

## Epidemiological studies on humans, living around mobile phone base stations

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I found 9 relevant studies published in scientific journals. In 8 of these studies (some) significant effects are reported. If anyone knows other (new) studies, please let me know.

An epidemiological study is per definition a study on a human population which attempts to link human well being and/or health effects to a cause (e.g. long-term exposure to electromagnetic radiation from mobile phone base stations). Epidemiological studies are needed to study the possible long-term effects. They include observational studies as well as intervention studies. But without other experimental studies, in most studies a real causal effect cannot be determined for sure. Within the scientific community the usefulness of epidemiological studies to investigate health effects related to the electromagnetic radiation (EMR) from mobile phone base stations has been debated controversially due to a number of unsolved methodological problems. Each study alone does not allow conclusions, and large scale studies are lacking. In the context of base station research, researchers have to be aware of possible Nocebo effects. The Nocebo effect is the inverse of the Placebo effect and means that adverse symptoms due to expectations (due to concerns). Therefore, the use of simple questionnaires is problematic if study participants are aware of their exposure status. So, several questions remain open, e.g. the adequate type of study design, the endpoints to be investigated, the adequate exposure metric and the methodology how to deal with the emissions from other radiofrequency sources. For base station studies, no adequate exposure metric for studying long term effects is available at the moment (distance to the base station alone cannot be recommended, the use of analytical calculations is questionable, the use of monitoring systems and dosimeters is promising, but needs to be evaluated). One crucial question is whether a reliable method can be developed in order to assess exposure of large study collectives. The answer to this question is relevant for the feasibility of epidemiological studies on base stations. See the report of Neubauer et al. (2005) for further information. [http://www.mobile-research.ethz.ch/var/pub\\_neubauer\\_pref14.pdf](http://www.mobile-research.ethz.ch/var/pub_neubauer_pref14.pdf)

### Epidemiological studies: possible effects of GSM base stations: 9 studies were found in the PubMed database and/or WHO EMF database

Study	Normal questionnaire. Participants were told that the subject of the study was 'base station health effects' (possible psychosomatic effects)		Cross-sectional study. Questionnaire with additional tests. Participants were told that the subject of the study was 'environmental health effects'		Assessment on cancer and/or tumor incidence	
Quality and reliability	<b>A</b> Normal → High quality Low → Normal reliability		<b>B</b> Normal → High quality Low → High reliability		<b>C</b> Normal → High quality Normal → High reliability	
	Only distance to base station determined	EMR from base stations also measured	Only distance to base station determined	EMR from base stations also measured	Only distance to base station determined	EMR from base stations also measured
Studies with one or more significant effect	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>2</b>	-
Studies with no significant effect	-	-	-	-	<b>1</b>	-

**A. Studies with normal questionnaire. Participants were told that the subject of the study was 'base station health effects'.**

**Santini, R., Santini, P., Danze, J.M., Le Ruz, P., Seigne, M. (2002). Study of the health of people living in the vicinity of mobile phone base stations: I. Influences of distance and sex. *Pathol. Biol.* 50:369-373**

**Abstract**

A survey study using questionnaire was conducted in 530 people (270 men, 260 women) living or not in vicinity of cellular phone base stations, on 18 Non Specific Health Symptoms. Comparisons of complaints frequencies (CHI-SQUARE test with Yates correction) in relation with distance from base station and sex, show significant ( $p < 0.05$ ) increase as compared to people living  $> 300$  m or not exposed to base station, till 300 m for tiredness, 200 m for headache, sleep disturbance, discomfort, etc. 100 m for irritability, depression, loss of memory, dizziness, libido decrease, etc. Women significantly more often than men ( $p < 0.05$ ) complained of headache, nausea, loss of appetite, sleep disturbance, depression, discomfort and visual perturbations. This first study on symptoms experienced by people living in vicinity of base stations shows that, in view of radioprotection, minimal distance of people from cellular phone base stations should not be  $< 300$  m.

