



EMFnEAR

EXPOSURE AT UMTS ELECTROMAGNETIC FIELDS: STUDY ON POTENTIAL ADVERSE EFFECTS ON HEARING

Paolo Ravazzani
Institute of Biomedical Engineering
National Research Council
Italy



Health and Consumer Protection
Directorate-General

MEETING OF THE WORKING PARTY ON HEALTH AND ENVIRONMENT
LUXEMBOURG, May 23, 2006

The EMFnEAR Project



- **CNR-ISIB**, Milan-Padua, Italy, Paolo Ravazzani
- **CNRS**, Lyon, France, Lionel Collet
- **ENEA**, Rome, Italy, Carmela Marino
- **ISVR**, Southampton, UK, Mark Lutman
- **KMU**, Kaunas, Lithuania, Ingrida Uloziene
- **NIOM** , Lodz, Poland, Mariola Sliwinska-Kowalska
- **NIRR**, Budapest, Hungary, Gyorgy Thuroczy
- **RCA**, Moscow, Russia, George Tavartkiladze

- **Start Date:** December 15, 2004
- **End Date:** June 14, 2007
- **Duration:** 30 Months



Specific Objectives



- Assess potential changes in auditory function of animals and humans due to exposure to EMF produced by UMTS phones
- Support informed decision-making by health and environmental authorities and public information
- Provide industry with adequate information for assessing and managing the potential risks of UMTS standard for hearing.
- Contribute to the definition of the exposure limits at this modulation and frequency band and, consequently, to the revision of Council Recommendation 1999/519/EC.

Animal Experimentation



- Design and manufacturing of exposure and positioning systems

COMPLETED

- Animal experimentation:

- Exposure protocols
- Audiological assessment protocols
- In-vitro analysis protocols
- Ethical committee approvals

COMPLETED

- Experimental phases
- Data processing

IN PROGRESS

Human Experimentation



- Exposure and positioning systems

PARTIALLY COMPLETED

- Within-subject study:

- Exposure protocols
- Audiological assessment protocols

COMPLETED

- Ethical committee approvals
- Experimental phases
- Data processing

IN PROGRESS



Experimental Methods



In-vivo audiological assessment

- Battery of audiological tests to be performed before, during (animals) and after UMTS controlled exposure:
 - Distortion Product Otoacoustic Emissions (animals and humans)
 - Transient Evoked Otoacoustic Emissions (humans)
 - Contralateral efferent effects (humans)
 - Auditory Evoked Potentials (humans)
 - Subjective audiogram (humans)

In-vitro audiological assessment

Analysis of specific hair cells markers expression, apoptosis and ion concentration in outer hair cells of Sprague-Dawley or Wistar rats, following UMTS-exposure.



Gantt Chart (updated Sept 05)

ACTIVITY	3	6	9	12	15	18	21	24	27	30
Animal Protocols	Done	Done								
Human Protocols	Done	Done	Done	Done						
Animal Experiments			Done	Done	Done	Done	To Be Done	To Be Done	To Be Done	
Human Experiments						Done	To Be Done	To Be Done	To Be Done	
Dissemination		Done	Done	Done	Done	Done	To Be Done	To Be Done	To Be Done	To Be Done

