

*Private Members' Business*

body have large natural electric fields across their outer membranes. This way of thinking has recently been revised as new scientific findings have emerged. These new findings show that electric and magnetic fields can interact with some biological systems at lower levels than it was previously thought possible. There are many scientific studies, some showing effects and very many not showing any effects or indeed any detrimental effects.

The Department of National Health and Welfare recognized this problem a few years ago and has done a thorough review and assessment of the existing scientific evidence. In addition, specific actions have been undertaken to address the issue.

To start with, let me briefly describe what scientific evidence we have on interactions of electro-magnetic fields with living systems. In general, the three types of studies have been conducted. These are studies on various cell culture preparations, studies on laboratory animals and studies on human volunteers and human populations. Scientific studies today indicate that electric and magnetic fields can cause critical changes to cells in laboratory experiments.

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On the other hand, these fields do not cause genetic effects and cell mutations. Although observed interactions with cancerous cells suggest a possibility that electro-magnetic fields affect tumour development and that they may act as tumour promoters as co-promoters with other agents, such as toxic chemicals.

In evaluating scientific findings derived from experiments on separated cells, it must be kept in mind that it is not easy to predict whether and how these biological effects on cells in the laboratory translate into health effects on the animal or man. What makes this task even more difficult is that for some effects a stronger field does not cause a specific effect, while a weaker field does. This behaviour is contrary to our traditional thinking in the field of toxicology as we are finding that with electro-magnetic fields, more may not necessarily be worse.

Let us review now the studies on intact laboratory animals. Very many experiments were performed with very strong electric fields, higher than those under power lines. Fewer experiments so far have been done with magnetic fields. Some critical systems were not found to

be affected by the fields. For instance, no effects were found on blood and immune systems.

On the other hand, mixed evidence exists in the area of reproduction. No effects were found for rodents but malformations in chicken embryos were observed under some conditions. The best documented effects in experimental animals are shifts in daily rhythms and associated hormonal changes, changes in responses to drugs and some changes in behaviour.

Regarding humans, laboratory experiments with volunteers showed that people can usually perceive an electric field above seven kilovolts per metre, but some individuals can perceive fields as weak as two kilovolts per metre. Magnetic fields are believed not to be perceived by people. In a carefully conducted study it was found that exposure to fields did not change most vital signs, physiological parameters, daily life activities, memory span and fatigue but small changes in the heart rate slowing by three beats were observed in some individuals. Also some effects on alertness and reaction time were observed.

A lot of attention and concern are associated with some of the epidemiological studies. Some of these studies have indicated an increased incidence of cancer particularly leukaemia and brain tumours in children living close to high current wires, presumably reducing above average magnetic fields in their homes. Studies of workers in so-called electrical occupations have found an increased risk of cancer. However, the studies suffer from many limitations such as small populations studied, weak associations, a lack of consistency and a lack of assessment of actual exposures. Despite the limitations, these studies must not be disregarded. At the same time, this evidence can be judged only as suggestive until we learn more.

It is also important to note that electric and magnetic fields are used in medical practice for treatment of broken bones which do not want to unite for a long period of time. Other beneficial medical uses are being currently tested, such as prevention of osteoporosis, wound healing and nerve regeneration.

To conclude, regarding health effects of electro-magnetic fields, we have found the available evidence inconclusive and we have found it inconsistent. The emerging evidence does not allow us to categorically assert that there is no health risk. But at the same time, it is not sufficient to prove that there is a significant risk. If