Mobile Phone Base Stations—Effects on Wellbeing and Health
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International Journal of Occupational and Environmental Health
Full text: http://www.brain-surgery.us/Khurana_et_al_IJOEH-Base_Station_RV.pdf

Description
In this review, 10 epidemiological studies are discussed that consider exposure to RF radiation of cell towers and human health. On page 265, there is a great table, summarizing the details of the 10 studies.

Abstract
Human populations are increasingly exposed to microwave/radiofrequency (RF) emissions from wire- less communication technology, including mobile phones and their base stations. By searching PubMed, we identified a total of 10 epidemiological studies that assessed for putative health effects of mobile phone base stations. Seven of these studies explored the association between base station proximity and neurobehavioral effects and three investigated cancer. We found that eight of the 10 studies reported increased prevalence of adverse neurobehavioral symptoms or cancer in populations living at distances < 500 meters from base stations. None of the studies reported exposure above accepted international guidelines, suggesting that current guidelines may be inadequate in protecting the health of human populations. We believe that comprehensive epidemiological studies of long-term mobile phone base station exposure are urgently required to more definitively understand its health impact.

Mobile Phone Base Stations—Effects on Wellbeing and Health

M. Kundi, H.-P. Hutter
Pathophysiology
Full text:
http://www.mreengenharia.com.br/pathfisology/Pathophysiology_2009_Kundi.pdf

Description

In this review, the available evidence of epidemiological investigations (9) as well as experimental studies (6) on the relationship between exposure to RF radiation of cell towers and human health is assessed.

Abstract

Studying effects of mobile phone base station signals on health have been discouraged by authoritative bodies like WHO International EMF Project and COST 281. WHO recommended studies around base stations in 2003 but again stated in 2006 that studies on cancer in relation to base station exposure are of low priority. As a result only few investigations of effects of base station exposure on health and wellbeing exist. Cross-sectional investigations of subjective health as a function of distance or measured field strength, despite differences in methods and robustness of study design, found indications for an effect of exposure that is likely independent of concerns and attributions. Experimental studies applying short-term exposure to base station signals gave various results, but there is weak evidence that UMTS and to a lesser degree GSM signals reduce wellbeing in persons that report to be sensitive to such exposures. Two ecological studies of cancer in the vicinity of base stations report both a strong increase of incidence within a radius of 350 and 400m respectively. Due to the limitations inherent in this design no firm conclusions can be drawn, but the results underline the urgent need for a comprehensive investigation of this issue. Animal and in vitro studies are inconclusive to date. An increased incidence of DMBA induced mammary tumors in rats at a SAR of 1.4W/kg in one experiment could not be replicated in a second trial. Indications of oxidative stress after low-level in vivo exposure of rats could not be supported by in vitro studies of human fibroblasts and glioblastoma cells. From available evidence it is impossible to delineate a threshold below which no effect occurs, however, given the fact that studies reporting low exposure were invariably negative it is suggested that power densities around **0.5-1mW/m(2)** must be exceeded in order to observe an effect. The meager data base must be extended in the coming years. The difficulties of investigating long-term effects of base station exposure have been exaggerated, considering that base station and handset exposure have almost nothing in common both needs to be studied independently. It cannot be accepted that studying base stations is postponed until there is firm evidence for mobile phones.

Effects of Exposure to GSM Mobile Phone Base Station Signals on Salivary Cortisol, Alpha-Amylase, and Immunoglobulin A

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Biomedical and Environmental Sciences
Summary: http://www.ncbi.nlm.nih.gov/pubmed/20708499?dopt=Abstract

