

Authors Response to Powerwatch’s “Norwegian Study fails to find a link between Mobile Phones and Headaches”.

All methods and inclusion criteria of our study “Mobile phone headache: a double blind, sham-controlled provocation study” (Ofstedal et al., 2007) was carefully considered in the planning phase and described in the paper. This does not mean that different approaches could not have been made. In short, decisions commented by Powerwatch were

- use of RF signals and not the ELF fields
- use of an antenna that would expose a larger area of the head
- inclusion of subjects getting symptom when using mobile phones and not when being close to other sources of electromagnetic fields
- exclusion of people with headache that could mask the effect of the exposure

In general, not all aspects of a larger problem can be studied in a single study. Different studies, including those done by different groups of scientist must complement each other to see the whole picture. We made our choices based on rationales that are explained in the following. We also comment the use of RF exposures with respect to the conclusions and the number of test to demonstrate possible effects.

Statements concerning the study with respect to the use of RF fields

As pointed out by Powerwatch, the title of the paper does not specify that we used RF signals only. We agree that more information would have been immediately visible if that had been done. We would however, point to the fact that the aim was clearly stated in the first sentence of the abstract: *“The objective was to test whether exposure to radio frequency (RF) fields from mobile phones may cause head pain or discomfort and whether it may influence physiological variables in individuals attributing symptoms to mobile phones, but not to electromagnetic fields in general.”* Be aware that the use of RF fields only also is consistent with that fact that the participants did not claim to react to any sources of low frequency fields.

In the paper we discussed various possible reasons for the headaches and other symptoms, and when concluding we also restrict the result to be valid RF fields: *“The study gave no evidence that RF fields from mobile phones may cause head pain or discomfort or influence physiological variables. The most likely reason for the symptoms is a nocebo effect”* (cited from abstract).

At the end of the discussion session we make a more general statement: *“For individuals who attribute symptoms to mobile phone use, however, the nocebo effect probably is an important cause of the pain and discomfort in the head not only in test situations but also in every day life in connection with the use of mobile phone.”* This is not only based on our study, but also on other studies that are discussed in the paper, and in some of them “real” mobile phone exposure were used.

Reasons for the choice of exposure

As explained at the internet page of Powerwatch, the exposure from a GSM mobile phone consists of ELF fields (as also explained in the paper) well as the RF fields. Since it is impossible to study the effect of all components in a single study, we had to make some choices, and in this study we chose the RF fields because they has been in the focus of

concern. As stated in the paper: “*We were interested in the effect of the RF fields only (i.e. not the low frequency field) ...*”.

The use of a different antenna than the mobile phone antenna is questioned by Powerwatch. As said in the paper: “...and we decided to expose a relatively large area around the ear to increase the chance that a possible target tissue or organ would be affected”. The areas exposed by the RF fields from mobile phones vary considerably [Wilén et al., 2003]. Some phones expose mainly the cheek area while the exposure from others covers the area above the ear. Therefore, by choosing one particular mobile phone type for exposure, we would have no guarantee that we would cover the most relevant tissue or organs (if any). By using the antenna solution and not the phone close to the head we also omitted the low frequency fields, as intended.

Selection of participants not being “electromagnetic hypersensitive in general”

At the internet page of Powerwatch we are criticised for a couple of our selection criteria. Citing the abstract already again: *The objective was to test whether exposure to radio frequency (RF) fields from mobile phones may cause head pain or discomfort and whether it may influence physiological variables in individuals attributing symptoms to mobile phones, but not to electromagnetic fields in general.*” And we made it clear in the conclusion session (“*In this study we included a highly selected group of individuals who frequently experienced headache and other discomfort when using their mobile phone, but not when being near or using sources of low frequency fields*”) in the sentence before concluding with result of the study. This is again a question about choice, and we did this by reasons mainly explained in the introduction of the paper:

“Some individuals claim to react specifically to mobile phones whereas others attribute their symptoms to various sources of electromagnetic fields including sources of only low frequency fields (3, 6). The latter often regard themselves as “electromagnetic hypersensitive” (6). Studies have indicated that such individuals may have abnormal autonomic nervous system regulation (7-9), and their sensory response to flickering light (7, 10) differs from that of controls. Some deviations have also been found in a group of individuals who were sensitive to mobile phones only, but these deviations are different from those observed among electromagnetic hypersensitive subjects (11).

