestos-related pathologies of seafarers

**Material and Methods:** The information is stored in a Relational Data Base Management System (RDBMS), which allows you to explore the data using the SQL query language.

**Results and Conclusions:** With the aim to create a network between the bodies responsible for health and environmental protection, through the consultation of Aminavi, it is possible to reconstruct the career of, to date, 623 cases (621 men and 2 women) with asbestos-related diseases. Of these, 31.92% are Officers (Commander, Doctor, etc) and 68.08% are non-commissioned officers and Sailors (Mechanic, Electrician, Radio-telegraphist, etc, more exposed for their job duties). The main pathology is Mesothelioma 56.25%, then Neoplasia 8.81% and Lung Carcinoma 7.69%, 72.39% of the collected cases have died. The recognized diseases are 25.84%.

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***Mitigating Injury and Illness Through A Pandemic: A Mid-Size Organization Demonstrates the Power of Integrating Occupational Health and Safety with Business Operations***

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**Introduction:** In 2017, Parking Concepts, Inc (PCI) implemented a corporate prevention plan to reduce injuries and illnesses by integrating occupational. Health and safety (OHS) with business operations. By 2019 PCI had significantly reduced all key metrics. In 2020, COVID-19 brought challenges to their frontline essential workers. Ultimately PCI'S OHS plans proved powerful in effectively mitigating injury and illness across their 185 worksites, resulting in further reduction in injuries and illness, including:

- Total Injuries 78%
- Litigated Claims 89%
- Direct Cost 81%

**Measurement and Methods:** Risks identified through a 5-year retrospective analysis were used as baseline measurements and to identify and target risks. Specificity in risk reduction methods was essential in reducing targeted risks:

- Leadership direct participation
- Innovative communication methods and technology to deliver OHS materials increased employee confidence and trust
- COVID-19 corporate policies, procedures, and training by state and local delivered to each employee through multiple communication channels in various languages to accommodate all employees
- Strategic and efficient execution in OHS methods hit the targeted risks

• Annual PCI Wellness Challenges enhanced employee morale  
**Results and Conclusions:** The power of leadership commitment, execution of methods, use of technology, and innovative communication strategies proved successful before and during a global pandemic. PCI, poised to seamlessly respond to the pandemic while continuing to reduce all injuries and risks, demonstrates the sustainability of its OHS model.

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***A study of morbidities among food manufacturing industry workers in Goa, India***

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**Introduction:** Food manufacturing industry units are among the most common industries all over the world. It involves a large number of employees required for the processing, manufacturing, storage, and transportation of food items. Workers are usually sedentary and involve very little physical movement. Chronic illnesses are common among these sedentary workers. The study was done to assess selected morbidities among workers of food manufacturing units in Goa.

**Materials and methods:** The retrospective record-based cross-sectional study was conducted over 3 months and was commenced after obtaining approval from the Institutional Ethics Committee of Goa Medical College. Periodic medical check-up of the workers was conducted. Data included sociodemographic details of the workers and details of periodic medical check-ups. The data was analyzed using SPSS version 23.

**Results:** It was observed that 11.1% of workers had obesity with a BMI >30, 19.28% had Hypertension (>140/90) and 24.4% had Diabetes mellitus with HbA1C >6.5. In addition, 5.28% had far vision