

## SCIENCE

### **Experimental study: Stimulation of the brain with radiofrequency electromagnetic field pulses affects sleep-dependent performance improvement**

Sleep-dependent performance improvements seem to be closely related to sleep spindles (12-15 Hz) and sleep slow-wave activity (SWA, 0.75-4.5 Hz). Pulse-modulated radiofrequency electromagnetic fields (RF-EMF, carrier frequency 900 MHz) are capable to modulate these electroencephalographic (EEG) characteristics of sleep.

The aim of this study was to explore possible mechanisms how RF-EMF affect cortical activity during sleep and to test whether such effects on cortical activity during sleep interact with sleep-dependent performance changes. Sixteen male subjects underwent 2 experimental nights, one of them with all-night 0.25-0.8 Hz pulsed RF-EMF exposure. All-night EEG was recorded. To investigate RF-EMF induced changes in overnight performance improvement, subjects were trained for both nights on a motor task in the evening and the morning.

The researchers obtained good sleep quality in all subjects under both conditions (mean sleep efficiency > 90 %). After pulsed RF-EMF an increased SWA during exposure to pulse-modulated RF-EMF compared to sham exposure ( $P < 0.05$ ) toward the end of the sleep period were found. Spindle activity was not affected. Moreover, subjects showed an increased RF-EMF burst-related response in the SWA range, indicated by an increase in event-related EEG spectral power and phase changes in the SWA range. Notably, during exposure, sleep-dependent performance improvement in the motor sequence task was reduced compared to the sham condition (-20.1 %,  $P = 0.03$ ). The researchers conclude that the changes in the time course of SWA during the exposure night may reflect an interaction of RF-EMF with the renormalization of cortical excitability during sleep, with a negative impact on sleep-dependent performance improvement.

Bibliography: Lustenberger et al., Brain Stimul 2013; 6 (5): 805 - 811. **Abstract**

Study details on **EMF Portal** and summary of the IT'IS Foundation at: <http://www.itis.ethz.ch/>

### **Reaction of the immune system to low-level RF/MW exposures**

Radiofrequency (RF) and microwave (MW) radiation have been used in the modern world for many years. The rapidly increasing use of cellular phones in recent years has seen increased interest in relation to the possible health effects of exposure to RF/MW radiation. In 2011 a group of international experts organized by the IARC (International Agency for Research on Cancer in Lyon) concluded that RF/MW radiations should be listed as a possible carcinogen (group 2B) for humans. The incomplete knowledge of RF/MW-related cancer risks has initiated searches for biological indicators sensitive enough to measure the "weak biological influence" of RF/MWs. One of the main candidates is the immune system, which is able to react in a measurable way to discrete environmental stimuli.

In this review, the impacts of weak RF/MW fields, including cell phone radiation, on various immune functions, both in vitro and in vivo, are discussed.

The bulk of available evidence clearly indicates that various shifts in the number and/or activity of immunocompetent cells are possible, however the results are inconsistent. For example, a number of lymphocyte functions have been found to be enhanced and weakened within single experiments based on exposure to similar intensities of MW radiation. Certain premises exist which indicate that, in general, short-term exposure to weak MW radiation may temporarily stimulate certain humoral or cellular immune functions, while prolonged irradiation inhibits the same functions.

Bibliography: Szmigielski, Sci Total Environ. 2013; 454 - 455: 393 - 400. **Abstract**

## Pooled analysis of case-control studies on acoustic neuroma diagnosed 1997-2003 and 2007-2009 and use of mobile and cordless phones

The researchers previously conducted a case-control study of acoustic neuroma. Subjects of both genders aged 20-80 years, diagnosed during 1997-2003 in parts of Sweden, were included, and the results were published. The researchers have since made a further study for the time period 2007-2009 including both men and women aged 18-75 years selected from throughout the country.

These new results for acoustic neuroma have not been published to date. Similar methods were used for both study periods. In each, one population-based control, matched on gender and age (within five years), was identified from the Swedish Population Registry. Exposures were assessed by a self-administered questionnaire supplemented by a phone interview. Since the number of acoustic neuroma cases in the new study was low we now present pooled results from both study periods based on 316 participating cases and 3530 controls. Unconditional logistic regression analysis was performed, adjusting for age, gender, year of diagnosis and socioeconomic index (SEI).

