

# **HPA Advice on the First Interim Assessment of SAGE**

The Agency has given advice to Health Ministers on the first interim assessment of SAGE (Stakeholder Advisory Group on ELF EMFs (Extremely Low Frequency Electromagnetic Fields)) regarding precautionary approaches to ELF EMFs and specifically regarding power lines and property, wiring and electrical equipment in homes.

The first interim assessment of SAGE was published on 27 April 2007 and can be found on the SAGE website ([www.sagedialogue.org.uk/](http://www.sagedialogue.org.uk/)) in the Document Index.

Following a request from Ministers, the Agency's Chief Executive, Professor Pat Troop, wrote to RT Hon Dawn Primarolo MP on 15 October 2007 giving advice on the SAGE publication. The full text of her letter is reproduced below.

## **Letter from Professor Pat Troop to RT Hon Dawn Primarolo MP, Minister of State for Public Health, 15 October 2007**

Dear Minister

### **HPA comments on the SAGE First Interim Assessment**

This letter follows on from Sir William Stewart's letter dated 29 August 2007, please find enclosed the detailed response to the SAGE Report, originally requested by your predecessor Caroline Flint MP.

The Stakeholder Advisory Group on ELF EMFs (SAGE) First Interim Assessment<sup>1</sup> considers practical precautionary measures to protect the public from the possible health effects of extremely low frequency electromagnetic fields (ELF EMFs), in relation to power lines, and wiring and electrical equipment in homes. The Health Protection Agency (HPA) was one of the stakeholders involved in the SAGE process which was led by the Department of Health (DH) with three funding partners (DH, the Electricity Industry and the charity, Children with Leukaemia). The Minister for Public Health asked the HPA to consider the implications of SAGE recommendations for public health and to provide advice to Government. These considerations and advice are provided here and should be read in conjunction with the SAGE First Interim Assessment<sup>1</sup>. These observations are also relevant to the findings of the Parliamentary Cross Party Inquiry into childhood leukaemia and ELF EMF which recommends among other things a moratorium on building homes or houses within 60 metres of high voltage powerlines<sup>2</sup>.

The impact of exposure to ELF EMFs on health is a difficult and controversial area with mixed views on the extent of any health risk. One major difficulty is that although there are a number of high quality studies and reviews, health effects, if any, are not clear cut; and more work still needs to be done to resolve uncertainties. HPA recognises the difficulties faced in bringing together stakeholders with widely differing views and developing the common ground between them. SAGE has assembled a wealth of material in the supporting papers but has not yet considered all exposure situations.

## **Existing HPA advice**

In 2004, the National Radiological Protection Board (NRPB - now the Radiation Protection Division of the HPA) recommended the adoption in the UK of guidelines from the International Commission on Non-Ionizing Radiation Protection (ICNIRP) for limiting exposures to ELF EMFs<sup>3,4</sup>. This advice remains extant. ICNIRP is an independent body recognised by the World Health Organization (WHO) that provides advice on the health effects of exposure to non ionising radiations. Guidelines for ELF EMFs are based on the plausible and coherent scientific evidence related to effects on the central nervous system and other excitable tissues. The review of scientific evidence that underpinned this recommendation was published as Documents of the NRPB Volume 15 No 3<sup>5</sup>.

In addition, the uncertainties in the underlying evidence base led NRPB to recommend in its 2004 document that the Government should consider the need for further precautionary measures in respect of exposure of people to ELF EMFs. In doing so, it should note that the overall evidence for adverse effects of ELF EMFs on health at levels of exposure normally experienced by the general public is weak. The least weak evidence is for the exposure of children to power frequency magnetic fields and childhood leukaemia<sup>5</sup>. The Government welcomed this advice from NRPB.

## **HPA advice on the SAGE Report**

Adopting a precautionary approach, HPA has considered two questions: First, is there any evidence that ELF EMFs can cause adverse health effects at levels to which members of the public would normally be exposed? Second, based on the strength of the evidence, what would be an appropriately proportionate precautionary response?

