

Occupational exposure to heavy metals and welding fumes and testicular germ cell tumours risk in a French case-control study

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Introduction

Testicular cancer is the most frequent malignancy in young men in industrialized countries with an increasing incidence, and its aetiology remains largely unknown. An association with occupational exposure to heavy metals (HMs) and welding fumes (WFs) has been suggested in the literature but with inconsistent findings, most likely due to methodological exposure assessment limitations. We investigated the role of occupational HMs and WFs exposures on the risk of testicular germ cell tumours (TGCT) in the TESTIS study.

Methods

The French nationwide case-control study TESTIS was conducted between 2015 and 2018 among men aged 18-45 years old and included 454 cases and 670 controls frequency-matched on year of birth and hospital centre. Questionnaire-based data were collected regarding subjects' occupational histories. The INTEROCC job-exposure matrix was then applied to the subjects' jobs coded according to ISCO-68, to assign individual occupational exposure to five selected HMs (lead, iron, cadmium, chromium, nickel) and WFs. Odds ratios and 95% confidence intervals (OR [;]) were estimated using conditional logistic regression models adjusted for sibship size, being born from multiple pregnancies, personal history of testicular trauma, family history of TGCT, family history of cryptorchidism and exposure to solvents.

Results

The prevalence of occupational exposure to at least one of the HMs and WFs was 30.4% among cases and 24.6% among controls. Heavy metals co-occur largely in occupational settings; Cramer's V statistics showed correlations between 0.68 and 1.0. OR for ever being occupationally exposed to iron was (OR=1.57 [1.07 ; 2.30]), and for welding fumes (OR=1.54 [1.05 ; 2.27]), nickel (OR=1.56 [1.06 ; 2.28]), lead (OR=1.32 [0.93 ; 1.86]), cadmium (OR=1.28 [0.87 ; 1.88]) and chromium (OR=1.35 [0.91 ; 1.98]).

Conclusion

Due to the high correlation observed between HMs and WFs, it is difficult to identify which HM/WF or a combination of them is driving the positive associations seen. More experimental studies and alternative methodological approaches are mandatory to understand the mechanisms related to each specific metal and solvent exposure and testicular cancer development for prevention purposes.

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