Use of mobile phones of the analogue type gave odds ratio (OR) = 2.9, 95 % confidence interval (CI) = 2.0-4.3, increasing with > 20 years latency (time since first exposure) to OR = 7.7, 95 % CI = 2.8-21. Digital 2G mobile phone use gave OR = 1.5, 95 % CI = 1.1-2.1, increasing with latency > 15 years to an OR = 1.8, 95 % CI = 0.8-4.2. The results for cordless phone use were OR = 1.5, 95 % CI = 1.1-2.1, and, for latency of > 20 years, OR = 6.5, 95 % CI = 1.7-26. Digital type wireless phones (2G and 3G mobile phones and cordless phones) gave OR = 1.5, 95 % CI = 1.1-2.0 increasing to OR = 8.1, 95 % CI = 2.0-32 with latency > 20 years. For total wireless phone use, the highest risk was calculated for the longest latency time > 20 years: OR = 4.4, 95 % CI = 2.2-9.0. Several of the calculations in the long latency category were based on low numbers of exposed cases. Ipsilateral use resulted in a higher risk than contralateral for both mobile and cordless phones. OR increased per 100 h cumulative use and per year of latency for mobile phones and cordless phones, though the increase was not statistically significant for cordless phones. The percentage tumour volume increased per year of latency and per 100 h of cumulative use, statistically significant for analogue phones.

The researchers conclude that this study confirmed previous results demonstrating an association between mobile and cordless phone use and acoustic neuroma

Bibliography: Hardell et al., Int J Oncol 2013; 43 (4): 1036 - 1044. **Abstract**

Study details on [EMF Portal](#)

## TECHNOLOGY

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### Wi-Fi signals enable gesture recognition and location of persons

Computer scientists of the University of Washington have developed a gesture recognition technology ("WiSee"). The Researchers have shown it's possible to leverage Wi-Fi signals around us to detect specific movements without needing sensors on the human body or cameras. When a person moves, there is a slight change in the frequency of the wireless signal. By using an adapted Wi-Fi router and a few wireless devices in the living room, users could control their electronics and household appliances from any room in the home with a simple gesture.

A video demonstrating the "WiSee-Technology" and publications can be found at:

<http://wisee.cs.washington.edu/>

<http://www.washington.edu/news>

<http://www.heise.de/netze/meldung/Gestensteuerung-per-WLAN-1885044.html> (in German)

Computer scientists of the Massachusetts Institute of Technology have developed a software that uses the reflections and changes of the electromagnetic radiation emitted from wireless routers for locating people behind closed doors ("Wi-Vi-Technology").

A video demonstrating the "Wi-Vi-Technology" and a publication can be found at:

<http://people.csail.mit.edu/fadel/wivi/index.html>

<http://www.spiegel.de/netzwelt/> (in German)

## RFID for improved mobility of visually impaired now also tested in Germany

The Project SESAMONET (SEcure and SAfe MObility NETwork) of the Joint Research Centre of the European Commission is a “virtual path” based on an innovative application of RFID (Radio Frequency Identification) technology. This Project is being tested at the Kassel Calden regional airport, Germany. Passive transponders buried in the pavement and a dedicated electronic walking cane help to guide visually impaired people by acoustic signals inside the airport terminal. The project realised with Flughafen Kassel GmbH is the first official SESAMONET path in Germany and aims to contribute to make air travel more accessible for people with impaired vision.

Further Information on SESAMONET at: <http://ipsc.jrc.ec.europa.eu/?id=438>

[http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&obj\\_id=17770&dt\\_code=NWS&lang=en&ori=HPG](http://ec.europa.eu/dgs/jrc/index.cfm?id=1410&obj_id=17770&dt_code=NWS&lang=en&ori=HPG)

## Calendar

24 - 26 April 2014

### New conference date: EHE 2014

The International Conference on Electromagnetic Fields, Health and Environment 2013 will be held in Porto, Portugal, from 24<sup>th</sup> to 26<sup>th</sup> April, 2014. The Conference will cover a wide spectrum of topics in three thematic areas:

- Field Modeling, Measurement and Simulation
- Bioeffects and Health Implication
- Environment and Policies

Further details at the conference website:

<http://www.apdee.org/conferences/ehe2014/index.php>