

ELF-EMF: GENETIC VILLAIN OR UNJUSTLY VILIFIED?

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Technological **BOOM**

For more than 30 years the entire population of the developed world has been non-occupationally exposed to extremely low frequency electromagnetic fields (ELF-EMF). Both naturally, through thunderstorms, and due to technological advancements, more predominantly through artificial means.

ELF-EMFs are generated in the presence of a flowing electrical current and are thus produced largely by power grids, through electrical distribution and transmission lines. Though, the majority of our exposure will come from household electrical appliances. Therefore, the aim of our study is to establish whether acute exposure to ELF-EMFs, at levels mimicking our daily exposures, increase mutation frequencies.

Background levels

In our study we analyse the effects of a 50 Hertz (Hz) magnetic field at 10, 100 or 300 micro tesla (μT) for 2 and 15 hours. These exposure ranges are within the daily guidelines established by governing bodies for everyday and occupational exposure levels, 200 μT and 1 millitesla (mT) respectively. They are also within the range of doses that household electrical appliances emit, for example, the use of a hair dryer held 10 cm from you emits an EMF of less than 70 μT . While, the average 24 hour exposure of UK residents is estimated to be less than 0.11 μT .

THE DAILY NOISE

A Controversial Topic

Experimental studies riddled with contradiction

Since the 60's ELF-EMF exposure has been linked to a vast range of adverse health effects. Yet, the most prominent association has been with an increased prevalence in childhood leukaemia.

There is however an issue in that many of the studies involving ELF-EMFs often provide inconsistent and contradictory data, that cannot be replicated.

For example, from 63 studies, 29 provided negative data, 14 indicated a mutagenic potential, while the final 20 studies were inconclusive in their findings.

However, based on the very limited evidence available, the International Agency for Research on Cancer (IARC), has classified ELF-EMFs as 'potentially carcinogenic', although it is in the same category as coffee.

Results

In the blood samples taken from our positive control of exposure to 1 Gray (Gy) of acute X-rays there was a statistically **significant** 1.8-fold increase in mutation frequency.

In sharp contrast, the frequency of mutation from all ELF-EMF exposed blood samples **did not significantly** differ from that in our mock-treated controls. We therefore conclude that ELF-EMF irradiation with doses of up to 300 μT **does not result** in mutation induction.

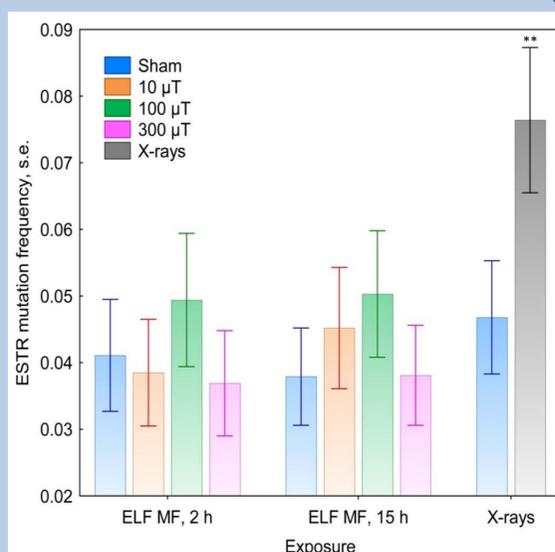


Fig. 1. Mutation frequencies in DNA extracted from exposed and mock-treated blood samples.

Summary

1. Despite many studies, the evidence for any association between ELF-MF exposure and an increase in genetic aberrations and disease remains highly controversial.
2. Exposure to 1 Gy of acute X-rays significantly increases the frequency of ESTR mutation in blood.
3. In sharp contrast, exposure to ELF-MF within the range of doses 10 μT to 300 μT does not affect the frequency of ESTR mutation in blood.