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### 1. Reviews and meta-analyses

None

### 2. Residential exposure

None

### 3. Occupational exposure

#### 3.1 Malignant lymphoma and occupational exposure to extremely low frequency magnetic fields and electrical shocks: a nested case-control study in a cohort of four Nordic countries.

Jalilian, H., Guxens, M., Heikkinen, S., Pukkala, E., Huss, A., Hossaini, S.K.E., Kjaerheim, K., Vermeulen R. (2022). Malignant lymphoma and occupational exposure to extremely low frequency magnetic fields and electrical shocks: a nested case-control study in a cohort of four Nordic countries. *Occupational and Environmental Medicine, in press*. <https://doi:10.1136/oemed-2021-108120>

**Background and Objective:** Background Exposure to extremely low frequency magnetic fields (ELF-MFs) and electric shocks is a common occupational risk factor in many workplaces. Recent investigations have highlighted a possible association between such exposures and lymphoma risk. This study was carried out to further explore the association between occupational exposure to ELF-MFs and electric shocks and risk of lymphoma in a large Nordic census-based cohort.

**Methodology:** The authors included cases of non-Hodgkin's lymphoma (NHL, n=68 978), chronic lymphocytic leukaemia (CLL, n=20 615) and multiple myeloma (MM, n=35 467) diagnosed between 1961 and 2005 in Finland, Iceland, Norway and Sweden. Cases were matched to five controls by year of birth, sex and country. Lifetime occupational ELF-MF and electric shock exposures were assigned to jobs reported in population censuses using job-exposure matrices. The risk of cancer was assessed based on cumulative exposure to ELF-MF and electric shocks. ORs with 95% CIs were estimated using logistic models adjusted for occupational co-exposures relevant to lymphomas.

**Results:** Less than 7% of the cases experienced high levels of ELF-MF. The authors observed no increased risks among workers exposed to high levels of ELF-MF for NHL (OR: 0.93; CI 0.90 to 0.97), CLL (OR: 0.98; CI 0.92 to 1.05) or MM (OR: 0.96; CI 0.90 to 1.01).

**Conclusion:** The results do not provide support for an association between occupational exposure to ELF-MFs and electric shocks and lymphoma risk.

#### 4. Human Experimental Studies

None

#### 5. Exposure Assessment

None

#### 6. Leukaemia Studies

##### 6.1. Cadmium (Cd) and Lead (Pb) topsoil levels and incidence of childhood leukemias.

Asenjo, S., Nunez, O., Segutell, J. et al. (2022). Cadmium (Cd) and Lead (Pb) topsoil levels and incidence of childhood leukemias. *Environmental and Geochemical Health*, 44, 2341–2354. <https://doi.org/10.1007/s10653-021-01030-w>

**Background and Objective:** There are few well-established risk factors for childhood leukemias. While the frequency of childhood leukemias might be partially attributable to some diseases (accounting for a small fraction of cases) or ionizing radiation, the role of heavy metals has not been assessed. The objective of this study was to assess the potential association between levels of cadmium (Cd) and lead (Pb) in soil and childhood leukemias incidence.

**Methodology:** The authors conducted a population-based case–control study of childhood leukaemia in Spain, covering 2897 incident cases gathered from the Spanish Registry of Childhood Tumours and including 14 Spanish Regions with a total population of 5,307,433 children (period 1996–2015). Cd and Pb bioavailable levels at every children’s home address were estimated using data from the Geochemical Atlas of Spain. Logistic regression was used to estimate odds ratios (ORs) and their 95% confidence intervals (95% CIs); Sex, rurality, employment rate and socioeconomic status were included as covariates. Metal levels were analysed according to two definitions: as continuous variable assuming linearity and as categorical variables to explore a potentially nonlinear association (quantiles).

**Results:** Increases in both Cd and Pb topsoil levels were associated with increased probability of childhood leukemias incidence. The results for the models with the continuous variables showed that a unit increase on the topsoil level was associated with an OR of 1.11 for Cd (95%CI 1.00–1.24) and an OR of 1.10 for Pb (95%CI 0.99–1.21).

**Conclusion:** This study may point towards a possible link between residential Cd and Pb topsoil levels and the probability of childhood leukemias incidence. Residing in a location with the highest concentrations of these heavy metals compared to those locations with the lowest could increase the risk around a 20%, for both Cd and Pb.

## 6.2 Maternal pesticide exposure and its relation to childhood cancer: an umbrella review of meta-analyses.

Iqbal, A., Shahbaz, A., Ali, I. (2022). Maternal pesticide exposure and its relation to childhood cancer: an umbrella review of meta-analyses. *International Journal of Environmental Health Research*, 32(7), 1609-1627. <https://doi.org/10.1080/09603123.2021.1900550>

**Background and Objective:** This umbrella review summarizes the available meta-analyses elucidating the effects of maternal pesticide exposure on adverse health outcomes in children particularly the risk of childhood cancer.

**Methodology:** A literature search was conducted on PubMed and Scopus with 10-years temporal restriction and with search terms of ('pesticides') and ('maternal' or 'pregnancy' or 'gestational' or 'perinatal' or 'children' or 'infants' or 'birth weight' or 'gestational age' or 'cancer' or 'tumor' or 'malignancy' or 'carcinoma') and ('metaanalysis' or 'systematic review'). Using relative risk estimates, e.g., odds ratio (OR), relative risk (RR),  $\beta$  coefficients, and 95% confidence interval (CI) as a prerequisite for inclusion/exclusion criteria a total of 19 eligible metaanalyses were included.

**Results:** The results showed that maternal domestic/occupational pesticide exposure increases the risk for childhood leukaemia. The overall OR regarding the risk of pesticide exposure and leukaemia was 1.23 to 1.57 with heterogeneity  $I^2$  values that varied between 12.9% and 73%. Some studies found that exposure to dichlorodiphenyldichloroethylene (p,p'-DDE) and polychlorinated biphenyls (PCB-153) pesticides appears to decrease infant birth weight to some extent [p,p'-DDE ( $\beta = -0.007$  to  $-0.008$ )] and [PCB-153 ( $\beta = -0.15$  to  $-0.17$ )]

**Conclusion:** Needing more studies on this relationship, our study found that pesticide exposure is a risk factor for leukaemia in children.