

RADIATION FROM ELECTRIC POWER IS NOT A SIGNIFICANT CAUSE OF CANCER.

By

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There is much current debate about the potential of the electromagnetic radiation associated with electric power to cause ill-health, particularly cancer. A study published by J.D. Jackson in the April 1992 edition of the Proceedings of the National Academy of Sciences, U.S.A., clearly demonstrates that, amongst the population at large, such radiation is not a significant cause of cancer.

On the other hand, there is some evidence that particular groups exposed to increased levels of this form of electromagnetic radiation are at increased risk of developing cancer. For example there is evidence of a weak association between increased exposure and an increased risk of leukaemia in children. There is also evidence of an increased carcinogenic risk in workers whose occupations have a higher exposure to magnetic fields. However, both in the case of children and exposed workers, contradictory studies have been published, and much more research is needed before we can say anything for sure in these areas.

We are all pretty much continually exposed to electro-magnetic radiation fields that stray from the ubiquitous circuitry of electric power that exists in our environment. Electric power is generated in a power station and is transmitted over long distances on high-voltage cables that run high over the ground. The power is thus directed to numerous substations from whence it is redirected at lower voltage to transformers for local distribution. The transformer steps the power down to a voltage of 220/240 volts for domestic consumption. Typically, local power distribution is carried along the streets on cables mounted 20 to 30 feet above the ground. Finally, within our houses the power is carried through conduits in the walls to outlets for lights, equipment and appliances.

The mechanism for the transmission and distribution of electric power has remained essentially unchanged since the 1920s. However, the volume of power generation and the volume of domestic consumption of electricity has increased dramatically since then. It follows, therefore, that the exposure of the general population to the electromagnetic radiation that strays from electric power has increased throughout the century directly in step with the increase in power generation and in domestic consumption. If electromagnetic radiation is a significant factor in inducing cancer, one would expect this to be reflected in the pattern of cancer statistics recorded over the same period. Jackson's 1992 study compared cancer statistics, volume of power generation, and per capita residential power consumption in the USA over the period 1900 to the present.

The illustration plots per capita electric power generation, per capita electric power consumption, mortality rate from all cancers, mortality rate from respiratory cancers, and mortality rate from all cancers except respiratory cancers, for the period 1900 to 1990 in the United States. Power generation and power consumption increased exponentially over this period. Per capita electric power generation increased by a factor of more than 300 between 1902 and 1990. In the past 50 years it has increased by a factor of more than 10. Similar increases have occurred in per capita residential consumption, with an increase by a factor of 20

in the past 50 years. The exposure of the population to the unavoidable low intensity stray electromagnetic fields has also increased by roughly the same factors over the same time period.

The illustration also shows the age-adjusted death rates from all cancers. This rate has increased relatively little, from 0.8 deaths per 1,000 per year in 1900 to 1.3 deaths per 1,000 per year in 1970, and has been essentially constant since then. Some of the increase in the early years is certainly attributable to more complete reporting of the cause of death.

The illustration also shows that respiratory cancer mortality has been steadily increasing since 1930. When respiratory cancer mortality is subtracted from the total cancer mortality data we see that, since 1940, the death rate from all other cancers has been slowly declining. The great bulk of respiratory cancers are caused by cigarette smoking. The remaining minor increases and decreases in all other cancer mortality rates have occurred in a general background of extremely rapid growth in the generation and use of electric power by society. This data shows that the stray radiation associated with generation, distribution and use of electricity is not a significant cause of overall cancer deaths in the population.

However, an alternative explanation for the data shown in the figure might be that increased exposure to the electromagnetic fields does indeed cause an increase in the incidence of cancer but this effect is not apparent in cancer-mortality data because of the improved cure rates achieved by modern medicine. This explanation does not hold water. Medical intervention in cancer has been a qualified failure as regards significantly affecting overall cancer mortality rates.

Reliable United States data on age-adjusted incidence rates for various cancers exist from 1969 to 1986 and are cited in Jackson's paper. I will consider data for all cancers, lung and bronchial cancers, leukaemia, and childhood leukaemia. There was a 17% increase in total incidence rates from 1969-1986, a 35% rise in respiratory cancers and a slight decrease in the overall incidence of leukaemia. The incidence rate of childhood leukaemia was essentially constant over this period. Over this same period generation and consumption of electric power per capita increased by a factor of 2 which is much greater than the cancer incidence increase. Furthermore, most of the slow increase in rate of 0.93% per year over the period 1969 to 1986 is largely caused by increases in the cancer rates for four sites - lung and bronchus, colon and rectum, breast, and prostate. Cancers of the four sites mentioned each have established or inferred causes that do not include stray electromagnetic fields. Therefore, only a very small fraction, at most, of the 0.93% per year increase in total incidence rate could conceivably be attributed to electromagnetic fields. Leukaemia, in particular, shows no sign of increasing incidence for the period 1950 to the present.

Jackson concludes from his study that, (1) there cannot be any significant overall cause of cancer from the use of electricity in society: (2) there is no evidence that stray electromagnetic fields cause leukaemia. Therefore, the average person need not be worried about using electrical appliances or walking under over-head power lines. Jackson's data however does not rule out possible risks to very small segments of the population particularly susceptible to this radiation for one reason or another.

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