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DIRECCIÓN GENERAL DE
SALUD PÚBLICA

SUBDIRECCIÓN GENERAL
DE SANIDAD AMBIENTAL Y
SALUD LABORAL

SPAIN
Report on EMF activities

1. New policies and legislations regarding EMF exposure

In Spain, the radio emissions from both mobile telephony and other sources (i.e. radio, television) are regulated by:

- Law 11/2022, of June 28, General Telecommunications
- Law 14/1986, of April 25, General Health and Law 33/2011, of 4 October, General of Public Health
- Royal Decree 1066/2001, of September 28, regulating protection conditions of radioelectric domain, the restrictions and the sanitary protection measures

Other legislations already published:

- Royal Decree 123/2017, of February 24, whereby the Regulation on the use of the radioelectric public domain
- Order ETU / 416/2018, of April 20, which modifies Order ETU / 1033/2017, of October 25, approving the national table of frequency allocation

The Ministry of Economic Affairs and Digital Transformation, by the General Law of Telecommunications, is responsible for the inspection of telecommunications networks, the competence for the management of the public radioelectric domain and technical verification of radioelectric emissions. In addition, the Ministry of Health is responsible for the information on health risks related to EMF. Coordination between the two ministries is essential to promote research on radioelectric emissions and human health.

Special topic 5G

The Ministry of Economic Affairs and Digital Transformation has developed the 5G National Plan for the 2018-2020 period. 5G networks will enable the following:

- Mobile broadband of very high speed and capacity
- Ultra-reliable low latency communication
- Mass M2M communications

The 5G National Plan contributes to the pursuit of European Union goals, and it is developed in line with the deadlines established in the Union's strategy.

2. New public information activities

The rapid global development of modern telecommunications has led to the spread of radio frequency-transmitting base stations and devices in Spain. Although no adverse

health effects have been established as being caused by electromagnetic fields (EMF) yet, a large number of studies are being performed to study their possible potential effects on health in the short and long term.

Regarding the regulatory framework of EMF at the national level, Spanish health authorities complied with the EU Recommendation (1999/519/CE) derived from the ICNIRP guidelines. Furthermore, the Royal Decree 1066/2001 that establishes the limits of exposure to radio electric emissions was approved in 2001.

More recently, the Ministry of Health, in collaboration with the Ministry for the Ecological Transition and the Demographic Challenge, recognized the interdependence relationship between the environment and population's health through the publication of the Health and Environment Strategic Plan. This plan is an ambitious strategy that specifies different objectives and indicators for the several intervention lines that have been stablished regarding the most critical environmental risk factors. It includes a section dedicated to radiation considering both thematic areas on ionizing and non-ionizing radioactivity, where the latter's objective is to monitor EMF's exposure limits set by the EU and the WHO - ICNIR, as well as to assess the risks of new technologies (5G). To pursue this aim, the First action program (2022-2023) includes various activities, such as:

- **Assessing the need to update of Royal Decree 1066/2001**

The publication of the updated ICNIRP guidelines (2020) and the requirement to determine exposure levels for low frequency EMF require an update to Royal Decree 1066/2001, the Regulation that establishes conditions for the protection of the radio electric public domain, radio electric emission limits, and health protection measures against radio electric emissions. This will also contribute to the aim of improving coordination and management among the entities involved in EMF prevention and protection. This action will be carried out in accordance with WHO and EU guidelines.

- **The compilation of an inventory of research projects on this topic**

Preventive measures need to base on strong scientific evidence that can be identified by collecting information about national research centres and units. The objective is to benefit decision-making processes from expertise and previously proven results.

- **Conducting a pilot study on exposure to extremely low frequency EMF**

As a prelude to a broader study on the real exposure levels of the Spanish population to low frequency EMF at the national level, a pilot research is being developing at chosen locations and facilities. The main purpose is to promote study and dissemination of the effects of low frequency EMF exposure on the public in order to maintain safe levels of exposure. The aim is to establish a common measurement protocol for exposure levels in the selected areas. The results will be used to develop a

national protocol and expand the measurements to other areas of the country. Ultimately, the aim is to publish national legislation setting exposure limits.

- **The analysis of patterns in mortality rates, prevalence and incidence of CNS tumors and leukemias**

International agencies and committees advocate monitoring SNC tumor patterns and mobile phone use to establish an association between them if incidence rates reveal a rising pattern over time. Then, indirect indicators such as mortality, morbidity, and the prevalence of diseases associated with the exposure will be used to assess the health impact of RF-CEM and low frequency CEM exposure. This will also contribute to the aim of promoting study and dissemination of the EMF exposure's effects on the public to maintain safe levels of exposure.

To verify this association, the Ministry of Health promoted the development of two reports on the evolution of trends in the rates of these diseases.

Recently, the Spanish Network pf Cancer Registries (REDECAN) published a report titled "Trends in the incidence of brain cancer in Spain between 1985 and 2015 and its possible relationship with the use of mobile phones". As mention before, the Health and Environment Strategic Plan includes electromagnetic fields as one of the thematic areas. Specifically, the objective is to promote research and dissemination of the effects of public exposure to radiofrequency electromagnetic fields. One of the actions proposed in the Plan is to study and analyze the incidence rates of Central Nervous System tumors and to monitor the evolution of the trends of these rates in the Spanish population.

The main conclusion of the report is that the results of the study show an upward trend in the incidence of brain tumors in the 1980s, possibly caused by the diagnostic improvements implemented in these years, and later a stabilization, and do not support the hypothesis of a possible correlation between mobile phone use and malignant brain tumors.