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list\\_uids=12168254](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=12168254)

[http://www.hese-project.org/hese-uk/en/papers/santini\\_pathbio\\_eng3.pdf](http://www.hese-project.org/hese-uk/en/papers/santini_pathbio_eng3.pdf)

**Santini, R., Santini, P., Danze, J.M., Le Ruz, P., Seigne, M. (2003). Symptoms experienced by people in vicinity of base stations: II. Incidences of age, duration of exposure, location of subjects in relation to the antennas and other electromagnetic factors. *Pathol. Biol.* 51:412-415**

**Abstract**

This is the 2nd part of a survey study conducted on 530 people (270 men, 260 women) living or not in vicinity of cellular phone base stations. Comparison of complaints frequencies for 16 Non Specific Health Symptoms was done with the CHI-Square test with Yates correction. Our results show significant increase ( $p < 0.05$ ) in relation with age of subjects (elder subjects are more sensitive) and also, that the facing location is the worst position for some symptoms studied, especially for distances till 100 m from base stations. No significant difference is observed in the frequency of symptoms related to the duration of exposure (from  $< 1$  year to  $> 5$  years), excepted for irritability significantly increased after  $> 5$  years. Other electromagnetic factors (electrical transformers, radio-television transmitters,...) have effects on the frequency of some symptoms reported by the subjects.

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list\\_uids=12948762&query\\_hl=40&itool=pubmed\\_docsum](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&dopt=AbstractPlus&list_uids=12948762&query_hl=40&itool=pubmed_docsum)

<http://www.ingentaconnect.com/content/els/03698114/2003/00000051/00000007/art00020;jsessionid=2182c71xu3agt.victoria>

**Navarro, E.A., Segura, J., Portolés, M., Gómez-Perretta de Mateo, C. (2003). The Microwave Syndrome: A Preliminary Study in Spain. *Electromagn. Biol. Med.* 22:161-169**

**Abstract**

A health survey was carried out in Murcia, Spain, in the vicinity of a Cellular Phone Base Station working in DCS-1800 MHz. This survey contained health items related to "microwave sickness" or "RF syndrome." The microwave power density was measured at the respondents' homes. Statistical analysis showed significant correlation between the declared severity of the symptoms and the measured power density. The separation of respondents into two different exposure groups also showed an increase of the declared severity in the group with the higher exposure.

<http://www.informaworld.com/smpp/content~content=a713628989~db=all~order=page>

[http://www.stopumts.nl/pdf/studies/navarro\\_2003.pdf](http://www.stopumts.nl/pdf/studies/navarro_2003.pdf)

See also further study in

[http://www.stopumts.nl/pdf/studies/navarro\\_2004.pdf](http://www.stopumts.nl/pdf/studies/navarro_2004.pdf)

**Bortkiewicz, A., Zmyslony, M., Szykowska, A., Gadzicka, E. (2004). Subjective symptoms reported by people living in the vicinity of cellular phone base stations. *Med. Pr.* 55:345-351**

**Abstract**

The problem of health effects of electromagnetic fields (EMF) emitted by cellular phone base stations evokes much interest in view of the fact that people living in their vicinity are fated to continuous exposure to EMF. None of the studies carried out throughout the world have revealed excessive values of standards adopted by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). A questionnaire was used as a study tool. The results of the questionnaire survey reveal that people living in the vicinity of base stations report various complaints mostly of the circulatory system, but also of sleep disturbances, irritability, depression, blurred vision, concentration difficulties, nausea, lack of appetite, headache and vertigo. The performed studies showed the relationship between the incidence of individual symptoms, the level of exposure, and the distance between a residential area and a base station. This association was observed in both groups of persons, those who linked their complaints with the presence of the base station and those who did not notice such a relation. Further studies, clinical and those based on questionnaires, are needed to explain the background of reported complaints.

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list\\_uids=15620045](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15620045)

**B. Cross-sectional studies. Questionnaire with additional tests. Participants were told that the subject of the study was 'environmental health effects'.**

**Hutter, H.P., Moshhammer, H., Wallner, P., Kundi, M. (2006). Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations. *Occup. Environ. Med.* 63:307-313**