Abstract
Objective The present study aimed to test whether exposure to radiofrequency electromagnetic fields (RF-EMF) emitted by mobile phone base stations may have effects on salivary alpha-amylase, immunoglobulin A (IgA), and cortisol levels.
Methods Fifty seven participants were randomly allocated to one of three different experimental scenarios (22 participants to RF-EMF source was a GSM-900-MHz antenna located at the outer wall of the building. In scenarios 1 and 2, the first, third, and fifth sessions were "low" (median power flux density 5.2 $\mu W/m^2$) exposure. The second session was "high" (2126.8 $\mu W/m^2$), and the fourth session was "medium" (153.6 $\mu W/m^2$) in scenario 1, and vice versa in scenario 2. Scenario 3 had four "low" exposure conditions, followed by a "high" exposure condition. Biomedical parameters were collected by saliva samples three times a session. Exposure levels were created by shielding curtains.
Results In scenario 3 from session 4 to session 5 (from "low" to "high" exposure), an increase of cortisol was detected, while in scenarios 1 and 2, a higher concentration of alpha-amylase related to the baseline was identified as compared to that in scenario 3. IgA concentration was not significantly related to the exposure.
Conclusions RF-EMF in considerably lower field densities than ICNIRP-guidelines may influence certain psychobiological stress markers.

Specific Health Symptoms and Cell Phone Radiation in Selbitz (Bavaria, Germany)—Evidence of a Dose-Response Relationship

H. Eger, M. Jahn

Umwelt·Medizin·Gesellschaft (original in German)
Summary: http://www.umg-verlag.de/umwelt-medizin-gesellschaft/210_ej_z.pdf

Description

The questionnaire contained 19 questions regarding health symptoms, including two control symptoms. From 1,090 questionnaires sent out, 255 were returned for analysis. Exposure groups were classified as follows:
Group 1: < 100 m distance; Group 2: 100-200 m distance; Group 3: 200-300 m distance; Group 4: 300-400 m distance; Group 5 or control group > 400 m distance.
Actual RF measurements of cell phone base stations were taken; the main beam touches the ground at 200 m from the cell phone transmitters. Groups 1 and 2 have a mean exposure level of 1.2 V/m (ca. 4,000 $\mu W/m^2$) and groups 3 and 4 0.7 V/m (ca. 1,000 $\mu W/m^2$). The control group has a mean exposure level of 0.18 V/m (ca. 90 $\mu W/m^2$).

Results

Within the 400-m radius around the transmitter, a higher symptom rate could be documented for 14 out of 19 symptom groups in the highest exposure groups 1 and 2 close to the transmitter compared to groups 3 and 4 further away from the transmitter (Table 4). The difference is statistically significant.

Abstract

In January 2009 the administration of the Bavarian Municipality of Selbitz gathered relevant data from 251 residents as part of a health survey. Subsequently, the data were assessed based on the exposure levels of cell phone radiation.
In a next step, the exposure levels based on residential location and available RF measurements of local cell phone radiation levels were used to classify participants into exposure groups.
The mean radiation exposure level of the highest exposure group in Selbitz (1.2 V/m) was substantially higher than that of the study population in the QUEBEB study (1) of the German Mobile Phone Programme (mean value 0,07 V/m). For such symptoms as sleep problems, depressions, cerebral symptoms, joint problems, infections, skin problems, cardiovascular problems as well as disorders of the visual and auditory systems and the gastrointestinal tract, a significant dose-response relationship was observed in relation to objectively determined exposure levels. The impact of microwave radiation on the human nervous system serves as an explanation.
Carried out without outside funds, the study presented here provides a protocol concept that allows physicians and municipalities to cooperate and assess the potential human health impact of cell phone base stations located within residential areas.

The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer

H. Eger, K. U. Hagen, B. Lucas, P. Vogel, H. Voit

Umwelt·Medizin·Gesellschaft (original in German)
Full text: http://www.powerwatch.org.uk/news/20041118_naila.pdf

Description

After the installation of a new 935-MHz GSM transmission tower in Naila (Germany) in 1993, the case histories of 967 patients were studied between 1994 and 2004. Cancer incidence in patients living within a 400-m radius was compared to those living further away. RF exposure levels were calculated, but no actual measurements were taken.

Results

After 5 years, the cancer incidence within the 400-m radius doubled compared to the group living further away. After 10 years, the cancer incidence within the 400-m radius tripled.

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, *ie* after ten years of 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.

