

LETTER TO THE EDITOR

RESPONSE

We would like to clarify some of the issues raised by Arnetz and coworkers in their recent letter. Arnetz and coworkers suggest that the 40-minute exposure used in our study may not have been sufficient to detect an effect of acute exposure to an electromagnetic field (EMF) emitted by standard mobile phones on subjective symptoms. They claim that longer exposures of up to 3 hours do enhance headache (1), cognitive functioning and decrease deep sleep. This is very interesting, but unfortunately the data supporting the last two claims have not yet been published in peer-reviewed journals and therefore we cannot comment on this claim and whether it has been replicated (cf. 1, p. 186). We acknowledge the potential importance of testing very long exposures, such as those used in Hillert et al. (1), but the length of exposure chosen for our study was intended to reflect a more realistic approximation to what in everyday life could be considered a relatively long continuous exposure to EMF emitted by mobile phones. Nevertheless, future research should focus on a variety of exposure durations.

Arnetz and coworkers also argue that it is important to divide participants into groups depending on whether they experience symptoms they attribute to mobile phone use. The rationale for this would be that any effects of exposure to EMFs would be easier to detect in sensitive individuals. This is a good point, although there are reports showing that effects are often not found in these groups (2,3). Moreover, an unexpected pattern was found in the Hillert et al. (1)

study. Although interaction between groups and exposure was reported the patterns found were not as predicted. Specifically, the “symptom” group reported more headaches following the sham as compared with the GSM exposure. In contrast, the “no-symptoms” group demonstrated the opposite pattern. Given the unexpected nature of this interaction, it is especially important to correct for familywise error rate and this was not done even though effects on 15 different symptoms were tested (i.e., the α level used to assess relevant effects was left at 0.05 for every symptom). A replication of this pattern in a large follow-up study is therefore vital before any strong conclusions can be drawn.

Arnetz and coworkers also highlight the fact that in one of Cinel et al.’s (4) studies participants reported significantly more fatigue following the sham exposure condition than following EMF exposure. However, as we pointed out in the original paper this outcome is not statistically significant when controlling for the familywise error rate (i.e., the α level used was 0.01 for each comparison). Perhaps more importantly, this effect was not replicated in either study 2 or 3 (p values $>.25$) with a sample size of over 160 in each study. This confirms that the original observation was not indeed reliable.

Finally, Arnetz and coworkers emphasize the need to mask EMF induced heat in these type of studies. In our view, studies on the effect of EMF emitted by mobile phones should closely simulate their real use. Since real mobile phones do get warm with use, the phones used in these studies were also designed to

become warm. This is actually quite critical to ensure that the conditions are genuinely double-blind. In our study, the phones were carefully designed to ensure that GSM, CW, and sham modes all released similar amount of heat. Thus, the test was truly double-blind.

CATERINA CINEL, PhD
Department of Computing and
Electronic Systems

RICCARDO RUSSO, PhD
Department of Psychology

ELAINE FOX, PhD
Department of Computing and
Electronic Systems
University of Essex
Essex, UK

ANGELA BOLDINI, PhD
Department of Psychology
University of Valencia
Valencia, Spain

REFERENCES

- Hillert L, Åkerstedt T, Lowden A, Wiholm C, Kuster N, Ebert S, Boutry C, Mouffat SD, Berg M, Arnetz BB. The effects of 884 MHz GSM wireless communication signals on headache and other symptoms: an experimental provocation study. *Bioelectromagnetics* 2008;29:185–96.
- Eltiti S, Wallace D, Ridgewell A, Zougkou K, Russo R, Sepulveda F, Mirshekar-Syahkal D, Rasor P, Deeble R, Fox E. Does short-term exposure to mobile phone base station signals increase symptoms in individuals who report sensitivity to electromagnetic fields? A double-blind randomized provocation study. *Environ Health Perspect* 2007;115:1603–8.
- Rubin GJ, Munshi JD, Wessely S. Electromagnetic hypersensitivity: a systematic review of provocation studies. *Psychosom Med* 2006;67:224–32.
- Cinel C, Russo R, Boldini A, Fox E. Exposure to mobile phone electromagnetic fields and subjective symptoms: a double-blind study. *Psychosom Med* 2008;70:345–8.

AUTHOR QUERIES

AUTHOR PLEASE ANSWER ALL QUERIES

1