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Objectives Brain tumours are a serious, often fatal disease with few established risk factors. Although ionising radiation has been clearly linked with brain tumours, there are a number of other environmental and occupational agents suspected including extremely low frequency magnetic field (ELF-MF) exposure. However the literature is inconsistent, and questions remain due to small sample sizes and limitations in exposure assessment in previous studies. The objective of this paper was to examine the association between occupational exposure to ELF-MF in different time windows and brain tumours in the large-scale INTER-OCC study.

Methods The INTEROCC study is formed by seven participating countries Australia, Canada, France, Germany, Israel, New Zealand, United Kingdom) from the parent INTERPHONE study. Cases of primary brain glioma and meningioma aged at least 20 years were recruited between 2000 and 2004. Detailed occupational history data was collected for jobs held at least six months. Job titles were coded into standard international occupational classifications and estimates of mean workday ELF-MF exposure assigned based on a job exposure matrix. Conditional logistic regression was used to obtain adjusted odds ratios and 95% confidence intervals.

Results Data on a total of 3,978 brain tumour cases, including 2,054 gliomas and 1,924 meningiomas, were analysed with 5,601 control subjects. Estimates of cumulative exposure, time-weighted average exposure, maximum exposure, and exposure duration were calculated for exposure 1–4, 5–9, and 10+ years in the past. Estimates of mean cumulative exposure were higher for males, older participants, and participants with lower levels of educational attainment. Positive associations between different indicators of ELF-MF exposure in the 1–4 year time window and glioma but not meningioma were observed.

Conclusion Occupational ELF-MF exposure may play a role in the promotion of glioma, however findings may also be due to reverse causality or other methodological sources of bias.

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242   **QUANTITATIVE MEASUREMENTS OF OCCUPATIONAL EXPOSURE TO STATIC MAGNETIC STRAY FIELDS FROM MRI SCANNERS IN CLINICAL AND RESEARCH ENVIRONMENTS**

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Objectives Workers' exposure to static magnetic stray fields from MRI scanners was evaluated in a large cross-sectional study in The Netherlands. Factors determining the exposure to static magnetic fields (SMF) and time-varying magnetic fields (TVMF) like scanner characteristics, work patterns and individual practices could be quantified.

Methods Occupational exposure to static magnetic fields (B) and rate of change of field due to movement through a static magnetic field (dB/dt) were measured using a Magnetic Field Dosimeter (University of Queensland). About 480 predominantly full-shift measurements were collected from more than 300 employees working at 14 clinical or research MRI facilities. During measurement days, participants kept a log of the tasks they performed and the scanner (s) at which they worked.

Results Highest peak B and dB/dt exposures were observed among MRI radiographers and research staff. Peak exposures were highest in academic hospitals (mean [range]: 814 mT [36 - 4928]; 1291 mT/s [27 - 5057]) and lowest for people working in experimental animal imaging facilities (mean [range]: 227 mT [31 - 625]; 395 mT/s [32 - 1329]). Scanner field strength showed a strong association with peak B and dB/dt exposure when subjects worked near a closed bore scanner. However, for small bore scanners this association appeared to be negative. This could be partially explained by variability in shielding (active vs. passive) of the small-bore magnets.

Conclusions For assessment of exposure for epidemiological studies classification solely based on scanner field strength is insufficient. The type of scanner (open/closed/extremity scanner; large/small bore) and type of shielding of the static magnetic field (active/passive) should be taken into account as well.

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243   **OCCUPATIONAL EXTREMELY LOW FREQUENCY MAGNETIC FIELD EXPOSURE AND CANCER INCIDENCE IN A LARGE PROSPECTIVE COHORT STUDY**

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Objectives This study investigated the association between exposure to occupational extremely low frequency magnetic fields (ELF-MF) and various types of cancer within the prospective Netherlands Cohort Study (NLCS).

Methods For this case-cohort analysis, 120,852 men and women aged 55 to 69 years at time of enrollment in 1986 were followed up (17.3 years) for incident cases of lung, breast, brain and haematopoietic cancers and their subtypes. Information on occupational history and potential confounders such as sex, age, smoking, alcohol use and attained educational level were collected at baseline through a self-administered questionnaire.

Occupations were coded using the International Standard Classification of Occupations (ISCO-88). Occupational ELF-MF exposure was assigned by using a semi-quantitative ELF job-exposure matrix which assigns ordinal exposure levels (background, low and high exposure) based on intensity and probability of exposure. Metrics of ELF-MF exposure were ever low and ever high exposure versus background exposure, duration of exposure, and cumulative exposure to ELF-MF up to baseline. Associations with cancer incidence were analysed with Cox-regression using attained age as underlying time scale.

Results Ever low or ever high exposure to ELF-MF showed no effect on cancer incidence of lung, breast, brain cancer, nor any of the assessed subtypes. Duration and cumulative exposure also showed no effect of ELF-MF exposure on these cancer sites. Ever high exposed to ELF-MF showed a significant association with acute myeloid leukaemia (AML) (hazard ratio [HR] 2.09; 95% confidence interval [CI] 1.05–4.15) and follicular lymphoma (HR 2.40; 95%CI 1.00 - 5.77). In addition, cumulative

exposure to ELF-MF showed a positive association with follicular lymphoma.

