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Analysis of time-frequency fine structure of transiently evoked otoacoustic emissions to study the effects of exposure to GSM radiofrequency fields

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Mobile phones have become very commonly used throughout the world within a short period of time. To date there is only limited knowledge about interaction between electromagnetic fields (EMFs) emitted by mobile phones and the auditory function. Moreover, there is widespread concern that there may be potential for harm. The aim of this study, performed in the framework of the European Commission Project GUARD "Potential adverse effects of GSM cellular phones on hearing" (5FP, QLK4-CT-2001-00150, 2002-2004), was to assess potential subtle changes in cochlear function of normal hearing subjects by measuring the time-frequency fine structure of TEOAEs after exposure to low-intensity EMFs emitted by GSM mobile phones. TEOAEs were recorded in 27 healthy young adults before and after 10 min of real or sham exposure in a double-blind design. TEOAE data were analyzed both globally (broadband analysis) and using the Wavelet Transform (analysis of time-frequency fine structure). The broadband analysis revealed no significant effect on TEOAEs related to exposure, confirming results of previous studies; in addition, no significant change was detected in the analysis of the elementary wavelet components, suggesting that a 10-minutes exposure to EMFs emitted by GSM mobile phones has no immediate after-effect on TEOAE time-frequency fine structure.