General research activities related to EMF health
The research activity in 2011 was mainly based on the same topics outlined in 2010. The main institutions involved are Universities, grouped in ICEMB consortium, the National Research Council (CNR), the Italian national agency for new technologies, energy and economic sustainable development (ENEA), the Institute for Environmental Research and Protection (ISPRA), the National Institute of Health (ISS), and the National Workers' Compensation Authority (INAIL).

The scientific activities in Italy are presented here on the basis of results published in 2011 in peer-reviewed scientific papers, authored or co-authored by researchers affiliated to Italian Universities or research organizations. This should be considered an excerpt and some additional scientific research can be involuntary missed. Two main topics of activity are identified: the first one concerns biological aspects and analysis of in vivo and in vitro effects of electromagnetic fields, the second one deals with engineering, exposure assessment and dosimetry.

Biological studies were mainly focused on the potential effects of exposure to radiofrequency (RF) and extremely low frequencies (ELF) fields, with a few of them also on other signals. Both in vitro and in vivo models were used. The effects of the exposure to ELF (and LF) were investigated mainly in vitro on oxidative stress (1), neuroblastoma cells (2), mesenchymal cell differentiation and osteogenesis (3), and nociception (4). Professionally exposed welders were screened for genotoxic effects due to ELF exposure (5). Biological effects of ELF and static fields were also analyzed in plants, in particular on pollen germination (6) and growth of green gram seedlings (7).

The effects of MW, including GSM and WiFi, EMF exposure were also investigated in in vitro and in vivo models. In vitro settings were used to evaluate the effects on cell membrane components, signal transduction molecules, mitosis and cell proliferation (8-10). Adaptive response to GSM signals was studied in cell cycle (10). In vivo studies included experiments with early life exposure (newborn mice) to evaluate the effects of WiFi signals on the maturing immune system (11). Cognitive effects of exposure to WiFi signals were evaluate in human volunteers also using functional MRI analyses (12, 13). Explorative studies investigated the therapeutic effects of MW-induced hyperthermia and of PEMFs on carpal tunnel syndrome and cartilage explants, respectively (14, 15).

The Italian activities on EMF exposure assessment span across the whole frequency range from static fields to microwaves. Static fields: the electric field induction by movements near to a MRI devices was studied in one paper (16). ELF and Low Frequency fields: the studies were focused in 2011 on personal measurements of low frequency magnetic fields in occupational environment, fetal exposure to low frequency magnetic field from laptops, contact currents from 40 Hz to 110 MHz and magnetic field from power lines with complex geometry (17-20). Intermediate Frequencies fields: two papers from the same authors discussed the assessment of RFID 13.56 MHz exposure in females, children and neonates (21, 22). Radiofrequencies and microwaves: the research on RF and microwaves mainly addressed the design and development of microwaves exposure systems for in-vivo experiments, the SAR estimation in human bodies, the assessment of population and occupational exposure to WiFi, the assessment of exposure of adult and children from 900 MHz to 3 GHz and the dielectric characterization of liquid-based materials for mimicking breast tissues in the 0.5-12 GHz frequency range (23-29). EMF and biomedical applications: The studies addressed the computation of the current densities in the brain tissues injected during transcranial Direct Current Stimulation, the electromagnetic compatibility of WLAN Adapters with life-supporting medical devices, the design and development of a minimally invasive antenna for ablation therapies and of an UWB antenna for cardiac application (30-33). Finally micro-dosimetry for nanosecond pulsed electric field applications was applied to electroporation (34) and a study on the analysis of heart magnetic stimulation (35) was published.

The program launched in 2009 by the former National Institute for Occupational Safety and Prevention (ISPESL), in cooperation with CNR-IFAC and ENEA, addressed to the assessment of occupational exposure during Magnetic Resonance Imaging clinical procedures has completed and
main results will be published soon. The activities on MR assessment are being continued in the frame of a wider project on occupational safety for EMF technologies used in health facilities, funded by Ministry of Health and coordinated by INAIL, with participation of ISS, CNR-IFAC and ENEA.

The program mentioned in the previous report funded by Ministry of Health, aimed at the creation of a public national database of emission levels of equipment or devices used at workplaces, able to emit or produce exposure to physical agents including EMF has been completed, and the web site www.portaleagentifisici.it has been created and it is in use. The site will be regularly managed and upgraded by INAIL, in cooperation with Tuscany regional authority, and local occupational safety and prevention Departments of Siena and Modena cities. The development of the web site is absolutely relevant in the frame of public information activities, specifically designed for occupational safety.

**New policies and legislations regarding EMF exposure**

No relevant events have occurred in the last year, and no new policy or legislation act has been issued. The term of enforcement of Directive 2004/40/EC has been moved by UE to 31 October 2013. General provisions for risk assessment of physical agents fully apply, but no binding exposure limit values for EMF are in force. This implies however that employers have the obligation to carry out an EMF risk assessment, and adopt the proper protection measures when necessary. The non-binding guidance to EMF risk assessment and management mentioned in the past year is currently under a process of institutional validation.

The Ministry of Environment is still working at regulatory acts concerning the institution of a national database for telecommunication plants and power lines, and the definition of rules for labelling of equipment emitting EMF.

**Areas of public concern and national responses**

Few have changed since 2010. The major concern of the public remains focused on base stations for mobile phones and installation of new Wi-Fi network. Committees of “hypersensitive” subjects are still very active, and their concern is mostly addressed to Wi-Fi new technologies. IARC classification of RF field had a wide echo on the media, and attention was particularly paid to risk from mobile phones. Nevertheless, public concern on potential risks from mobile phones has remained very low compared to base stations. The national response, at central level, is still based on a communication strategy, even though the overall response of authorities, local and central, is not yet fully coherent. In November 2011 the Highest Council of Health (the top consultation body of the Ministry of Health), issued an opinion on possible RF long term risk and IARC classification. The Council concluded that no risk is established, but it cannot be completely ruled out for heavy users of mobile phones. The Council suggested the Minister of Health to develop an information campaign to the public, aimed at a conscious use of mobile phone, including practical recommendation for reduction of exposure and the special advice for children that mobile phone is not to be considered as a common use tool, but limited to necessary situations. Such measures should clearly be presented as purely prudential, and not linked to any certain health benefit. The information campaign is currently in preparation.

**Public information activities**

The website www.iss.it/elet, developed in the frame of the communication project “Health and Electromagnetic Fields”, promoted by the Ministry of Health and carried out by the National Institute of Health (ISS), is continuing to be regularly updated. The Consortium Elettra 2000 continues to manage a website for public information, and relevant newsletters. It has to be finally mentioned again the web site www.portaleagentifisici.it as a powerful tool of information for occupational safety.
ANNEX: Quoted references


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