INTERNATIONAL EMF PROJECT
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National Report (Republic of Korea)

1. EMF regulations and standards

The EMF exposure limits in Republic of Korea were established in 2000 (MIST Notification No. 2019-4) and enforced since April 2002. Ministry of Science and ICT (MSIT) is responsible for EMF regulations, except power lines which is regulated by MOTIE (Ministry of Trade, Industry and Energy). National Radio Research Agency (RRA) is in charge of the standards. The EMF exposure limits of SAR in Korea are based on the international standards developed by IEEE (FCC guideline). Until Dec. 2012, only the limit of local SAR for head had been mandated. The SAR limits for workers and for body, limbs and whole-body average were adopted and effective from January 2013. The limits of electromagnetic field level are based on the international standards developed by ICNIRP in 1998. The new ELF EMF guideline adopted by ICNIRP in 2010 is not adopted yet in Korea.

There are two measurement standards for electromagnetic field strength and SAR (RRA Notifications No. 2019-3, 2018-18). The devices and installations regulated for SAR and electromagnetic field strength are described in the separate notification (RRA Notification No. 2019-1). The assessment results for the electromagnetic field level for the broadcasting stations (aggregated antenna power > 60 W) and the base stations (aggregated antenna power > 30 W or 60 W, depending on the type of the communication system) before putting into service (Clause 65 of Presidential Decree of Radio Wave Act) shall be reported. The regulations for high-power stations (over 500 W) were added on Dec. 12, 2017 (enforcement date: since Dec. 12, 2018), and the regulations for Household Appliances were mandated since Dec. 2016 (the enforcement date for electric blankets is July 2017and that for IH cooker, hobs and hotplates is Jan. 2019). The regulations for 5G mobile phone and base stations were mandated since Jan. 17, 2019.

The regulations for EMF rating and labelling were enforced from August 1, 2014 (MSIT Notification No. 2017-20). The operators of radio stations should affix the labels for EMF strength rating in an appropriate place. For portable devices used in direct contact with the head, those who manufacture or import such devices should affix the labels for SAR rating, and/or display the highest SAR values appropriately.

2. Public Concerns and Risk Communications

The public concerns about EMF are still very high in Korea. The public appeals against the radiation of electro-magnetic energy from base stations have been submitted to government offices and operators in a year. Regarding power lines and substations, more than hundred complaints have been filed to KEPCO (Korea Electric Power Corporation). Government offices, operators and KEPCO are actively taking care of such complaints.

EMF web sites for interactive and bilateral communication (www.rra.go.kr/emf, www.emf.or.kr, www.emf60hz.com, home.kepco.co.kr) have been providing EMF related information, including the guidelines for the safe use of home appliances and mobile phones, Q&A, videos for education and forum offered by RRA. Especially, from 2012 the information on the SAR values of each mobile-phone model, including the kid's phone and watch phone from April 2015, was opened to the public through this website. RRA also endeavors to provide the correct information on electromagnetic waves and to alleviate the concerns of the general public through interactive communications. Since 2015, RRA has been running the education programs on electromagnetic wave safety and forums to enhance the bilateral risk communication with the public. Currently, we are expanding the target audiences of the education programs and forums, and also developing new contents such as issue reports, brochures on EMF information, videos for EMF experiment, etc.

KEPCO also operates the Public Information Dissemination Center since 2006. From 2004, two kinds of Newsletters, one for EMF measurement standards and the other one for biological effects, exposure limits and policies are published biannually. Every other year, a survey on “perception for EMF exposure and its hazard” for general public or experts is performed.

3. Researches on the biological effects of EMF

KEHC (Korea EMF Health Criteria) 2020 was published jointly by KIEES and ETRI. In this report, the health effects of IF and RF exposure were reviewed, and the translated versions of the WHO fact sheets on the electromagnetic field and public health, namely, mobile phones, base stations and wireless technologies, and radar and human health were included in the Appendix. KEHC 2020 will be used as a reference for risk communication activities in Korea.

As reported last year, RF research project which is titled as “A study on public health and safety in a complex EMF environment” was started in 2019 and will be finished in 2023. The main research activities in 2020 are as follows.

Following the 28-day toxicity study last year, a protocol for a 2-year carcinogenic joint study between Korea and Japan was finalized in early 2021, and the research is ongoing according to this protocol. In this international study, rats were divided into three groups: exposure group, sham group, and cage control group, and each group consists of 75 Harlan SD male rats. The exposure level of the exposure group is a whole-body SAR of 4 W/kg.

In ETRI, the rhesus monkey was implemented as a 3D numerical model by segmenting the tissues based on MRI images and/or anatomical images. This virtual model including the average head models and the male and female whole-body models were released to be used free of charge as general-purpose data that can be used in the field of medical technology in addition to the virtual simulation of exposure to electromagnetic fields.

This data can be found on the websites:

https//www.data.go.kr/en/data/15074612/fileData.do,
https//www.data.go.kr/en/data/15074160/fileData.do,
https//www.data.go.kr/en/data/15074159/fileData.do

In vitro studies, the effects of LTE (1.762 GHz) and 5G (28 GHz) EMFs on skin pigmentation were investigated. It was shown that neither LTE nor 5G exposure induced significant effects on cell viability or pigmentation. On the other hand, the possible biological response of human keratinocytes to RF EMF exposure (LTE, 1.762GHz), including skin-aging process were studied. The results showed that exposure to 1.76 GHz RF-EMF induced ROS generation, leading to MMP activation and FoxO3a and ERK1/2 phosphorylation.

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