

Medical/biological study (experimental study)

Non-thermal DNA breakage by mobile-phone radiation (1800 MHz) in human fibroblasts and in transformed GFSH-R17 rat granulosa cells in vitro. med./bio.

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Journal , PubMed 
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Aim of study (acc. to author)

To confirm or disprove the genotoxic potential of radiofrequency electromagnetic field by investigating possible DNA-damaging effects in different cell types by using a newly developed sophisticated exposure system (publication 7926).
Information of the Medical University of Vienna (23.05.2008): Suspicion of an erroneous study by the former Division of Occupational Medicine (in German) and the press release Science and Ethics (in German) .
The Austrian Agency for Research Integrity  was not able to verify the suspicion of an erroneous study (see statement of 23.11.2010).
Background/further details:
The work is part of the REFLEX project (Risk Evaluation of Potential Environmental Hazards From Low Energy Electromagnetic Field Exposure Using Sensitive in vitro Methods), funded by the European Union.

Endpoint

- genotoxicity/mutation: DNA single-strand breaks and double-strand breaks

Exposure

- mobile communications, GSM

Exposure	Parameters
Exposure 1: 1,800 MHz Modulation type: CW Exposure duration: continuous for 4, 16 and 24 h	SAR: 2 W/kg mean
Exposure 2: 1,800 MHz Modulation type: CW Exposure duration: intermittent, 5 min on/10 min off, for 4, 16 and 24 h	SAR: 2 W/kg mean
Exposure 3: 1,800 MHz Modulation type: pulsed Exposure duration: intermittent, 5 min on/10 min off, for 4, 16 and 24 h	SAR: 2 W/kg mean
Exposure 4: 1,800 MHz Modulation type: pulsed Exposure duration: continuous for 4, 16 and 24 h	SAR: 1.2 W/kg mean

extended view 

Exposed system:
intact cell/cell culture
GFSH-R17 (transformed rat granulosa cells) and human diploid fibroblasts

Methods

Endpoint/measurement parameters/methodology

- genotoxicity/mutation: DNA single-strand breaks and double-strand breaks (alkaline and neutral comet assay)

Investigated material: DNA/RNA, cell suspension

Time of investigation: after exposure

Main outcome of study (acc. to author)

Electromagnetic field exposure (SAR 1.2 or 2 W/kg; different modulations; during 4, 16 and 24 h; intermittent or continuous wave) induced DNA single-strand breaks and double-strand breaks. The evaluation became significant after 16 h of exposure. Effects occurred (after 16 h irradiation) in both cell types and after different modulations. The intermittent exposure showed a stronger effect 

than continuous exposure.

The authors conclude that the induced DNA damage cannot be based on thermal effects.

Study character: medical/biological study, experimental study, full/main study

Study funded by

- European Union (EU)/European Commission
- VERUM Foundation (Stiftung für Verhalten und Umwelt), Germany

Comments on this article

- Adlkofer F (2014): Whether or not the genotoxic effects of exposure to continuous wave (CW) radio frequency electromagnetic fields (RF-EMF) in HL-60 cells are reproducible, is still an open question.
- Speit G (2014): Genotoxic effects of exposure to radiofrequency electromagnetic fields (RF-EMF) reported by the REFLEX project are not reproducible.
- Adlkofer F et al. (2011): [About the dealing with scientific results in mobile communications research at the Medical University of Vienna].
- Lerchl A et al. (2010): Critical comments on DNA breakage by mobile-phone electromagnetic fields [Diem et al., Mutat. Res. 583 (2005) 178-183].
- Rudiger HW (2009): Letter to the editor: doubts raised about the blinding process do not apply to the Diem et al. paper.
- Tuffs A (2008): University calls for mobile phone research to be withdrawn after technician admits faking data.
- Vogel G (2008): Scientific misconduct. Fraud charges cast doubt on claims of DNA damage from cell phone fields.
- Vijayalaxmi et al. (2006): Comments on: "DNA strand breaks" by Diem et al. [Mutat. Res. 583 (2005) 178-183] and Ivancsits et al. [Mutat. Res. 583 (2005) 184-188].

Related articles ⓘ

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- Speit G et al. (2013): Genotoxic effects of exposure to radiofrequency electromagnetic fields (RF-EMF) in HL-60 cells are not reproducible.
- Franzellitti S et al. (2010): Transient DNA damage induced by high-frequency electromagnetic fields (GSM 1.8GHz) in the human trophoblast HTR-8/SVneo cell line evaluated with the alkaline comet assay.
- (2009): [Statement on the final report of the REFLEX research association (5th EU Framework Program)].
- Valbonesi P et al. (2008): Evaluation of HSP70 expression and DNA damage in cells of a human trophoblast cell line exposed to 1.8 GHz amplitude-modulated radiofrequency fields.
- Schwarz C et al. (2008): Radiofrequency electromagnetic fields (UMTS, 1,950 MHz) induce genotoxic effects in vitro in human fibroblasts but not in lymphocytes.
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- Speit G et al. (2007): Genotoxic effects of exposure to radiofrequency electromagnetic fields (RF-EMF) in cultured mammalian cells are not independently reproducible.
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- Maes A et al. (2006): Cytogenetic investigation of subjects professionally exposed to radiofrequency radiation.

