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PLATFORM PRESENTATION ☒

Numerical Dosimetry dedicated to Children RF Exposure

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The last decade has seen an unprecedented increase in the use by children of wireless communication systems. This strong growth has highlighted the need to assess the exposure of children induced by these radio-frequency (RF) wireless systems.
The exposure induced by a system emitting electromagnetic fields (EMF) depends on many parameters such as frequency, location and type of the sources, dielectric properties of biological tissues, morphology and posture of the person exposed. The child exposure analysis is an important question since the power absorbed depends on parameters (e.g. morphology, usage) that are age dependent.
For many years, the exposure analysis was conducted for compliance tests, which involve an overestimation and measurements in a homogeneous phantom. Since 10 years and taking advantage of the improvement of computers, large efforts have been carried out to improve the numerical tools used to assess the Specific Absorption Rate (SAR) in heterogeneous tissues exposed to EMF. Today the well-known Finite-Difference-in-Time-Domain (FDTD) that does not require any matrix inversion has proven its ability to handle RF exposure problems.
The relationship between the SAR and the incident field strength, the exposure induced by a phone in brain was investigated with 3D models of children bodies. Several research programs have been established to develop child models anatomically correct. Studies performed with these models shown that exposure of adults and children may be different both for peripheral tissues of the brain and also for whole body exposure. These studies have also shown that oversimplified models (eg uniform downsizing of the head of adults) do not permit a valid assessment of exposure.
Today, great efforts are made to develop models of fetus models and assess its exposure. Studies are also underway to manage the variability in the human body and patterns of exposure (eg multiple exposure). Despite advances in high performance computing, the computing time is not negligible and the analysis of the influence of parameters such as the position of the phone cannot be done using methods such as Monte Carlo. To analyze the statistical distribution of exposure, recent studies have substituted the model response by an analytical approximation based on Polynomial Chaos. Such a method has been used to analyze the influence of position on the distribution of phone SAR.
In this presentation an overview of exposure assessments and uncertainties management will be given.