## **The evidence**

SAGE was not set up to review the scientific evidence relating to the health effects of ELF EMFs. Rather, it took as its starting point the NRPB advice to “consider the possible need for further precautionary measures....” However, SAGE identified two broad viewpoints on the science. In one, exposure to ELF EMFs is assumed to be a risk factor (possibly causal) for childhood leukaemia. This is termed by SAGE the “WHO/HPA” position, short-handed as CL. The other viewpoint allows for the possibility of a larger number of illnesses attributable to exposure to ELF EMF (e.g. adult leukaemia and brain tumours, miscarriage and amyotrophic lateral sclerosis). This viewpoint is short-handed as CL+, or the “California” position in the SAGE report. The HPA’s published view of the scientific evidence is broadly in line with that described as the WHO/HPA position in the SAGE report.

1. The evidence to date suggests that in general there are no adverse effects on the health of the population of the UK caused by exposure to ELF EMFs below the guideline levels. However, there are a number of epidemiological studies, including studies from the UK, showing an association between exposure to ELF EMFs at home and/or living close to high voltage powerlines and a small excess of childhood leukaemia. At present there is no plausible biological mechanism to explain this excess if real, or certainty about what aspect of ELF EMF exposure, if any, might be responsible.
2. The results to date are equivocal because of uncertainties resulting from the small number of attributable cases of childhood leukaemia and the difficulties of undertaking epidemiological studies with adequate measures of exposure. Assuming a threshold effect (as suggested by the data), and taking into account how few children are exposed at this level in the UK; it is estimated that 2-5 cases from the total of around 500 cases of childhood leukaemia per annum in the UK, could be attributable to ELF EMFs. In these cases the sources of exposure include residential proximity to high voltage power lines, lower voltage distribution lines, appliances, wiring in the home or other sources of ELF EMFs.
3. The evidence for an association between exposure to ELF EMFs and a number of other diseases (the California position) is much weaker than that for childhood leukaemia and also lacks plausible biological support. In its 2004 review<sup>5</sup>, NRPB concluded that the results of studies (including those relating to childhood leukaemia) taken individually, or as collectively reviewed by expert groups, are insufficient either to make a conclusive judgement on causation, to quantify the effects or to estimate the benefits of precautionary measures. This conclusion is in accord with the manner in which other expert bodies – for example, ICNIRP (1998)<sup>4</sup> – have developed exposure guidelines for ELF EMFs.

## **HPA advice on the precautionary measures suggested in the SAGE Report**

The scientific evidence, as reviewed by HPA, supports the view that precautionary measures should address solely the possible association with childhood leukaemia and not other more speculative health effects. HPA advises that it would be wise to err on the side of caution, but with a proportionate response. The possible number of attributable cases of childhood leukaemia in the UK (2-5) has been calculated assuming a threshold response. However, if a linear no-threshold model is postulated, the number of attributable cases could be larger, and so would the cost of precautionary measures since they would apply to more exposure situations and people. HPA supports precautionary measures that have a convincing evidence base to show that they will be successful in reducing exposure, are effective in providing reassurance to the public, and where the overall benefits outweigh the fiscal and social costs.

On this basis, HPA makes the following points:

1. HPA notes that the “corridor option” considered by SAGE for separating new dwellings from high voltage powerlines and *vice versa* is not supported by the cost benefit analysis, even assuming a causal link between exposure to ELF

EMFs and childhood leukaemia. Therefore a decision to implement this precautionary option should be weighed against other health benefits obtainable from the same resources. Nevertheless, HPA recommends that, within the existing government planning framework, the attention of local authority planning departments and the electricity companies be drawn to the evidence for a possible small increase in childhood leukaemia which may result from siting new buildings very close to powerlines, or new powerlines very close to existing buildings.

