

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.

Session: 4. Occupational cancer

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

uranium co-exposure. A potential excess risk of lung cancer related to chromium (VI) exposure observed among nuclear workers should be confirmed in further studies.

247 MORTALITY STUDY IN TWO ITALIAN COHORTS OF WORKERS EXPOSED TO PCBs: EXTENSION OF THE FOLLOW-UP UP TO 2006

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Objectives PCBs have been classified as carcinogenic in animals and probably carcinogenic to humans (IARC1987). Epidemiological studies showed increased risks for Non-Hodgkin's Lymphoma, liver and biliary tract, digestive, skin, prostate and brain cancer but findings are still controversial. We present the results of the extension of the follow-up as of 2006 of two cohorts of workers potentially exposed to PCBs in capacitor manufacturing plants in Lombardy, Northern Italy. The mortality of the two cohorts was previously examined up to 1991 (Plant 1) and 2002 respectively (Plant 2).

Methods The study population included 544 males and 1551 females employed between 1946 and 1978 in Plant 1 and 373 males and 97 females employed between 1950 and 1988 in plant 2. Standardised mortality ratios (SMR) and 95% Confidence Intervals (95% CI) were calculated (in the whole cohort, separately in plant 1 and 2 and among males and females) using as reference the regional mortality rates specific by age and calendar period.

Results In the whole cohort, increased mortality from biliary tract and "other digestive" cancer, prostate, brain cancer, Hodgkin and non-Hodgkin lymphoma (8 deaths, SMR 1.65; 95% CI 0.8–3.3) were detected. The excess mortality from biliary tract cancer was confined to males (4 deaths, SMR 3.9; 95% CI 1.5–10.4), where as the increased mortality from Hodgkin lymphoma (4 deaths, SMR 3.6, 95% CI 1.3–9.5) and brain cancer (7 deaths, SMR 2.1; 95% CI 1.02–4.5) was observed in plant 1 only. The excess mortality from other digestive cancer and NHL was equally distributed in the two cohorts and among males and females. Analyses by duration of employment and time since first employment did not show consistent trends.

Conclusions Our findings suggest increased mortality from cancers of "a priori" interest in PCB exposed workers, however these excesses were not clearly related to duration of employment and latency.

248 OCCUPATIONAL EXPOSURE TO TRICHLOROETHYLENE AND PERCHLOROETHYLENE AND THE RISK OF LYMPHOMA, LIVER AND KIDNEY CANCER IN FOUR NORDIC COUNTRIES

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Objectives Trichloroethylene (TCE) and Perchloroethylene (PER) are two chlorinated solvents that have been applied widely as degreaser of metal parts and in dry cleaning and other applications. In 2012 the International Agency for Research on Cancer classified TCE as *carcinogenic to humans* and PER as *probably carcinogenic to humans*. We explored exposure-response relations for TCE and PER and non-Hodgkin lymphoma (NHL), multiple myeloma (MM), and cancers of the kidney and liver in the Nordic Occupational Cancer (NOCCA) cohort which holds information on occupation and long-term follow-up for cancer for the populations of Norway, Sweden, Finland and Iceland.

Methods The cohort was set-up by linking occupational information from censuses to national cancer registry data utilising personal identity codes in use in all the Nordic countries. Country, time-period, and job-specific exposure estimates were generated for TCE, PER, and potentially confounding occupational exposures with a comprehensive job-exposure matrix. Two exposure metrics were created: cumulative exposure and 'average intensity times prevalence' of exposure. Conditional logistic regression was conducted for exposure groups as well as for continuous cumulative exposure.

Results Hazard ratios for liver cancer, NHL, MM, but not kidney cancer were slightly elevated in groups with high exposure to PER (compared to occupationally unexposed subjects). Hazard ratios for liver cancer and NHL also increased with increasing continuous exposure to PER. We did not observe evidence for an association between exposure to TCE and NHL, MM, and liver and kidney cancer.

Conclusions Although this study was subject to limitations related to the low prevalence of exposure to PER and TCE in the Nordic population and a necessarily rudimentary exposure assessment strategy, we observed some evidence indicative of an excess risk of cancer of the liver and NHL in subjects exposed to PER. Exposure misclassification may have diluted the observed associations in this study.

249 A COMPREHENSIVE DANISH OCCUPATIONAL CANCER LINKAGE

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Objectives Linkages of cancer and occupation provide an important resource to aid in our understanding of the role of occupational exposures in the aetiology of cancer. The majority of existing surveys have, however, been based on census data including occupational information from only one certain date, thus lacking the general situation with several changed between different jobs during a work career. We report on a series of 60 Danish nested case-control studies based on nationwide data linkages, including information on all employments since 1964.

Methods All cancer cases (N = 1,031,504; 50.4% women and 49.6% men) diagnosed between 1970 and 2010, aged 18 and 84 years old, was retrieved from the Danish Cancer Registry. Each subject was individually linked with employment information from the Nationwide Pension Scheme with compulsory membership, including information on start and end of each employment, and a 5-digit hierarchically trade code. Information on job title, civil and vital status was obtained from the Central Population Register (CPR). Controls free of cancer and matched on birth year and sex have been selected from the