
Assessment of induced SAR in children exposed to electromagnetic plane waves between 10 MHz and 5.6 GHz

J F Bakker¹, M M Paulides¹, A Christ², N Kuster² and G C van Rhoon¹

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j.bakker@erasmusmc.nl

¹ Erasmus MC-Daniel den Hoed Cancer Center, Department of Radiation Oncology, Section Hyperthermia, PO box 5201, NL-3008 AE, Rotterdam, The Netherlands

² Foundation for Research on Information Technologies in Society (IT'IS), Switzerland

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Abstract

To avoid potentially adverse health effects of electromagnetic fields (EMF), the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has defined EMF reference levels from the basic restrictions on the induced whole-body-averaged specific absorption rate (SAR_{wb}) and the peak 10 g spatial-averaged SAR (SAR_{10g}). The objective of this study is to assess if the SAR in children remains below the basic restrictions upon exposure at the reference levels. Finite difference time domain (FDTD) modeling was used to calculate the SAR in six children and two adults when exposed to all 12 orthogonal plane wave configurations. A sensitivity study showed an expanded uncertainty of 53% (SAR_{wb}) and 58% (SAR_{10g}) due to variations in simulation settings and tissue properties. In this study, we found that the basic restriction on the SAR_{wb} is

occasionally exceeded for children, up to a maximum of 45% in small children. The maximum SAR_{10g} values, usually found at body protrusions, remain under the limit for all scenarios studied. Our results are in good agreement with the literature, suggesting that the recommended ICNIRP reference levels may need fine tuning.

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