Systematic review on the health effects of radiofrequency electromagnetic field exposure from mobile phone base stations

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INTRODUCTION

The introduction of mobile phones and base stations using the digital GSM 900 and GSM 1800 systems in the 1990s and the subsequent introduction of UMTS have raised public concerns about potential health effects of the radiofrequency electromagnetic field (RF-EMF) emissions of this technology. In the last 4 years, research efforts have increased to investigate health effects of mobile phone base station radiation using randomized, blinded laboratory trials, field intervention trials, and observational studies. The aim of this work was to systematically review the scientific literature concerning all health effects of mobile phone base station radiation that have been addressed so far [1].

MATERIALS AND METHODS

A systematic literature search was performed in March 2009 including all articles on randomized, blinded human laboratory trials and epidemiological studies published before this date. The health effects comprised self-reported non-specific symptoms, physiological parameters, cancer, and other chronic diseases. Additionally, we included randomized trials evaluating the ability to perceive the RF-EMF exposure. The data of each study were extracted independently by two researchers. The only outcome with a sufficient number of comparable studies allowing a meta-analysis was the ability to perceive RF-EMF exposure. For each of these studies we calculated the difference between the number of observed correct answers (O) and the number of expected correct answers by chance (E), normalized by the number of expected correct answers by chance ((O-E)/E).

RESULTS

In total, 134 potentially relevant papers were identified and 117 articles were excluded as they did not meet our inclusion criteria. Among the 17 papers included, 5 reported on randomized trials and 12 epidemiological studies. Most commonly addressed were non-specific symptoms including self-reported sleep disturbances. Summing up, no single symptom or symptom pattern was consistently related to mobile phone base station exposure in randomized trials. Some cross-sectional epidemiological studies with crude exposure assessments showed health effects, whereas studies based on more sophisticated exposure measurements did not indicate any association. Data on other health effects than non-specific symptoms such as cancer were scarce. The field perception trials [2, 3, 4, 5] indicated that neither individuals with self-reported electromagnetic hypersensitivity (EHS) nor non-EHS individuals could detect the presence or absence of mobile phone base station radiation better than expected by chance (Figure 1).
Figure 1: Results of the field detection tests with mobile phone base station radiation in randomized double blind laboratory trials. Effect size (ES) refers to the relative difference between observed and expected correct answers. The edges of the diamonds show the 95% confidence intervals of the pooled estimates (subtotal, overall).

CONCLUSIONS

In conclusion, the present research does not indicate an association between any health outcome and RF-EMF exposure from mobile phone base stations at levels typically encountered in our everyday environment. There is also no evidence that EHS individuals are more susceptible to base station radiation than the rest of the population. Whereas acute health effects can be excluded with a high level of certainty based on randomized trials, longitudinal data regarding potential long-term effects are missing. Thus, the evidence for the absence of long-term effects is limited.

REFERENCES