**Abstract**

BACKGROUND: The erection of mobile telephone base stations in inhabited areas has raised concerns about possible health effects caused by emitted microwaves. METHODS: In a cross-sectional study of randomly selected inhabitants living in urban and rural areas for more than one year near to 10 selected base stations, 365 subjects were investigated. Several cognitive tests were performed, and wellbeing and sleep quality were assessed. Field strength of high-frequency electromagnetic fields (HF-EMF) was measured in the bedrooms of 336 households. RESULTS: Total HF-EMF and exposure related to mobile telecommunication were far below recommended levels (max. 4.1 mW/m<sup>2</sup>). Distance from antennae was 24-600 m in the rural area and 20-250 m in the urban area. Average power density was slightly higher in the rural area (0.05 mW/m<sup>2</sup>) than in the urban area (0.02 mW/m<sup>2</sup>). Despite the influence of confounding variables, including fear of adverse effects from exposure to HF-EMF from the base station, there was a significant relation of some symptoms to measured power density; this was highest for headaches. Perceptual speed increased, while accuracy decreased insignificantly with increasing exposure levels. There was no significant effect on sleep quality. CONCLUSION: Despite very low exposure to HF-EMF, effects on wellbeing and performance cannot be ruled out, as shown by recently obtained experimental results; however, mechanisms of action at these low levels are unknown.

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list\\_uids=16621850&dopt=Abstract](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&list_uids=16621850&dopt=Abstract)

<http://www.emf-portal.de/viewer.php?l=e&aid=13735>

[http://www.buergerwelle.de/pdf/base\\_stations\\_health\\_utter\\_oem\\_2006.pdf](http://www.buergerwelle.de/pdf/base_stations_health_utter_oem_2006.pdf)

**Abdel-Rassoul, G., Abou El-Fateh, O., Abou Salem, M., Michael, A., Farahat, F., El-Batanouny, M., Salem, E. (2007). Neurobehavioral effects among inhabitants around mobile phone base stations.**

***Neurotoxicology* 28:434-440**

**Abstract**

BACKGROUND: There is a general concern on the possible hazardous health effects of exposure to radiofrequency electromagnetic radiations (RFR) emitted from mobile phone base station antennas on the human nervous system. AIM: To identify the possible neurobehavioral deficits among inhabitants living nearby mobile phone base stations. METHODS: A cross-sectional study was conducted on (85) inhabitants living nearby the first mobile phone station antenna in Menoufiya governorate, Egypt, 37 are living in a building under the station antenna while 48 opposite the station. A control group (80) participants were matched with the exposed for age, sex, occupation and educational level. All participants completed a structured questionnaire containing: personal, educational and medical histories; general and neurological examinations; neurobehavioral test battery (NBTB) [involving tests for visuomotor speed, problem solving, attention and memory]; in addition to Eysenck personality questionnaire (EPQ). RESULTS: The prevalence of neuropsychiatric complaints as headache (23.5%), memory changes (28.2%), dizziness (18.8%), tremors (9.4%), depressive symptoms (21.7%), and sleep disturbance (23.5%) were significantly higher among exposed inhabitants than controls: (10%), (5%), (5%), (0%), (8.8%) and (10%), respectively ( $P < 0.05$ ). The NBTB indicated that the exposed inhabitants exhibited a significantly lower performance than controls in one of the tests of attention and short-term auditory memory [Paced Auditory Serial Addition Test (PASAT)]. Also, the inhabitants opposite the station exhibited a lower performance in the problem solving test (block design) than those under the station. All inhabitants exhibited a better performance in the two tests of visuomotor speed (Digit symbol and Trailmaking B) and one test of attention (Trailmaking A) than controls. The last available measures of RFR emitted from the first mobile phone base station antennas in Menoufiya governorate were less than the allowable standard level. CONCLUSIONS AND RECOMMENDATIONS: Inhabitants living nearby mobile phone base stations are at risk for developing neuropsychiatric problems and some changes in the performance of neurobehavioral functions either by facilitation or inhibition. So, revision of standard guidelines for public exposure to RFR from mobile phone base station antennas and using of NBTB for regular assessment and early detection of biological effects among inhabitants around the stations are recommended.

[http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&list\\_uids=16962663](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&cmd=Retrieve&list_uids=16962663)

### C. Studies on cancer and/or tumor incidence.

**Wolf, R., Wolf, D. (2004). Increased incidence of cancer near a cellphone transmitter station. *Int. J. Cancer Prev.* 1:123-128**

