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Results Estimates of exposure for 138 EMF sources were obtained from measurements (1424 aggregated records) extracted from 71 papers and hygiene reports (1974–2013). For each source, exposure was calculated by frequency band and dosimetry type, as the arithmetic and geometric means of all measurements identified. Standard deviations were included in order to characterise the variability of the estimates.

Conclusions A source-exposure matrix has been constructed for the most common sources of EMF in the workplace, based on the responses to the INTERPHONE-INTEROCC study questionnaire. This database currently represents the most comprehensive source of information on occupational EMF exposure and is available on request to researchers.

0286

OCCUPATIONAL USE OF INSECTICIDES, FUNGICIDES AND FUMIGANTS AND RISK OF NON-HODGKIN LYMPHOMA AND MULTIPLE MYELOMA IN THE AGRICULTURAL HEALTH STUDY

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Objectives Farming and exposure to pesticides have been linked to non-Hodgkin lymphoma (NHL), and multiple myeloma (MM) in previous studies. We evaluated use of insecticides, fungicides and fumigants and risk of NHL, including MM and other NHL sub-types in the Agricultural Health Study, a US-based prospective cohort study.

Method A total of 527 cases occurred among 55 875 pesticide applicators from enrollment (1993–1997) through 2011 in Iowa and 2010 in North Carolina. Information on pesticide use, other agricultural exposures and other factors was obtained from questionnaires at enrollment and follow-up approximately five years later (1999–2005). Information from these questionnaires was used to create lifetime-days and intensity-weighted lifetime-days of pesticide use. Poisson regression and polytomous logit models were used to calculate relative risks (RR) and 95% confidence intervals (CI) to evaluate associations between 26 pesticides and NHL and five NHL-subtypes including multiple myeloma, while adjusting for potential confounding factors.

Results Statistically significant positive exposure-response trends occurred between overall NHL risk and lindane (p-trend = 0.004) and DDT (p-trend = 0.02). In addition, ever use of terbufos was associated with NHL overall (RR=1.2; CI=1.0–1.5), but with no exposure-response trend. In sub-type analyses, terbufos and DDT were associated with small cell lymphoma/chronic lymphocytic leukaemia/marginal cell lymphoma. In addition, lindane and diazinon were associated with follicular lymphoma and permethrin with MM although tests of homogeneity did not show significant differences in exposure-response among NHL-subtypes for any chemical.

Conclusions These findings are among the first to suggest links between DDT, lindane, permethrin, diazinon and terbufos and specific NHL subtypes.

0288

GENE-SPECIFIC DNA METHYLATION AS A VALUABLE TOOL FOR RISK ASSESSMENT: THE CASE OF OCCUPATIONAL EXPOSURE TO DIFFERENT VOC'S IN MEXICAN WORKERS

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Objectives To determine gene-specific methylation levels (promoter region) on genes from critical cellular pathways in persons occupationally exposed to a single volatile organic compound (VOC) or to a mixture of them

Method Workers from two tanneries, two shoe factories, and two gas stations were included (exposed groups to VOC's). We also included administrative workers (reference group), all of them from the city of León Guanajuato, México. In tannery workers we measured individual exposure levels to three different VOC's; for the rest of the groups we measured up to 7 VOC's. After exposure characterisation, we took blood samples and extracted DNA in order to determine, by PCR-pyrosequencing, methylation levels in genes involved in inflammation, DNA repair, oxidative stress and xenobiotic metabolism pathways.

Results Only toluene environmental levels were higher in tannery workers. Workers from the leather shoe factory showed the highest exposure levels for up to five different VOC's. There was no statistical significant difference in gene-specific methylation for tannery workers when compared to the control group. For the leather shoe factory workers, we found hypermethylation in the TNFa, SOD1 and TOP2A promoter regions compared to the control group or to other exposed groups. Gas station attendants showed hypermethylation for the IL6 gene compared to controls

Conclusions Occupational exposure to a mixture of VOC's has important effects on the methylation status of genes involved in inflammation, DNA repair and oxidative stress. These epigenetic changes, detectable at a pre-clinical stage, represent a valuable tool for performing an early risk assessment in these populations

0289

PREVENTING NEEDLESTICKS AND OTHER SHARPS INJURIES TO HOME CARE AIDES: RESULTS OF A SURVEY TO IDENTIFY HAZARDS DURING HOME VISITS

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Objectives To follow up on our previous finding that home care (HC) aides have a substantial risk of injury with used sharp medical devices, this study's goal was to identify modifiable aspects of aide-client encounters during HC visits that increase risk of sharps injuries (SI).

