

# Childhood Leukemia and 60Hz AC Power

## Introduction

In the last few years there have been a number of groups who have claimed that AC power lines have contributed to an increase in childhood leukemia. This posting will set the stage for an analysis of the many papers that have been written both pro and con. Before continuing with a detailed analysis it is important to review the statistics pertaining to leukemia and then take a short look at the study which caused this whole field of endeavor.

Before continuing a few words on nomenclature are required. The abbreviation EMF stands for “Electric and Magnetic Fields”. It is occasionally replaced by “AC Magnetic Fields”. Without getting into the physics behind the definitions you can assume that the use of the expression “AC Magnetic fields” represents those fields produced by the current flowing through the wires

In 1979 Wertheimer and Leeper (Wertheimer N, Leeper E. Electrical wiring configurations and childhood cancer. American Journal of Epidemiology 109:273-284, 1979. ) published a study alleging that childhood leukemia was higher in households which were located near electric power lines. They did not take any measurements in these houses but merely looked at the type of wiring. The criteria they used was the thickness of the household wiring and the distance of the house from the power lines. Wire thickness was determined using a table of Wire Codes. A short description of this study can be found at [Wertheimer Leeper Study](#).

The Wertheimer and Leeper study launched an industry of pseudo scientists and promoters who used public fear fed by the media for their own purposes. This was the starting point for the attempt to link AC fields and leukemia.

Using wire thickness as an indicator is nonsense. The strength of the magnetic field is directly proportional to the current. Wire size determines the maximum allowable current, it does not tell you what the current is. Throughout the day the current required by the house can vary dramatically. Consider the electrical consumption required when the occupants are sleeping. Now compare this to the requirements needed when preparing food etc. If you are looking for an association between AC Magnetic fields and childhood leukemia it would have made sense to actually measure the EMF field.

Any biological effect would depend on the intensity of the EMF field and the amount of exposure. This can be measured using a dose meter which can be worn by the subjects under study. To date no repeatable recognized study has been able to show a relationship between EMF and a persons health.

Later studies did measure these fields and I will discuss the methodology and results in a later posting.

To alleviate any sense that AC fields are dangerous I suggest reading the following article from the New England Journal of Medicine:  
[Residential Exposure to Magnetic Fields and Acute Lymphoblastic Leukemia in Children](#)

"Our results provide little evidence that living in homes characterized by high measured time-weighted average magnetic-field levels or by the highest wire-code category increases the risk of leukemia in children."

A later study entitled [Risk in Perspective EMF and Childhood Cancer](#) (Harvard Center for Risk Analysis. March 1996 Volume 4), did not yield any correlation. The author states

"The question of why a relationship has been seen between cancer risk and wire code configuration but not actual EMF measurements remains a perplexing one."

What the above statement means is that there is some other factor involved. It's possible that the type of wire used is indicative of a type of housing construction, geographic location or socio economic class.

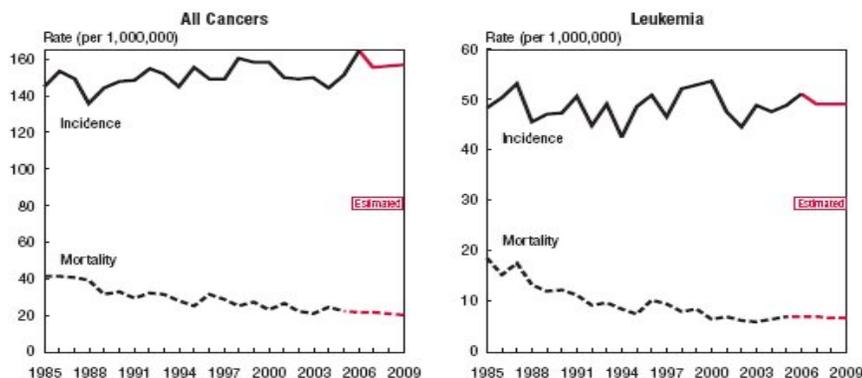
In subsequent posts I will discuss some of the more controversial papers but first I believe it is important to look at the actual childhood cancer statistics.

Childhood leukemia is a very emotional topic. We are dealing with a child not an elderly person who has lived a long life. From the so called "studies" you would expect that we are in the midst of an epidemic. Let's examine the prevalence of leukemia in children. The source for the Canadian Statistics can be found at

[http://www.cancer.ca/Canada-wide/About%20cancer/Cancer%20statistics/~/\\_media/CCS/Canada%20wide/Files%20List/English%20files%20heading/pdf%20not%20in%20publications%20section/Stats%202009E%20Cdn%20Cancer.ashx](http://www.cancer.ca/Canada-wide/About%20cancer/Cancer%20statistics/~/_media/CCS/Canada%20wide/Files%20List/English%20files%20heading/pdf%20not%20in%20publications%20section/Stats%202009E%20Cdn%20Cancer.ashx)

## 5. INCIDENCE, MORTALITY AND SURVIVAL IN CHILDREN (0-14 YEARS)

**Figure 5.1**  
Age-Standardized Incidence and Mortality Rates for Selected Cancers in Children (0-14 Years), Canada, 1985-2009



For all childhood cancers the range varies from 140 to 160 per million. Leukemia ranges from 45 to 55 per million. Typical cancer statistics are based on a per 100,000 population. Because the numbers are very low they are presented per million. For comparison purposes breast cancer has an incidence rate of approx 1000 per million. The total

number of cases per year is approx 275 for leukemia and 850 for all cancers. Notwithstanding the emotional response to childhood leukemia, we nevertheless must look at the numbers objectively. The numbers clearly indicate that there is no epidemic.

A major contributor to the leukemia scare is caused by the media not understanding the numerical results of a study. For example purposes, consider a study which indicates that there has been a 25% increase in leukemia among children living near electric power lines. This would be major news. If however, I told you that instead of the expected 4 cases out of a 100,000 there were 5 cases you would look at the results differently. If you had walked across the street and instead of finding 4 cases you only found 2, would you call the media and announce that you have discovered an area with 50% less leukemia.

What we are dealing with here is small numbers. If the area in question had a 10 fold increase then this would be something to investigate.

In the next installment I will discuss two Canadian studies. One of which found that AC fields may be beneficial and a corresponding study which indicated the opposite.