



# EFHRAN Project. State of the art and next actions

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# The EFHRAN Project

- Executive Agency for Health and Consumers EAHC
- Health 2008 Programme - Second programme of community action in the field of health (2008- 2013)
  - Starting date: February 1, 2009
  - Ending date: July 31, 2012
  
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# Current activities

- Report on the analysis of risks associated to exposure to EMF: in vitro and in vivo (animals) studies [COMPLETED - UPDATE IN PROGRESS ]
- Risk analysis of human exposure to EMF [COMPLETED - UPDATE IN PROGRESS ]
- Report on the level of exposure (frequency, patterns and modulation) in the European Union. Part 1: Radiofrequency radiation [COMPLETED]
- Report on the level of exposure (frequency, patterns and modulation) in the European Union. Part 1: Low frequency fields [COMPLETED]
- Report on dose-response assessment [in progress]
- Report on risk characterization [in progress]

## in vitro \_ in vivo animals: ELF magnetic fields

Outcome	Strength of evidence
<b>Cancer studies</b>	
- <i>In vivo</i>	Lack of effect
- <i>In vitro</i>	Inadequate evidence
<b>Other health effects</b>	
<i>In vivo</i>	
- Behaviour	Limited evidence
- Memory	Limited evidence
- Haematology	Inadequate evidence
<i>In vitro</i>	
- Calcium ion	Limited evidence
- ROS	Limited evidence
- Genotoxicity	Limited evidence

## in vitro \_ in vivo animals: Intermediate frequencies

Outcome	Strength of evidence
<b>Development</b>	Lack of effect
<b>Genotoxicity</b>	Lack of effect

Sufficient evidence
Limited evidence
Inadequate Evidence
Lack of effects

## in vitro \_ in vivo animals: RF radiofrequencies

Outcome	Strength of evidence
<b>Cancer studies</b>	
- Genotoxic effects	
<i>In vitro</i>	Limited evidence
<i>In vivo</i>	Lack of effect
- Non genotoxic effects	
<i>In vitro</i>	Inadequate evidence
<i>In vivo</i>	Inadequate evidence
<b>Nervous system</b>	
- BBB	Lack of effect
- Stress response	Limited evidence
- Gene expression	Inadequate evidence
- Neurodegenerative disease	Inadequate evidence
- Neurogenesis	Inadequate evidence
- Behaviour	Inadequate evidence
- <i>In vitro</i>	Limited evidence
<b>Development and reproduction</b>	
- Development, teratology	Inadequate evidence
- Reproduction	Inadequate evidence
- <i>In vitro</i>	Inadequate evidence
<b>Miscellaneous</b>	
- Auditory	Lack of effect
- Immunology	
<i>In vivo</i>	Inadequate evidence
<i>In vitro</i>	Inadequate evidence

Update in progress

Sufficient evidence
Limited evidence
Inadequate Evidence
Lack of effects

# Humans

Adverse health outcome		Low frequency	IF	High frequency
Cancer	Leukaemia in children	Orange	Yellow	Yellow
	Brain tumour in children	Yellow	Yellow	Yellow
	Brain tumour in adults	Yellow	Yellow	Yellow
	Breast cancer in adults	Green	Yellow	Yellow
	All other cancers	Yellow	Yellow	Yellow
Neurodegenerative diseases	Alzheimer's	Yellow	Yellow	Yellow
	ALS	Yellow	Yellow	Yellow
	Other diseases	Yellow	Yellow	Yellow
Reproductive outcomes	All	Yellow	Yellow	Yellow
Cardiovascular diseases	All	Green	Yellow	Yellow
Well-being	EHS	Green	Yellow	Green
	Symptoms	Yellow	Yellow	Yellow

Update in progress

Sufficient evidence
Limited evidence
Inadequate Evidence
Lack of effects

## Summary of RF Exposure Assessment

1. The general RF exposure level of the population from the fixed RF sources including LF/MF broadcast, VHF broadcast, UHF TV and telecommunications is very low. **The range is between 0,01-1 V/m in Europe** that is many times below the exposure limits of EU recommendations.
2. The results of exposure measurements show that **more than 60% of recorded total EMF exposures were below 1 V/m**, less than 1% above 6 V/m and only less than 0,1 % were above 20 V/m field strength. The relevant European recommended exposure limit for the public is **in the range of 28 V/m to 87 V/m**.
3. The contribution of the RF exposure from wireless telecommunication technology is continuously increasing and now **is above 60 % of the total exposure**.

## Summary of ELF Exposure Assessment

Four main type of ELF exposure assessment that performed in European countries since 1980:

- i) **Outdoor spot measurements of electric and magnetic fields** (in the area of high-voltage electric power lines, outdoor city area);
- ii) **Indoor spot and/or permanent recording of ELF magnetic fields** with modeling of retrospective exposure
- iii) Measurement of ELF fields **in proximity to household and other electric devices, including cars and transport systems**
- iv) **Personal exposimetry** by personal exposimeters.



## **Dose –response assessment and risk characterization**

- Assessing health impacts of exposure to ELF and RF fields in Europe
- Activities currently in progress
- Based on exposure assessment of European population to EMF at ELF and RF frequencies
  - Currently a survey is running to collect additional information about exposure assessment to ELF

*Science consists in grouping facts so that general laws or conclusions may be drawn from them*

*Charles Darwin*



<http://efhran.polimi.it>

