

Discussion The available data suggest that IRA may have biological effects regardless of the potential temperature increase of tissues. Moreover, a synergistic action between IRA, visible radiation, UVB or UVA, may not be excluded, for instance regarding ROS production, modulation of cell signalling, induction of mutations and/or epigenetic changes, especially for prolonged and repeated exposures of skin and eye tissues. Waiting for new experimental and epidemiological data (including those obtained applying 'omics' technologies) protection of workers exposed to solar radiation should ideally include the shielding of IRA (although effective sunscreens are not yet available in this regard), while health surveillance should not ignore the possibility of synergistic effects. Finally, preventive pathways have to include, among others, education to healthy lifestyles.

146 **MAIN PRINCIPLES OF ELECTROMAGNETIC FIELD OCCUPATIONAL EXPOSURE RISKS MANAGEMENT IN RUSSIA**

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Electromagnetic field (EMF) of power transmission, broadcasting systems, etc. are health risk factor. In case of occupational exposure EMF are purposeful risk factor; for other workers and general public EMF are enforces risk factor, and in case of different emitters (mobile phones, laptops, etc.) use EMF are voluntary risk factor.

The main principle of EMF occupational exposure risks management in Russia is based in concept of EMF 'cumulative' effects. Hygienic norms are time dependent, comprising a principle 'protection by time'. EMF hygienic standardisation in Russia is based on the results of hygienic, clinical-physiological, epidemiological and experimental studies (directed to long-term exposure threshold effects determination), as well as the data of peer reviewed scientific publications. Hygienic norms are developed for discrete frequency ranges in account of hygienic safety factor. Today EMF occupational exposure hygienic standards include: hypo-geomagnetic conditions, static electric and magnetic fields, 50 Hz electric and magnetic field, radiofrequency EMF (from 10 kHz to 300 GHz, and special EMF case (ultra broadband pulses). Dose (time-dependence) approach allowed to specify value of EMF permissible levels depending on exposure duration. This approach in radiofrequency range is realised by introduction of 'power exposition' (PE) and 'maximal permissible level' values.

The progress in EMF hygienic safety problem solving is time dependent norms for frequencies from 3 Hz up to 10 kHz development, as well as attempt of near zone EMF adequate evaluation (for >300 MHz frequency range) principles.

EMF risks management is based in realisation of protection by distance and protection by protective measures and means too. There are developed new methods of overhead and cable extremely high voltage transmission lines 50 Hz magnetic field decrease as well as new regulatory documents on requirements and testing of 50 Hz electric field and radiofrequency EMF individual protective means.

484 **RADON AND RISK OF LUNG CANCER IN APULIA REGION SOUTHERN ITALY**

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Introduction Radon is a naturally occurring radioactive gas and a level 1 carcinogen by IARC. It acts synergistically with cigarette smoke to cause lung cancer. The limit of 300 Bq/m³ is envisaged, both for working environments and for living environments, from the new European Directive on the Protection of Ionising Radiant ('Basic Safety Standards' – Council Directive 2013/59/Euratom, published in OJ L –13 of 17/1/2014), which will be transposed by Member States of the European Union by the deadline of 06 February 2018.

Method we studied the association between different building, occupational and geologic characteristics and high levels of radon concentrations (above the 75% percentile). Also the lung cancer death rates for the exposure to Radon was assessed by means of the REID method (Nezahat Hunter, 2015) related to different smoking habits groups. The data collection was carried out using Apulia observed radon data collected by regional environmental protection agency (Arpa), in the provinces of Bari and Lecce and other sources.

Results The preliminary data showed an increase of risk to observe Radon mean values above the 75th percentile (100 Bq·m⁻³) associated to years of building above 1972 (OR=2.28 to OR=4.70), elevated number of rooms (OR=2.16), Non cement walls (OR=2.6). The risk rate due to residential radon will be calculated and differentiated for Continuing smokers, Ex-smokers and Never smokers. The calculations of specific lung cancer rates will be based on the REID method.

Discussion Radon exposure is the second cause of lung cancer. Many lung cancer cases could be prevented in Apulia by reducing indoor radon and smoking habits. The regional and provincial health authorities would be benefited by improved testing for radon and subsequent home remediation rates. Safety structural building procedures could be useful for lung cancer prevention.