The Microwave Syndrome: A Preliminary Study in Spain

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Electromagnetic Biology and Medicine

Full text:
http://www.buergerwelle.de/pdf/the_microwave_syndrome_a_preliminary_study_in_spain_2003.pdf

Description

The questionnaire contained 25 questions, most of them regarding health symptoms. 101 of the returned questionnaires were analyzed. Minimum exposure time was 6 hours per day, 7 days a week. Electric field measurements were taken in the bedrooms (GSM 1800 MHz). The survey participants were divided into two groups: high-exposure group with an average of 1,000 $\mu W/m^2$ at < 150 m distance; low-exposure group with an average of 100 $\mu W/m^2$ at > 250 m distance.

Results

The greatest correlation between RF radiation exposure and health symptoms was found for discomfort, irritability, and appetite loss. Fatigue, headache, difficulty in concentrating, and sleep disturbances also showed a significant correlation with regard to exposure levels. Symptom severity weakens at distances greater than 250 m from the main RF source, namely at a power density level below 100 $\mu W/m^2$.

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.

Effects of Global Communication System Radiofrequency Fields on Well-Being and Cognitive Functions of Human Subjects with and without Subjective Complaints.

Zwamborn APM, Vossen SHJA, van Leersum BJAM, Ouwens MA, Makel WN
Netherlands Organisation for Applied Scientific Research (TNO).

Full text:
http://www.rivm.nl/milieuportaal/images/Zwamborn2003COFAMrapport.pdf

Description

In 2003, the Ministries of Health, Environment and Economics in the Netherlands commissioned a study to compare UMTS and GSM mobile phone exposure (GSM 900, GSM 1800, UMTS) with regard to potential health effects under double-blind randomized conditions. The study was performed in an RF-controlled environment (anechoic chamber). Reaction time test, memory comparison test, visual selective attention test, dual tasking test as well as a well-being questionnaire served to assess cognitive functions and well-being. Study participants were divided into two groups: those reporting complaints about EMF exposures and those who do not.

Results

A statistically significant relationship was found for UMTS-like signals at 1 V/m (3,000 µW/m) and decreased well-being in both groups. The relationship for GSM-like signals was not statistically significant.

Comments

"*When the test group was exposed to third generation base station signals* [UMTS], *there was a significant impact ... They felt tingling sensations, got headaches and felt nauseous,"* a spokeswoman for the Dutch Economics Ministry said.
www.powerwatch.org.uk/news/20030704_3g.asp

Study of the Health of People Living in the Vicinity of Mobile Phone Base Stations: I. Influences of Distance and Sex

Elsevier (original in French)

R. Santini, P. Santini, J. M. Danze, P. Le Ruz, M. Seigne

Full text: http://www.emrnetwork.org/pdfs/santini_pathbio_eng.pdf

Description

The questionnaire not only asked for health symptoms but EMF exposures as well, including cell phone use, observed distance from cell phone base station, power lines, TV tower, etc.

Results

Certain symptoms are experienced significantly more often, the closer survey respondents live to the cell phone base stations: up through 300 m for tiredness, 200 m for headache, sleep disruption, discomfort, etc., 100 m for irritability, depression, loss of memory, dizziness, libido decrease, etc. Women significantly more often than men complained of headache, nausea, loss of appetite, sleep disruption, depression, discomfort and visual disruptions.

Abstract

A survey study using a questionnaire was conducted on 530 people (270 men, 260 women) living or not in the vicinity of cellular phone base stations, on 18 nonspecific health symptoms. Comparisons of complaint frequencies (CHI-SQUARE test with Yates correction) in relation to the distance from base stations and sex show significant ($p<0.05$) increase as compared to people living > 300 m or not exposed to base stations, up through 300 m for tiredness, 200 m for headache, sleep disruption, 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 disruption, depression, discomfort and visual disruptions. This first study on symptoms experienced by people living in the vicinity of base stations shows that, in view of radioprotection, the minimal distance of people from cellular phone base stations should not be < 300 m.