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▶ **To cite this version:**

Mfoihaya Bedja, Isabelle Magne, Martine Souques, J. Lambrozo, Laurent Le Brusquet, et al.. French Population Exposure to 50 Hz Magnetic Fields: Intermediate Results. Proceedings of the joint meeting of Bioelectromagnetics Society and The European Bioelectromagnetics Association (BioEM'09), Jun 2009, Davos, Switzerland. hal-00422295

HAL Id: hal-00422295

https://centralesupelec.hal.science/hal-00422295

Submitted on 6 Oct 2009

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French Population Exposure to 50 Hz Magnetic Fields: Intermediate Results

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INTRODUCTION

In 1979, a study indicated that childhood cancers might be linked with extremely low frequency (ELF) magnetic field [1]. Leaning on numerous epidemiological studies, the International Agency for Research on Cancer classified in 2001 ELF MF as "possibly carcinogenic to human". These conclusions were based on a statistical association found in some epidemiological studies, unconfirmed by experimental results, between childhood leukaemia risk and a mean exposure over 24h higher than 0.4μT.

One remaining -and critical- question about these epidemiological results is the exposure assessment. Another relevant question is to know, in the overall exposure of people, the relative contribution of all the possible field sources in the daily environment.

Starting from a previous study (50 Hz magnetic field levels in houses, half of them close to power lines [2]), the French Ministry of Health initiated in 2006 a large study of the individual exposure of a randomly selected sample of the French population.

The total exposure database will contain 1000 measurements for children and 1000 measurements for adults. The analysis of results is still ongoing, and should be published in 2010. This paper presents intermediate results, based on the data already analysed.

MATERIALS AND METHODS

The exposure data were collected during 3 measurement campaign between the beginning of 2007 and the end of 2008.

The volunteers were randomly selected from phone lists. Each of them has worn an EMDEX II (Enertech, USA) MF recorder during 24h, and has simultaneously filled in a timetable describing his activities. In addition, all volunteers answered to a questionnaire about his socioprofessional data and his house (one of the parents answered for their child).

The present paper gives the intermediate results on 990 persons : 437 children (0-14 years) and 553 adults.

RESULTS

The observed arithmetic and geometric means are respectively 0.11μT and 0.03μT for children, 0.15μT and 0.04μT for adults.

The statistical analysis has led to the following results :

- The search for the most discriminating MF descriptors from a hierarchical clustering classification followed by CART method (Classification And

Regression Tree)led to a distribution of the studied sample into three groups for each type of population (adults and children). The most discriminating descriptors are

  - the arithmetic and geometric means and the Rate Change of metric standardized (RCMS) for both the two populations,
  - the maximum and the median values for the adults,
  - the third quartile and the standard deviation for the children.

- The factors that lead a person to be more exposed has been identified by linear and logistic regression methods or non-parametric regression models:
  - for both the two populations: the time spent in railway transport, the time spent using a computer, to sleep near a clock radio, to live in a collective building,
  - the age for the children,
  - to live in a city of more then 2.000 inhabitants and to have an individual electric water heating for the adults.

CONCLUSIONS

The most important factor influencing the personal exposure is the clock radio, which was identified in 120 series. The question whether these measurements are representative of personal exposure will be discussed.

The influence of proximity to electric transmission and distribution facilities will be analysed.

ACKNOWLEDGMENTS

This study was funded by the Ministry of Health and Solidarities and realized by Supélec, with the collaboration of EDF and RTE.

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