

Personal exposimetry for measuring the indoor exposure of children to ELF, VLF and RF fields generated by internal and external electromagnetic field sources

SUMMARY

As a consequence of the public and governmental concern about the EMF-exposure and possible risks, the lack of data about the issue and the encouragement by WHO for the EMF exposure by children, the Environment & Health Unit of the Environment, Nature and Energy Department (LNE) of the Flemish Government ordered a study by VITO for assessing the residential indoor ELF-, VLF and RF-exposure by means of personal exposimetry.

Whereas the ELF- and RF-exposure of the children was assessed by means of personal exposimetry, the VLF-exposure was performed by means of spot measurements at different distances from the PC- and TV screens. For what about the personal exposimetry each of the somewhat 90 children who participated in the survey simultaneously carried both an ELF magnetic field EMDEX Lite and an RF electric field Antennessa personal exposimeter during one evening. The VLF spot measurements were made by means of the Holaday set at a 30 cms' distance from the PC and the TV respectively and at the place where the children are normally sitting while watching TV.

As for the results, the ELF exposimetry showed that the personal exposure of the children was weak as compared to the reference levels of the recommendations of the Council of Europe (1999/519/EC), the Flemish 0.2 μT quality standard for indoor environment and the epidemiological 0.4 μT cut-off point for a possible relation with childhood leukaemia if a cause to effect relationship should exist. Concerning the spot measurements of the VLF electric and magnetic field of the TV- and PC-screens respectively, it was concluded that all observed field strengths were in compliance with the VLF reference level of the 1999/519/EC recommendation and consequently no special advise had to be given about this issue.

The personal RF-exposimetry of the children showed that the RF-levels generated by the internal wireless sources (DECT, GSM-Tx-Rx, WIFI, GPS, microwave oven) and the external sources (Radio & TV, GSM, UMTS, TETRA, i-city WIFI) was very weak: the sample maximum of the total E-field of the applications was 0,6 V/m. As for the RF-fields from the GSM- and DECT handsets it was shown on base of the comparison between observed and expected E-fields that there is a perfect fit between the measured and calculated E-field strength in the far-field but there is a big discrepancy between the observed and expected E-field strength once one enters the near-field. In this respect it was shown that the strength of the E-field at the ear cannot be simulated by fixing the handheld on the measurement probe of the spectrum analyser.

In order to define what could be the childhood exposure when someone was using the handheld GSM or DECT, we also studied the passive RF-exposure of the child. The conclusion was that the passive RF-exposure within a radius of 1.60 m is substantially higher than the one of the total field generated by all the indoor and outdoor wireless sources together. Therefore and in the framework of the precautionary principle attention should be paid to the use of the GSM-handheld in close presence of children.

As a general conclusion it can be stated that the personal ELF and RF indoor exposure is in general far more less than the existing exposure limits and opinions often expressed by newspaper and other communication media whose information is probably often based on spot measurements very close to the emission source(s). From the VLF-fields generated by TV- and PC-screens no health problems are to be expected.