In two previous provocation studies with mobile phones (12, 13), no evidence for a connection between the exposure and occurrence of subjective symptoms was found, but in these studies no differentiation was made between individuals with general electromagnetic hypersensitivity and those with specific sensitivity to mobile phone use.”

The results of the study by Wilén et al. (2005), also excluding those being “electromagnetic hypersensitive in general”, substantiated our choice (see paper). One more reason is indicated in the discussion session. Provocation studies in which individuals being hypersensitive in general have participated, clearly have demonstrated that they do get symptoms both with and without exposure. This has been seen with mobile phone exposure (combined ELF and RF) and in a number of provocation studies with low frequency fields (see Rubin et al. (2005) for review). In particular, we refer to the study by Lönne-Rahm (2000) , which shows that there is a difference between symptoms provoked by real and sham exposure when the subjects *know* when they are exposed and not, but no difference when they do not know.

Exclusion criterion concerning headaches not related to use of mobile phone

Powerwatch says: "... it seems unjustified to entirely exclude people with greater than 2 headaches per week where the cause of their headaches was unknown." The criterion was more precisely described in the paper: "*Possible masking of an effect of the RF exposure was avoided by excluding those who experienced frequent headaches (> 2/week) not distinguishable from the pain/discomfort attributed to the use of mobile phones*". Our intention was to exclude as few as possible, but at the same time reduce the masking of symptoms that might also occur at random and that could not be distinguished from the symptoms in focus. Actually no participant was excluded solely based on this criterion.

Statistical power of the study

Powerwatch mentions the size of the sample (17 subjects) with respect to achieve statistically significant effects. It should be emphasized that the ability to demonstrate an effect depends on the total number of tests, and in this study each single subject took part in up to eight sessions (four with RF and four with sham exposure), with the total of 65 RF and 65 sham sessions.

Conclusions

- We have clearly stated the purpose of the study, also with respect to the use of RF fields and not the ELF fields from mobile phones.
- Despite the restricted number of participants, the power to demonstrate a possible association was high due to the high number of tests.
- In our opinion we had good reasons for the methods used, including exposure and selection criteria.

Different approaches would have been possible, but several previous studies have already explored these possibilities, and they have yielded results consistent with those achieved in our study. We believe that the overall most likely explanation for our results is that RF-fields from mobile phones do not cause headache, which we believe is a positive message in the sense that it eliminates one item from the long list of potential health hazards. It surprises us that Powerwatch does not even discuss the possibility that our results are correct. One gets the feeling that whatever method had been used, the results would have been flatly rejected if the results were negative, and we realize that strong believers will always be able to find methodological flaws in any study going against their main creed.

References

Lonne-Rahm S, Andersson B, Melin L, Schultzberg M, Arnetz B, Berg M. Provocation with stress and electricity of patients with "sensitivity to electricity". *J Occup Environ Med* 2000;42:512-516.

Oftedal G, Straume A, Johnsson A, Stovner L.J. Mobile phone headache: a double blind, sham-controlled provocation study. *Cephalalgia* 2007;27:447-455.

Rubin GJ, Das Munshi J, Wessely S. Electromagnetic hypersensitivity: A systematic review of provocation studies. *Psychosomatic medicine* 2005;67(2):224-232.

Wilén J, Johansson A, Nebojsa K, Lyskov E, Sandström M. Psychophysiological tests and provocation of subjects with mobile phone related symptoms. *Bioelectromagnetics* 2006;27:204-214.

Wilén J, Sandström M, Hansson Mild K. Subjective symptoms among mobile phone users – A consequence of absorption of radiofrequency fields? *Bioelectromagnetics* 2003;24:152-159.