Abstracts

FDTD computation of temperature rise in the human head for portable telephones

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Temperature rises in the human head for portable telephones were computed with an anatomically based head model at 900 MHz and 1.5 GHz. The specific absorption rate (SAR) in the human head was determined using the finite-difference time-domain (FDTD) method, while a bioheat equation was numerically solved also using the FDTD method. The portable telephone was modeled by a quarter-wavelength monopole antenna on a dielectric covered metal box. The source geometries considered were the telephone barely touching the ear and the telephone pressing the ear, both having a vertical alignment at the side of the head. The antenna output power was set to be consistent with the portable telephones of today: 0.6 W at 900 MHz and 0.27 W at 1.5 GHz. Computed results show that a phone time of 6-7 min yields a temperature rise of approximately 90% of the steady-state value. Application of the ANSZ/IEEE safety guidelines restricting the 1-g-averaged spatial peak SAR to 1.6 W/kg results in the maximum temperature rise in the brain of 0.06/spl deg/C, and application of the ICNIRP/Japan safety guidelines restricting the 10-g-averaged spatial peak SAR to 2 W/kg results in the maximum temperature rise in the brain of 0.11/spl deg/C, both at 900 MHz and 1.5 GHz.

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