Partners

Prof. Niels Kuster, Coordinator,
IT'IS Foundation, Switzerland

Dr. César Cobaleda, CBMSO, CSIC/UAM, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Spain

Prof. Clemens Dasenbrock, Fraunhofer Institute for Toxicology and Experimental Medicine, Germany

Dr. Maren Fedrowitz
University of Veterinary Medicine Hannover, Germany

Dr. Katja Pokovic
Schmid & Partner Engineering AG, Switzerland

Dr. Paolo Ravazzani, Consiglio Nazionale delle Ricerche, Istituto di Ingegneria Biomedica, Italy

Prof. Martin Röösli
Swiss Tropical and Public Health Institute, Switzerland

Dr. Isidro Sánchez García
CIC, CSIC/USAL, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Spain

Prof. Primo Schär
University of Basel, Switzerland

Dr. Joachim Schüz
International Agency for Research on Cancer (IARC), France

Dr. Rony Seger
Weizmann Institute of Science, Israel

External Advisory Board

Prof. Yngve Hamnerius,
Chalmers University of Technology, Sweden

Prof. Izidore S. Lossos,
Sylvester Comprehensive Cancer Center, Miami, USA

Dr. Gunde Ziegelberger,
Federal Office for Radiation Protection, Germany

Project Management and Contact

Dr. Iris Szankowski, IT'IS Foundation
Zeughausstrasse 43, 8004 Zurich, Switzerland
email: irissz@itis.ethz.ch, phone: +41 44/2459690

Arimmora
Project website: www.arimmora-fp7.eu

Summary

Exposure to extremely low frequency (ELF) magnetic fields (MF) has increased exponentially as the transmission and use of electrical power has also increased significantly during the past few decades. Epidemiological data on childhood leukemia indicate a plausible association between ELF-MF exposure and cancer. However, laboratory studies using animals and cell models have only provided weak support to confirm these findings, while current biophysical models cannot explain the association. Based on these findings, ELF-MF were classified as a possible human carcinogen by the International Agency for Research on Cancer (IARC) in 2001. Insight into the plausible mechanisms associated with ELF-MF exposure and cancer is necessary to impose regulations to minimize related risks.

The EU-funded collaborative project ARIMMORA focuses on determining the biophysical mechanisms underlying the possible causal relationship between ELF-MF exposure and cancer, especially childhood leukemia.

The objectives of the project are:

- to develop and apply novel experimental an computational techniques to determine specific tissue exposure in highly exposed versus averagely exposed populations;
- to exploit the most recent advances in the molecular understanding of leukemia and in molecular technologies to test likely interaction mechanisms;
- to develop biophysical models of interactions;
- to compare new and existing results to determine if current risk assessment guidelines should be revised.

The three-year ARIMMORA project began on October 1, 2011 and involves 10 world-renowned research groups representing a wide range of expertise in engineering, biology and risk assessment.

Arimmora

Project acronym: Arimmora
Call: FP7-ENV-2011
Grant agreement no.: 282891

COOPERATION

Arimmora

Advanced Research on Interaction Mechanisms of electroMagnetic exposures with Organisms for Risk Assessment (ARIMMORA)

COOPERATION

Exposure Assessment

Existing data on ELF MF exposure of European children are insufficient. ARIMMORA will collect precise exposure estimates on appropriate spatial and temporal scales.

Three groups of children will be equipped with measurement devices to record ELF MF exposure.
Group I consists of children living or attending school within 200 m of a high voltage power line;
Group II comprises children living or attending school in a building with a transformer substation;
Group III represents a control group composed of children sampled randomly. Exposure patterns derived from the measurements will be analyzed according to location and behavioural activity.

Exposures to power line EMFs are associated with a higher incidence of childhood leukemia.

Dosimetry and Biophysical Modelling

The fields generated by external sources inside biological tissues are strongly influenced by anatomical details, e.g., height, fat content, posture, age, gender, etc.

Field distribution inside the tissue of a 6-year old boy when exposed to a uniform EMF-MF.

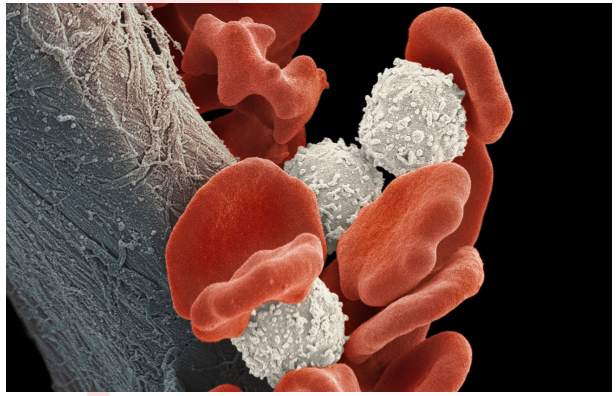
To correlate the results obtained in the in vitro and in vivo experiments with the exposure of children, the induced fields in the cell cultures and animals must be compared with those induced in the child's tissues during real-life exposure conditions.

Advanced simulation software and detailed anatomical models will be used to assess the fields within a representative range of child anatomies and postures (macrodosimetry). Subcellular models will be developed to determine the field distribution within the cells (microdosimetry) wand to examine potential interaction mechanisms (biophysical models).

Biology and Risk Assessment

The ARIMMORA project focuses on detecting interactions between biological systems and ELF-MF by applying advanced molecular leukemia cell cultures and animal models. In vitro and ex vivo experiments will be performed to detect possible effects on the epigenetic programming and composition of blood cells, alterations in cellular signalling processes, and abnormalities in immune regulation. In vivo mouse models will be used to study the initiation and progression of acute lymphoblastic leukemia.

At the end of the project, we will evaluate and compare the results of ARIMMORA with other recent studies to determine if existing risk assessment guidelines for extremely low frequency magnetic field exposure should be revised. All findings will be openly disseminated to the scientific community, the public and policymakers.



Abnormal red blood cells interspersed with B-lymphocytes in a leukemic patient.

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