Method A survey of 1249 HC aides was conducted in eastern Massachusetts. Approximately half the participants (634) were employed by HC agencies, and half (615) directly by HC clients and their families. A questionnaire gathered data on aides' most recent home visits, enabling quantification of hazardous working conditions. The specific investigation described here focused on understanding determinants of hazardous conditions likely to increase the risk of SI including: the aide finding used sharps

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lying around the house; assisting a client with using a sharp; and disposing of sharps. Poisson regression modelling was used to identify important predictors of handling or encountering used sharps. By linking these results to national data on HC visits and clients, we estimated the frequency with which these hazardous conditions occur to HC aides nationwide.

Results Although not authorised to do so, 7% of aides assisted clients to use a sharp. Aides were much more likely to encounter sharps if they were employed directly by clients/families than if employed through an agency. Other important determinants of sharps exposure included client medical conditions like diabetes, and aide characteristics including professional certification.

Conclusions The results are being investigated further through focus groups of HC aides and used to develop preventive interventions.

0305

THE NIEHS GULF STUDY: QUESTIONNAIRE RESULTS AND USE OF JOB EXPOSURE MATRICES TO LINK INHALATION AND DERMAL EXPOSURE ESTIMATES TO STUDY SUBJECTS

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Objectives To describe the activities of the GULF STUDY participants responding to the Deepwater Horizon oil release in the Gulf of Mexico in 2010 and the process of developing job exposure matrices (JEMs) of exposure group/location/time period combinations to link inhalation and dermal exposures to the participants.

Method Information on activities performed by the participants in the NIEHS epidemiologic study were collected via questionnaire with details on almost 100 clean-up activities (e.g., skimming); dates; amount of time spent performing these activities; and the geographic location where these activities were performed. The questionnaire also collected information on frequency of exposure to various oil components onto various parts of the body and the use of protective equipment. JEMs of inhalation and dermal exposure estimates have been developed for total hydrocarbons for unique exposure group/vessel/time period combinations.

Results Preliminary data indicate over 6000 study subjects reported patrolling the beaches, reported removing tar balls, and reported removing oil or oily sand. Over 5000 collected oily plants, a similar number bagged oiled material and over 4000 decontaminated vessels or equipment of oil. Approximately one-third of the study subjects worked on the water; about 5% worked near the wellhead.

Conclusions Study subjects performed a variety of activities at multiple locations that resulted in different levels of inhalation and dermal estimates. These estimates will be used in the evaluation of exposure-response relationships in the epidemiologic study.

0309

BURDEN OF CANCER ATTRIBUTABLE TO OCCUPATIONAL DIESEL ENGINE EXHAUST EXPOSURE IN CANADA

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Objectives To estimate the number of new lung cancers cases in Canada attributable to occupational diesel engine exhaust (DEE), which IARC classified as a definite human carcinogen in 2012. This is part of a larger effort to estimate the current burden of occupational cancers in Canada.

Method Relative risks were selected from two recent studies of miners and truckers with quantitative exposure-response. CAREX Canada estimates of exposure prevalence and level by detailed industry and occupation were supplemented by a literature search for DEE measurement data. For each exposure group, RRs were assigned based upon the estimated mean exposure. Employment trends of industries and occupations were based upon census data from multiple years. Annual Labour Force Survey data were used to attribute age- and tenure-distribution, as well as short-term turnover characteristics. Survival was adjusted to age at entry into the exposed cohort during the risk exposure period 1961–2001. The attributable fraction (AF) for DEE-related lung cancers will be calculated by province, sex, industry and occupation.

Results Approximately 1.4 million workers were exposed to DEE during the risk exposure period. The initial estimated AFs for DEE-related lung cancers are: 4.92% for males, 0.29% for females, and 2.70% overall.

Conclusions These burden estimates are somewhat higher than recent estimates from other groups (1.3–1.8%). They account for the most recent evidence for the risk of lung cancer from occupational DEE exposure, as well as detailed historical exposure assessment and labour force trends. Sensitivity analyses are underway to determine the influential assumptions.

0311

DEVELOPMENT OF A PREDICTIVE MODEL FOR ESTIMATING GAMMA RADIATION EXPOSURES AMONG ONTARIO URANIUM MINERS

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Objectives The objective of this study is to develop and validate a predictive model for estimating gamma radiation exposure for miners working in uranium mines between 1981 and 1985.

Method The dose prediction model was developed and validated using multiple linear regression. To aid in model development, 70% random sample of workers were used in the model development (i.e., Training Sample) while the remainder 30% (i.e., Test Sample) was used to determine model performance. A stepwise approach was used to select variables into the model. Criteria for retaining the variables in the model was based on a p-value of $<=0.15$. Model fit was assessed using adjusted R-square. Co-linearity was determined by the magnitude of the variance inflation factor (VIF). Variables with VIF greater than 3.0 were removed from the model. In addition, SAS procedure ROBUSTREG was used to minimise the effects of outliers and