Finally, the National Epidemiology Centre (CNE, ISCIII - CIBERESP) published the report entitled "Mortality due to leukemia, non-Hodgkin's lymphomas and tumors of the Central Nervous System in Spain. 2001-2020". The report includes the evolution of the mortality rates of these diseases and of benign and malignant CNS tumors to assess the impact of exposure to radiofrequency EMFs, since the deployment of mobile telephony began in Spain in the mid-1990s.

To carry out the study, the CNE used mortality data provided by the National Institute of Statistics. Standardized mortality rates were calculated for men and women, in four age groups and for each Autonomous Community of Spain.

The authors conclude that the trend in mortality from hematological neoplasms is statistically significantly decreasing during the period studied. This decrease is slightly greater in women and, in relative terms, in the younger population.

NextGEM

Likewise, the Spanish Ministry of Health also participates as a public regulatory body in the European Next Generation project titled "Integrated Sensing and Analytical System for Monitoring and Assessing Radiofrequency Electromagnetic Field Exposure and Health program (NextGEM)". This initiative is part of the Horizon Europe 2021 - 2022 programme on living and working in a health-promoting environment, which is being developed under the topic of EMF exposure and health.

Its goal is to address the issue of European recommendations' non-binding nature across countries by meeting the need for updated scientific evidence, as well as quality standardized criteria and methodology. In this regard, NextGEM will develop and validate tools for evidence-based risk assessment, and provide a platform for the generation of health-relevant scientific information and data on new scenarios of RF-EMF exposure in multiple frequency bands. NextGEM will also establish the NextGEM Innovation and Knowledge Hub (NIKH) for EMF and Health, which will provide a standardized mechanism for European regulatory bodies and the scientific community to store and evaluate project outcomes, as well as access to FAIR data. Accordingly, five distinct objectives have been defined:

a. **Measurement and modelling of single and multiple radio frequency sources, in changing EMF exposure patterns based on innovative monitoring technologies**

To examine the impact of new communication technologies on compliance with safety regulations, RF-EMF environmental and personal exposure levels will be studied and compared. Numerical models of EMF generated by 3G, 4G, and 5G sources will be created, as will calculations of fields induced inside the human body, and tools to monitor EMF dispersion in living and working situations. This would enable for the estimation of average personal exposure levels and cumulative RF energy absorption for certain population segments such as children and workers. Sensors and wearable devices will be utilized to characterize 5G band exposure. To gather and process in situ and historical data on RF-EMF ambient levels, cross layer/location monitoring systems will be established.

b. **Assess health effects and elucidate action mechanisms of different and combined EMF exposure patterns by experimental and human studies**

NextGEM will conduct experimental research (mechanistic, in vitro, ex vivo, and in vivo) on new RF-EMF exposure patterns, including combined exposures with other chemical or physical agents. Controlled-exposure studies on specified outcomes will be conducted using human participants. NextGEM will adhere to good laboratory

practices (GLP) for experimental investigations by creating Standard Operating Procedures (SOPs), which will include 3R principles for in vivo experiments. The project will conduct replication/confirmation investigations in separate labs for specified experimental circumstances, as well as investigate the possibilities of identifying candidate markers for risk assessment and assessing in heavy and light mobile phone users.

c. Identify causal links and perform risk assessment regarding RF-EMF exposure and selected health outcomes while providing FAIR (Findable, Accessible, Interoperable, Reusable) data access

Through two overviews of systematic reviews (SRs) and meta-analyses of epidemiological studies of cancer risk in relation to RF exposure from near-field and far-field sources, respectively, NextGEM will assess the evidence for a causal association between RF-EMF exposure and cancer in humans. The assessment of the degree of evidence in people will be integrated with similar assessments of the evidence from experimental investigations of RF-EMF and cancer-related outcomes in animals and cells during the review process. Furthermore, a risk assessment (RA) tool based on a dashboard and an accompanying database for safe GDPR-enabled provision of FAIR (Findable, Accessible, Interoperable, Reusable) data access will be developed to assist public authorities and regulators in RA for workers and the public.

d. Develop NextGEM Innovation Knowledge Hub (NIKH) and validate it through real case studies.

Implementation of the NextGEM Innovation Knowledge Hub (NIKH), a practical realization and integration of scientific components (Objectives 1-3), to monitor, store, share, and access RF-EMF and biological exposure data with SOPs for lab experiments and engineering solutions to maintain compliance with safety standards, minimize exposure levels in defined environments and contexts, and raise citizen awareness of RF-EMF information and research. To facilitate validation and exploitation, a benchmarked proof-of-concept reference platform will be constructed, which will include NIKH capabilities and will be open and adaptable, serving as the foundation for the progressive expansion of NIKH into the central European Hub and knowledge repository for EMF data. The NIKH platform will be built on an open-source framework that will include a full codebook and metadata.

e. Achieve project's impact maximisation through wide dissemination, communication and exploitation activities.

NextGEM will ensure involvement and awareness through campaigns, training, and ongoing programs to provide information about the health effects of EMF. The project will develop and test an effective communication approach for the public about the health dangers associated with EMF exposure. Next, the primary mission of GEM is to ensure compliance with and contribute to the development of quality criteria and standards (CEN/ISO), to update EU recommendations/directives and international

guidelines (ICNIRP), and to establish links with the WHO and other international and national organizations. The project's adoption and take-up will be accelerated in Europe and beyond by widespread dissemination, communication, and exploitation. Participation in a cluster will ensure coordination with other active projects.

3. Other activities

The Ministry of Economic Affairs and Digital Transformation provides an information service on radioelectric installations and exposure levels. The Information service on radioelectric stations and exposure levels shows the data of the region by location address. This service contains data about the certifications carried out by technicians and showed by the phone operators to comply with the Royal Decree 1066/2001.