 **DONE**

 **TO BE DONE**

Animal experiments First findings



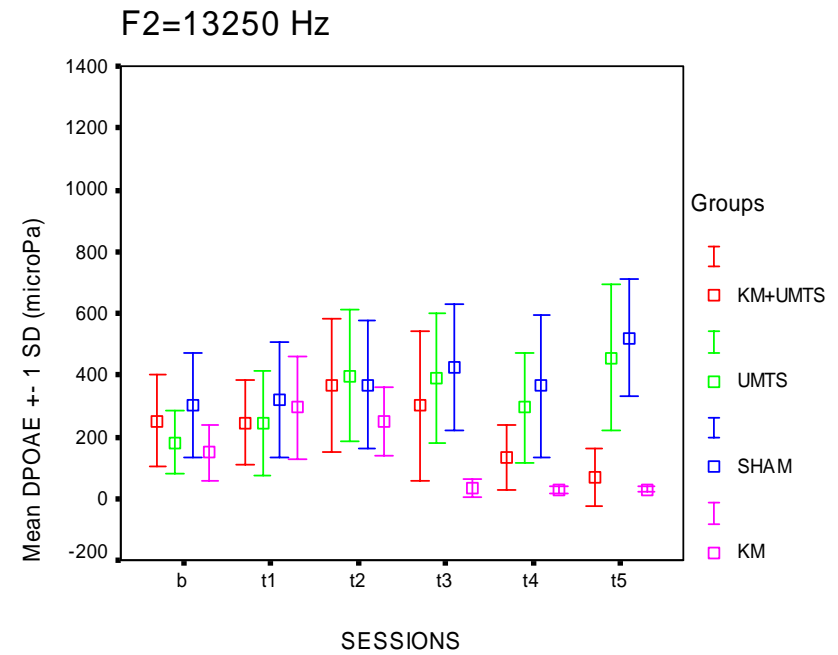
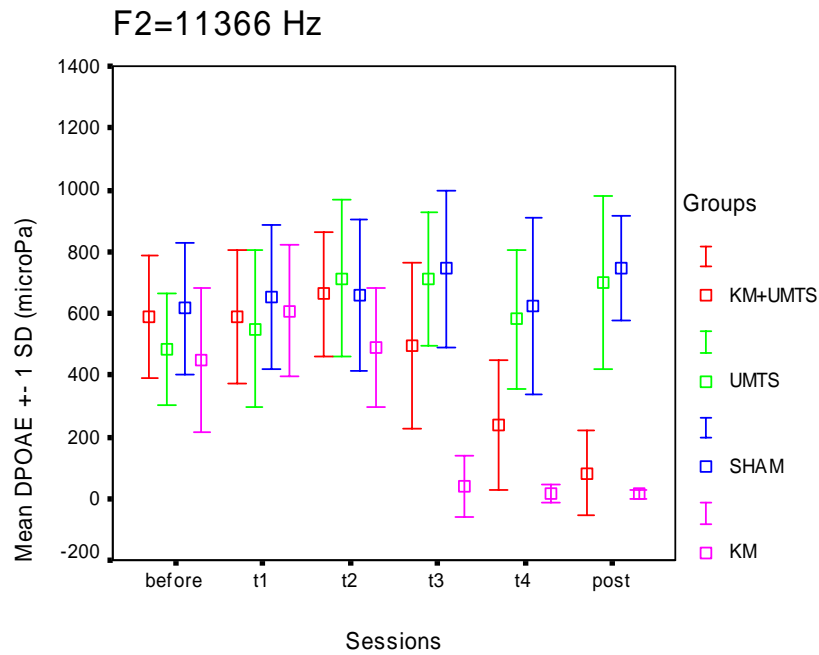
Objectives

To assess possible effects on the inner auditory system of rats exposed to electromagnetic fields related to UMTS mobile devices.

The effects on the hearing system of Sprague-Dawley rats exposed to UMTS exposure

The combined exposure of ototoxic drugs (i.e. kanamycin, KM) and UMTS exposure at high SAR levels (10 W/Kg) on the hearing system of Sprague-Dawley rats

Animal experiments First findings



Animal experiments



Summary

- The very preliminary findings of this study show no effects on the cochlea functionality of Sprague-Dawley rats exposed (SAR = 10 W/Kg) to UMTS fields compared to sham exposed animals
- A combined effect of KM and EMF exposure was observed, consisting in a reduction of the influence of KM on the cochlea outer hair cells
- Replication and confirmation studies should be undertaken (and are currently in progress) before drawing any conclusion

Dissemination Activities



EMFnEAR Website (<http://www.emfnear.polimi.it>)

EMFnEAR leaflets


Papers at International Conferences

Dissemination newspaper/television

Contacts with regulatory bodies

Contacts with stakeholders

**Special Session "Bioelectromagnetics and Hearing" at NHS 2006 Conference,
June 3, 2006, Cernobbio, Italy**



**Beyond Newborn Hearing Screening:
Infant and Childhood Hearing
in Science and Clinical Practice**

May 31 - June 3, 2006
Villa Erba, Cernobbio (Como Lake), Italy



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Future Steps (next six months)



- **Replication and confirmation of animal experiments**
- **Completion of human pilot experiments**
- **In-vitro studies on hair cells in animals**
- **Human experimentations**

Contacts:

Email: paolo.ravazzani@polimi.it

Website: <http://www.emfnear.polimi.it>

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