2. On the basis of existing information, and bearing in mind all the associated uncertainties, HPA agrees with SAGE that it is not justified to recommend removal of existing dwellings from close proximity to powerlines, and *vice versa* at this time. HPA notes that, in terms of current exposures to ELF EMFs from high voltage power lines, people living near lines could be considered the “critical group”. However, given that the “corridor option” for new builds is not supported by the economic analysis using the assumptions for the WHO/HPA position of SAGE, there are no logical reasons to recommend action for existing situations unless new information becomes available.
3. HPA supports the SAGE recommendations to implement optimal phasing of high voltage dual circuit powerlines to reduce ELF EMF exposures in their vicinity. However, it would be impossible to evaluate the effectiveness of this intervention, as the small reduction in the number of cases would be undetectable. HPA notes that optimal phasing is generally desirable for other reasons in the electricity industry and is considered to be of low cost.
4. HPA supports the SAGE proposal for manufacturers to test the design, manufacture and marketing of low magnetic field appliances. However there is a need to ensure the proportionality of any “health claims” or energy efficiency claims used in the promotion of such products.
5. HPA supports the SAGE proposal for an investigation of changes to wiring practices in homes, assuming they are shown not to compromise safety or breach regulations. HPA recommends a wider consultation on these measures to determine their impact. Existing knowledge does not allow quantification of the health benefit of these measures therefore care would be needed in implementation to ensure that new measures are, and are portrayed as, proportionate to the hazard involved.
6. HPA strongly supports the provision of high quality, evidence-based, scientific and technical information in the public domain, including details of the strength of evidence and risks. There may be advantages to dovetailing public information with information about electrical safety and energy saving. In the view of HPA the advice given should be proportionate to the risks identified by authoritative bodies and risks should be presented in the context of other hazards in everyday life. Evidence shows that information is most likely to be acted upon when there are clear messages and when those at potential risk can take action for themselves or their family. In relation to ELF EMFs, because of all the uncertainties it is not easy to define a clear message. Raising awareness of a hazard without giving advice on how to reduce exposure could cause anxiety and attendant health detriment especially for those who currently live near to high voltage powerlines. This is an important consideration when viewing the potential public health benefits from the measures that SAGE has proposed.

7. HPA notes the costs of any proposed precautionary approaches should be considered alongside other potential uses for the money, for example, to improve services for the treatment of leukaemia, or to enhance research into the causes and treatment of leukaemia.
8. HPA notes the on-going research of the UK Childhood Cancer Study Investigators and recommends that they should continue to monitor the incidence of childhood leukaemia in the UK, and encourages them and others to identify further studies that would improve knowledge of the causal factors.
9. HPA has submitted proposals to the Department of Health for support for research work that would in part provide the necessary information to evaluate the likely benefit in terms of reducing exposures.
10. HPA will keep under review the possible relationship between childhood leukaemia, other causes of ill-health and exposure to elevated levels of ELF EMFs in the home and/or through proximity to powerlines.

I hope this detailed response is useful.

Yours sincerely

Professor Pat Troop

**Chief Executive**

## References

1. Stakeholder Advisory Group on ELF EMFs (SAGE) (2007). Precautionary Approaches to ELF EMFs. First Interim Assessment: Power Lines and Property, Wiring in Homes, and Electrical Equipment in Homes. RK Partnership Ltd, 27 April 2007. [www.sagedialogue.org.uk/](http://www.sagedialogue.org.uk/) (Document Index)
2. Parliamentary Cross-Party Inquiry into Childhood Leukaemia and Extremely Low Frequency Electric and Magnetic Fields ELF EMF. [www.epolitix.com/forum/cpielfemf](http://www.epolitix.com/forum/cpielfemf)
3. NRPB (2004). Advice on Limiting Exposure to Electromagnetic Fields (0-300 GHz). *Documents of the NRPB, 15, No 2*.
4. ICNIRP (1998). Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). *Health Physics, 74* (4), 494-522. [www.icnirp.org/documents/emfgdl.pdf](http://www.icnirp.org/documents/emfgdl.pdf) (PDF, 29 pages, 612 kB)
5. NRPB (2004). Review of the Scientific Evidence for Limiting Exposure to Electromagnetic Fields (0-300 GHz). *Documents of the NRPB, 15, No 3*.

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