Non-Ionizing Radiation & Children's Health

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PLATFORM PRESENTATION ☒

Review EMF Epidemiology

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There is still an ongoing scientific controversy whether exposure to electromagnetic fields is associated with an increased cancer risk in humans. Epidemiological studies have shown a consistent association between exposure to extremely low-frequency (ELF) magnetic fields and the risk of leukemia in children, but even after decades of investigations it is unclear whether the observed association is causal or due to bias and limitations of the studies. In 2001, the International Agency for Research on Cancer (IARC) has therefore classified ELF magnetic fields as possibly carcinogenic to humans, an assessment recently confirmed by others, for instance the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) of the European Commission.

ELF magnetic fields have been studied as a risk factor for childhood leukemia since the late 1970s. At present, more than 20 epidemiological studies have investigated this topic, with significant improvements in study designs and methods of exposure assessment over time. These studies have been pooled in separate meta-analyses, suggestion roughly a doubling in risk related to 24 hours average exposures exceeding 0.3/0.4 μT. Few children were exposed to average magnetic fields of 0.4 to 1 μT or higher, hence, data were too sparse to reliably predict the shape of a dose-response curve for magnetic fields higher than 0.4 μT and this shape is more or less compatible with trends ranging from a further increase in risk, to a constant risk or even a downward gradient. It cannot be excluded that the observed association, although emerging in different studies, is due to methodological limitations. Particularly in studies measuring magnetic fields participation rates were low, suggesting an inflation of risk estimates in sensitivity analyses. However, it is not known whether the the entire observed effect can be explained by bias.

Overall, evidence from animal studies or in vitro studies neither supports nor contradicts the epidemiological findings. Recent studies on ELF magnetic fields and survival after childhood leukemia show a somewhat poorer survival with increasing exposure, but based on very small numbers and follow up of this hypothesis is required. It may suggest, however, that ELF magnetic fields promote the growth of leukemia cells resulting in a relapse.

Recent pooled analyses of ELF magnetic fields and the risk of brain tumors in children do not show evidence of an association.