Abstracts

Specific absorption rate and temperature increases in the head of a cellular-phone user

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In this paper, a complete electromagnetic and thermal analysis has been performed considering the head of a subject exposed to various kinds of cellular phones available on the market, and focusing the attention on important organs like the eye lens and brain. Attention has first been posed on a particular phone model, and a comparison between the absorbed power distribution and steady-state temperature increases has been carried out. The influence of different antennas (dipole, monopole, whip, and planar inverted F antenna) on the power absorption and on the consequent tissue heating has then been analyzed. The obtained results show for a radiated power of 600 mW, maximum SAR values, averaged over 1 g, from 2.2 to 3.7 W/kg depending on the considered phone. The maximum temperature increases are obtained in the ear and vary from 0.22/spl deg/C to 0.43/spl deg/C, while the maximum temperature increases in the brain lie from 0.08/spl deg/C to 0.19/spl deg/C. These steady-state temperature increases are obtained after about 50 min of exposure, with a time constant of approximately 6 min. Finally, the results evidence a maximum temperature increase in the external part of the brain from 0.10/spl deg/C to 0.16/spl deg/C for every 1 W/kg of SAR, averaged over 1 g of brain tissue.

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