

Temporal Skin Warming During Exposure To Cellular Telephones

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Radiocellular phone use causes heat perception. Part of the radiofrequency electromagnetic field is absorbed in the user's head (40 - 50 %) and the absorption is highest in the skin ([1] - [2]). Calculations of changes in brain temperature when the phone is in contact with the ear shows : *i*) for a radiated power of 600mW [1] a maximum rise at the skin of 0.22 - 0.43 °C and temperature increase in the brain of 0.09 - 0.16 °C (SAR induced in the head : SAR 10g = 1.0-2.0 W/kg - SAR 1g : 2 - 3.5 W/kg) and *ii*) for an average emitted power of 250 mW [2] a maximum temperature rise at the skin of 0.263 °C and in the brain of 0.005 °C (SAR 10g = 0.93W/kg - SAR 1g : 1.53 W/kg).

We measured the temperature increase of the temporal skin due to exposure to GSM 900 (900 MHz - radiated power 250mW) and GSM 1800 (1800 MHz - radiated power 125 mW), using a Luxtron 790 F optic fibers thermometer. The sensors were placed face to face in a very precise position one on the phone the other one on the volunteer's skin. The phone was held by the hand of the volunteer in a normal position of use - this putting the two temperature probes in a very close position. Temperature was recorded until steady state is reached. The steady state temperatures with the battery on but without emission (reception mode for 30 min allowing for temperature equilibration) were of 36.9 +/- 0.3 °C for GSM 900 and 37.4 +/- 0.4 °C for GSM 1800. Warming of the phone alone between a stabilized reception mode and a stabilized emission mode, measured at a room temperature of 18 °C, was found to be 4.4 °C for GSM 900 and 2.8 °C for GSM 1800. The skin temperature difference between reception mode and emission mode when the phone was emitting at full power (250 mW for GSM 900 and 125 mW for GSM 1800) was 0.93 +/- 0.24 °C for GSM 900 and 0.66 +/- 0.18 °C for GSM 1800.

As calculations showed that skin warming due to electromagnetic field is about 0.26 °C for an emitted power of 250 mW at 900 MHz, at least 2/3 of the temperature difference measured is due to calorific exchanges between telephone and skin. Further experiments will have to quantify more precisely the part of the skin warming due to the electromagnetic field.

ACKNOWLEDGMENT

The Authors recognize the support of Motorola for making available the Luxtron thermometer.

REFERENCES

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