MAGNETIC FIELD EXPOSURES AND BRAIN TUMOUR RISKS AMONG MALE ELECTRICITY WORKERS, 1973–2010

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Objectives To investigate whether brain tumour or leukaemia risks are related to occupational exposure to low-frequency magnetic fields.

Method Brain tumour and leukaemia risks experienced by 73,051 UK electricity supply industry workers were investigated for the period 1973–2010. All employees were hired in the period 1952–1982 and were employed for at least six months with some employment in the period 1973–1982. Detailed calculations had been performed to assess exposures to magnetic fields. Poisson regression was used to calculate relative risks (rate ratios) of developing a brain tumour (or glioma or meningioma) or leukaemia (or its sub-types) for categories of lifetime, distant (lagged) and recent (lugged) exposure.

Results Findings for gliomas, all brain tumours combined, and all leukaemia were unexceptional; risks were close to (or below) unity for all exposure categories. There were no significant dose-response effects shown for meningioma, but there was some evidence of elevated risks in the three highest exposure categories for distant exposures. There were no significant dose-response effects shown for the main leukaemia sub-types, but there was a significant positive trend for acute lymphocytic leukaemia (ALL). National comparisons indicated that the limited associations shown for meningioma and ALL were based, in the main, on unusually low risks in the lowest exposure category.

Conclusions The findings are consistent with the hypotheses that both distant and recent magnetic field exposures are not causally related to gliomas or to the main leukaemia sub-types. The limited positive findings for meningioma and ALL may be chance findings; national comparisons argue against a causal interpretation.
registry catchment areas was determined. Standardised incidence ratios (SIR) and standardised rate ratios for bladder cancer were calculated by exposure category and cumulative rank quartiles for different lag periods. Cox regression was used to model bladder cancer incidence with estimated cumulative rank, adjusting for confounders. Indirect methods were used to control for smoking.

Results Excess bladder cancer was observed compared to the New York State population (SIR=2.87, 95% confidence interval [CI] 2.02–3.96), with higher elevations among workers definitely exposed (moderate/high) (SIR=3.90, 95% CI 2.57–5.68) and in the highest cumulative rank quartile (SIR=6.13, 95% CI 2.80–11.6, 10-year lag). Bladder cancer rates increased significantly with estimated cumulative rank (10-year lag). Smoking only accounted for an estimated 8% elevation in bladder cancer incidence.

Conclusions Bladder cancer incidence remains elevated in this cohort and significantly associated with estimated cumulative exposure. Results are consistent with earlier findings in this and other cohorts. Despite other concurrent chemical exposures, we consider o-toluidine most likely responsible for the bladder cancer incidence elevation and recommend a reexamination of occupational exposure limits.

Objectives While sociodemographic and work-related factors are frequently studied as determinants of sickness absence (SA), health-related determinants have surprisingly received little attention. We examined the effect of multimorbidity and previous SA on the incidence and duration of future SA.

Method A retrospective (2004–2008) cohort of 373,905 workers who underwent a standardised medical evaluation in 2006 from which information on chronic conditions, health-related symptoms and behaviours was used to construct a sex-specific multimorbidity score (MMBS). Information on SA episodes occurring during the two years prior to the examination came from the employment history. We estimated the effect of the MMBS and prior SA on the 2-year incidence and duration of SA post-examination using a Cox model adjusted for age and occupational social class. Effects on SA duration were also adjusted for diagnosis.

Results Men, but not women, showed an effect with a trend of higher SA incidence risk from low (HR=1.06; 95% CI: 1.01–1.11) to high MMBS (HR=1.22; 95% CI: 1.18–1.28). Having five or more prior episodes was related to higher SA incidence risk, both in men (HR=2.19 95% CI: 2.11–2.28) and in women (HR=2.47; 95% CI: 2.35–2.61). Women, but not men, had longer SA duration from low (HR=0.91; 95% CI: 0.83–0.99) to high MMBS (HR=0.88; 95% CI: 0.78–0.99). Having 5 or more prior SA episodes was related to shorter duration in men (HR=1.67; 95% CI: 1.30–2.16) and women (HR=2.12; 95% CI: 1.56–2.89).

Conclusions Multimorbidity increases the risk of higher SA incidence and duration while the effect of prior SA episodes is more complex.

Objectives Occupational epidemiologists often analyse binary outcomes in cohort and cross-sectional studies using multivariable logistic regression models, yielding estimates of adjusted odds ratios. When the outcome is common the adjusted odds ratio will not closely approximate the covariate-adjusted risk or prevalence ratio. Consequently, investigators may decide to directly estimate the risk or prevalence ratio using a log-binomial regression model; however, such models tend to be unstable and may not converge.

Method A marginal structural log-binomial model can be used to estimate risk and prevalence ratios and differences. The approach reduces problems with model convergence typical of log-binomial regression by shifting all explanatory variables except the exposures of primary interest from the linear predictor of the outcome regression model to a propensity score model for the exposure. The approach also facilitates evaluation of departures from additivity in the joint effects of two exposures.

Results We illustrate the proposed approach using data from several illustrative occupational studies of common outcomes.

Conclusions The proposed approach facilitates analysis of risk or prevalence ratios and differences in cohort and cross-sectional studies with common outcomes.

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