#### **Abstract**

Significant concern has been raised about possible health effects from exposure to radiofrequency (RF) electromagnetic fields, especially after the rapid introduction of mobile telecommunications systems. Parents are especially concerned with the possibility that children might develop cancer after exposure to the RF emissions from mobile telephone base stations erected in or near schools. The few epidemiologic studies that did report on cancer incidence in relation to RF radiation have generally presented negative or inconsistent results, and thus emphasize the need for more studies that should investigate cohorts with high RF exposure for changes in cancer incidence. The aim of this study is to investigate whether there is an increased cancer incidence in populations, living in a small area, and exposed to RF radiation from a cell-phone transmitter station. This is an epidemiologic assessment, to determine whether the incidence of cancer cases among individuals exposed to a cell-phone transmitter station is different from that expected in Israel, in Netanya, or as compared to people who lived in a nearby area. Participants are people (n=622) living in the area near a cell-phone transmitter station for 3-7 years who were patients of one health clinic (of DW). The exposure began 1 year before the start of the study when the station first came into service. A second cohort of individuals (n=1222) who get their medical services in a clinic located nearby with very closely matched, environment, workplace and occupational characteristics was used for comparison. In the area of exposure (area A) eight cases of different kinds of cancer were diagnosed in a period of only one year. This rate of cancers was compared both with the rate of 31 cases per 10,000 per year in the general population and the 2/1222 rate recorded in the nearby clinic (area B). Relative cancer rates for females were 10.5 for area A, 0.6 for area B and 1 for the whole town of Netanya. Cancer incidence of women in area A was thus significantly higher ( $p < 0.0001$ ) compared with that of area B and the whole city. A comparison of the relative risk revealed that there were 4.15 times more cases in area A than in the entire population. The study indicates an association between increased incidence of cancer and living in proximity to a cell-phone transmitter station.

[https://www.novapublishers.com/catalog/product\\_info.php?products\\_id=1881](https://www.novapublishers.com/catalog/product_info.php?products_id=1881)  
[http://www.stopumts.nl/pdf/studies/wolf\\_2004.pdf](http://www.stopumts.nl/pdf/studies/wolf_2004.pdf)

**Eger, H., Hagen, K.U., Lucas, B., Vogel, P., Voit, H. (2004). Influence of the spatial proximity of mobile phone base stations on cancer rates (article in German). *Umwelt-Medizin-Gesellschaft* 17:273-356**

#### **Abstract**

Following the call by Wolfram König, President of the Bundesamt für Strahlenschutz (Federal Agency for radiation protection), to all doctors of medicine to collaborate actively in the assessment of the risk posed by cellular radiation, the aim of our study was to examine whether people living close to cellular transmitter antennas were exposed to a heightened risk of taking ill with malignant tumors. The basis of the data used for the survey were PC files of the case histories of patients between the years 1994 and 2004. While adhering to data protection, the personal data of almost 1.000 patients were evaluated for this study, which was completed without any external financial support. It is intended to continue the project in the form of a register. The result of the study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance of up to 400 metres from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away, and that the patients fell ill on average 8 years earlier. In the years 1999-2004, i.e. after five years' operation of the transmitting installation, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the installation compared to the inhabitants of Naila outside the area.

[http://www.stopumts.nl/pdf/studies/eger\\_2004.pdf](http://www.stopumts.nl/pdf/studies/eger_2004.pdf)

**Meyer, M., Gärtig-Daug, A., Radespiel-Tröger, M. (2006). Cellular telephone relay stations and cancer incidence (article in German). Umweltmed. Forsch. Prax. 11:89-97**

**Abstract**

Background: Impacts of emissions from cellular telephone relay stations are frequently discussed in the public and politics. Up to now population based studies about these effects on cancer incidence were not published.

Method: By means of an ecologic study, we evaluated the possible association between the presence of cellular telephone relay stations and the incidence of malignant cancer. The study population consisted of 177,428 persons living in 48 municipalities in Bavaria. The observed municipalities were classified into three categories of relay station coverage.

Results: Cancer incidence was not found to be elevated in municipalities with cellular telephone relay stations. The cancer incidence was highly variable in areas without any relay station. The mean age of cancer patients living in towns with relay stations was comparable to that of patients living in villages and towns far away from any relay station. Cancer occurrence in special tumour sites thought to be sensible for radiation effects did not show an association with the locations of the cellular telephone infrastructure.

Conclusions: The high variance of cancer incidence in towns without a cellular telephone relay station qualifies reports about local cancer clusters in the surrounding of such relay stations.

[http://www.emf-portal.de/viewer.php?aid=13803&sid=21e5c8f8f3af3188f6d3e0db2684a5f4&sform=6&pag\\_idx=30&l=e](http://www.emf-portal.de/viewer.php?aid=13803&sid=21e5c8f8f3af3188f6d3e0db2684a5f4&sform=6&pag_idx=30&l=e)