

Power lines and health part I: childhood cancer

No. 2018/08

Executive summary

Health Council of the Netherlands



In the Netherlands, on average approximately 135 new cases of childhood leukaemia are diagnosed each year. There are indications that the risk of getting this disease is twice as high in children living near overhead power lines than in other children. This means that one case of childhood leukaemia every two years may be associated with the presence of overhead power lines. Exposure to the magnetic fields generated by the power lines could be responsible for this, although other (unknown) factors and chance cannot be excluded. Motivated by a Health Council report published in 2000, the Netherlands Government recommends local and provincial authorities and electric power transport companies to apply a precautionary policy. The aim is to prevent as much as possible that new situations will arise with long-term exposure of children to magnetic fields from overhead high-voltage power lines that exceed an annual average level of 0.4 microtesla.

Request for advice

The then State Secretary for Infrastructure and the Environment (currently Infrastructure and Water Management) asked the Health Council to update its 2000 report and to consider not only leukaemia but also other health effects. This report, the first in a series of three, deals with childhood cancer. The other two reports, to be published later, will discuss cancer and neurodegenerative diseases in adults.

Two type of studies: using distance and magnetic field strength

The Electromagnetic Fields Committee of the Health Council re-analyzed the data on a possible relationship between exposure to magnetic fields generated by overhead and underground power lines and the incidence of childhood cancer. It did so in greater detail and including the most recent studies. Most studies do not measure the exact exposure of children, because that is too complex and time-consuming. Instead, some studies consider the distance between a child's residence and the

power line. Because the strength of the magnetic field generated by the line decreases with increasing distance, the distance provides an indication for the magnetic field strength in the residence. In other studies, the residential magnetic field strength has been assessed by measurements or calculations, or combinations of the two.

Childhood leukaemia

Overall, the results indicate an increasing risk of childhood leukaemia with decreasing distance and increasing magnetic field strength. The risk estimate is higher when the magnetic field strength is assessed more accurately. The most representative exposure estimate is the assessment of the magnetic field strength in all residences of a child between birth and diagnosis. Based on these data, the estimated leukaemia risk seems to be more than two and a half times higher in children that have been long-term exposed to an average magnetic field strength of 0.3 to 0.4 microtesla or higher compared to children that are exposed at



background level. There is considerable uncertainty in this risk estimate, but the Committee considers it highly unlikely that in reality there is no increased risk.

These new analyses confirm the earlier conclusions of the Health Council.

Other types of cancer

For other types of cancer in children only data are available on brain tumours and lymphomas. Only for brain tumours sufficient data are available to carry out analyses. In studies using distance as a measure of exposure, no indications for an association with brain cancer in children have been found. In studies using the magnetic field strength as an exposure metric, the risk of brain cancer seems almost 1.5 times higher in children that have been long-term exposed in their homes to magnetic field strengths averaging 0.4 microtesla or more. There is considerable uncertainty in this risk estimate and the Committee considers it more likely that the increase is a chance finding than in the case of leukaemia.

Conclusions

The analyses of the Committee provide indications of an association between exposure to magnetic fields around overhead power lines and the incidence of childhood leukaemia and possibly brain tumours. When the results are summarized in terms of the framework for assessing causality of the US Environmental Protection Agency, the Committee concludes that they are ‘suggestive of a causal relationship’ between magnetic field exposure and both leukaemia and brain tumours. However, the indications are weaker for brain tumours than for leukaemia. For both cancer types there is insufficient evidence for the qualification of a ‘likely’ or ‘proven causal relationship’, also because there is no supporting evidence from animal studies.

Regarding the risk of childhood lymphomas, there is insufficient data to infer on causality. An influence of other factors that are associated with the presence of overhead power lines cannot be excluded. However, this has not been shown in research to date. It can also not be

excluded that the observations, in particular those concerning brain tumours, are chance findings.

Recommendations

The current scientific knowledge does not give the Committee reason to recommend the State Secretary for Infrastructure and Water Management to reconsider the current policy regarding overhead power lines. Since there are indications for a causal relationship between exposure to magnetic fields and increased risks of childhood leukaemia and brain tumours, and magnetic fields are not blocked by soil or construction materials, the Committee suggests the State Secretary from a public health perspective to consider extending the precautionary policy to underground power cables and other sources of long-term exposure to magnetic fields from the electricity grid, such as transformer stations and transformer houses.



The Health Council of the Netherlands, established in 1902, is an independent scientific advisory body. Its remit is “to advise the government and Parliament on the current level of knowledge with respect to public health issues and health (services) research...” (Section 22, Health Act).

The Health Council receives most requests for advice from the Ministers of Health, Welfare and Sport, Infrastructure and Water Management, Social Affairs and Employment, and Agriculture, Nature and Food Quality. The Council can publish advisory reports on its own initiative. It usually does this in order to ask attention for developments or trends that are thought to be relevant to government policy.

Most Health Council reports are prepared by multidisciplinary committees of Dutch or, sometimes, foreign experts, appointed in a personal capacity.

The reports are available to the public.

This publication can be downloaded from www.healthcouncil.nl.

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