Conclusions In this large prospective cohort study, we found indications of an association of ELF-MF exposure with AML and follicular lymphoma, but not with other types of cancer. These results warrant further research in the possible association of ELF-MF and haematopoietic cancers.

| 244 | EFFECTS OF MRI RELATED MAGNETIC FIELDS ON COGNITIVE PERFORMANCE |

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Objectives The advances in modern medicine introduced stronger MRI systems up to 9.4 Tesla and a broader area of application. Since the use of stronger imaging systems the amount of reported side effects has increased. Among these symptoms are nausea, dizziness, fatigue sleeplessness, concentration problems and a metallic taste. An earlier study showed also negative effects of movement in the magnetic fields on concentration, visuo-spatial orientation and postural body sway.

Exposure to higher field strengths could have consequences for professions in medical settings where workers are repeatedly exposed. Especially for surgeons and radiologists working close to MRI systems need to maintain a high level of accuracy in performance and cognitive function. Better insight in acute effects on neurocognitive functions, will form a basis for the design of relevant protective and precautionary control measures.

In the present study we try to gain more insight which kind of magnetic fields are responsible for evoking the cognitive effects. We separate between the heterogeneous static magnetic field (SMF) around the scanner and movement induced time-varying magnetic fields (TVMF) within the static magnetic field.

Methods We used a double blind randomised cross over design in which thirty six healthy volunteers underwent four test sessions. The two exposure conditions were near a 7 T MRI system with personal SMF exposure of 1.0 Tesla. In one of these conditions subjects had to make standardised head movements before every task which induced additional TVMF of 2.4 T/s. Of the two corresponding sham conditions (0 T) one was with and one without additional head movements. Cognitive tasks which showed an effect in previous studies were assessed.

Results Results of this study suggests different effects from SMF and TVMF on cognition.

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| 245 | RISK OF EIGHT TYPES OF CANCER AND CLEANING-RELATED EXPOSURES IN A CASE-CONTROL STUDY |

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Objectives To evaluate the possible associations between occupational exposure to cleaning products and cancers of the following sites: bladder, pancreas, prostate, colon, stomach, kidney, non-Hodgkin's lymphoma, and lymphoid tissue (Hodgkin's and Non-Hodgkin's lymphomas and myelomas combined).

Methods We conducted a case-control study of occupational exposures and cancer in Montreal including 3730 cancer cases and 533 population controls. Occupational exposure to a set of agents was evaluated using a combination of subject-reported job history and expert assessment. We evaluated the association between each of eight cancer sites and each of eight cleaning-related occupations, and each of seven cleaning-related exposures (ammonia, hypochlorite, spray gases, waxes/polishes, caustic solutions, chlorine, and cleaning agents as a class). Analyses were done using multivariate logistic regression.

Results In general, we found no increased risk of cancer for the evaluated occupations as compared to never cleaners with the exceptions of pancreatic cancer (Odds Ratio; 95% CI (OR): 3.0; 1.3–6.8) and cancers of lymphoid origin (lymphomas and myelomas) (OR: 2.1; 1.1–4.1) in relation to long term employment as 'janitors and cleaners'. Among specific agents, we found an indication of excess risk for substantial exposure to ammonia and hypochlorite with a pooled set of lymphoid cancers (Non-Hodgkin's lymphoma, Hodgkin's lymphoma and myeloma) (OR: 2.2; 1.2–4.0 and 2.0; 1.0–4.0, respectively). For the rest of the agents and cancer sites evaluated we found no evidence of increased risk.

Conclusions Overall, our results do not support a clear association between occupational exposure to cleaning products or cleaning-related occupations and the examined cancer sites, with the exception of a potential link between lymphoid cancers (Hodgkin's and Non-Hodgkin's lymphomas and myeloma) and exposure to ammonia and to hypochlorite. Elevated ORs among janitors and cleaners should be further explored. Our results must be interpreted in a context of multiple hypotheses testing.

| 246 | CHEMICAL EXPOSURE AND CANCER MORTALITY IN A FRENCH COHORT OF URANIUM PROCESSING WORKERS |

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Objectives Besides radiation, nuclear workers can be exposed to a variety of chemical hazards. We examined the effect of chemical exposure on cancer mortality of French nuclear workers at the AREVA NC Pierrelatte establishment.

Methods A cohort of 2,897 uranium processing workers employed for at least 6 months was followed up from 1968 to 2006. Exposures to uranium and potentially carcinogenic chemicals were assessed using plant-specific job-exposure matrix. Lung, lympho haematopoietic, kidney and bladder, brain and other central nervous system (BCNS), and prostate cancers mortality hazard ratios (HRs) were estimated for each chemical exposure using Cox regression models stratified on sex and calendar period, and adjusted for socio-economic status. An effect of co-exposures to uranium and other chemicals was examined using additional adjustments.

Results Exposure to aromatic solvents was associated with increased risk of BCNS malignancies after adjustment for other chemicals (HR = 6.53, 95% CI = 1.14–37.41) and other chemicals and uranium (HR = 7.26, 95% CI = 0.90–58.19). Significantly elevated risk of lung cancer related to exposure to chromium (VI) compounds was also observed, based on only two deaths among exposed workers.

Conclusions Exposure to aromatic solvents was associated with the risk of BCNS cancers. The latter risk might be increased by