1649 **ELECTROMAGNETIC FIELDS: OCCUPATIONAL EXPOSURE AND PREVENTION IN WORKERS. AN UPDATE**

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Aim of special session Electromagnetic Fields (EMFs) are virtually ubiquitous, and the large part/almost all workers are virtually exposed. Consequently, an adequate prevention of the occupational risk related to EMFs exposure is important, as recognised by authoritative Institutions as ILO and WHO. In Europe a specific Directive, the 2013/35/EU, recently implemented in European Countries, introduced occupational limits, and the legal requirement of health surveillance of EMF exposed workers. Aim of this Special Session is to give an update on activities currently ongoing for the prevention of the occupational EMF risk, and on the problems of the

'workers at particular risk' and of health surveillance of exposed workers.

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1649a ILO ACTIVITIES FOR THE PREVENTION OF THE RISK RELATED TO OCCUPATIONAL EXPOSURE TO EMF IN WORKERS

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Introduction Hazards of non-ionising electromagnetic radiation (EMF) and risks from occupational exposures to them have been an increased concern to the ILO in particular over the last three decades. The health implications of over exposure to EMF are well documented in the scientific literature, such as injuries caused by leakage from microwave ovens or radio-frequency, and in some countries acute health effects of EMF can be considered occupational injuries. On the other hand there is only very limited scientific evidence presently on the diseases possibly caused by EMF exposure in workers. The ILO uses various means of action to give governments and employers' and workers' organisations the necessary help in drawing up and implementing programmes for the control of workplace risk factors, including EMF, as international standards in the form of legal instruments, codes of practice, practical manuals, training materials and education and training and technical cooperation. The ILO has collaborated with the ICNIRP and the WHO in the development of several practical guides and reports, including: Occupational Hazards from Non-Ionising Electromagnetic Radiation (ILO OSH Series No. 53), Protection of Workers From Power Frequency Electric and Magnetic Fields (ILO OSH Series No. 69), Visual Display Units: Radiation Protection Guidance (ILO OSH Series No. 70), and Safety in the Use of Radiofrequency Dielectric Heaters and Sealers (ILO OSH Series No. 71). These tools provide guidance on workplace safety and health measures and procedures that will lead to higher standards of safety for all personnel engaged in the operation which gives rise to occupational exposure to non-ionising radiation. The ILO also collects information on good workplace practice on protection of workers against non-ionising radiation and on the identifications and recognition of diseases as occupational caused by non-ionising radiation and provides support for the applications of the relevant ILO instruments in member States.

1649b EU DIRECTIVE 2013/35/EU ON OCCUPATIONAL EXPOSURE TO ELECTROMAGNETIC FIELDS

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Introduction Directive 2013/35/EU of the European Parliament and of the Council on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields (EMFs)) was published in 2013. The directive gives minimum requirements for the protection of workers from risks to health and safety arising from exposure to electromagnetic fields (0 Hz to 300 GHz). The aim of this paper is to describe the directive and how it has been implemented into practice.

Methods New guidelines have been written by different countries of the EU. Measurements and evaluations of EMFs have been conducted. High field values have been searched, and risk analyses for EMF exposure have been performed.

Results For example, the following topics have been proposed in new guidelines: offices, nuclear magnetic resonance (NMR) spectrometer, electrolysis, medical devices, engineering workshops, automotive industry, welding, metallurgical manufacturing, radiofrequency (RF) plasma devices, rooftop antennas, walkie-talkies, and airports. Evaluation criteria for the current is 100 A, and for the voltages, 100 kV. There are also evaluation principles for active implanted devices, and there are guidelines on distance attenuation principles of EMFs.

Discussion There has been progress in implementing the directive. However, small and medium size companies have often limited resources to put toward evaluation and risk analysis. Protection against these fields can be technical, increasing distance, working processes, worker guides, or in some cases, personal protection devices. Health examination can also give in some cases information on excessive exposure (e.g., micro-waves). Documentation of the actions is probably lacking to some extent in risk analysis files.

1649c THE PROBLEM OF THE WORKERS AT PARTICULAR RISK

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The directive 2013/35/EU on minimum health and safety requirements regarding the exposure of workers to risks arising from electromagnetic fields (EMF) states that the risk assessment and the implementation of preventive and protective measures have to take into account the workers at particular risk. Apart workers implanted with active or passive medical devices or wearing medical devices and pregnant women, the directive does not explicitly recognise other categories of workers at potential higher risk due to EMF exposure. Workers with active implanted medical devices (pacemakers in particular) are addressed by *ad hoc* technical standards (EN 50527-1:2010-04 and EN 50527-2-1:2011-05). In EU, active implantable and wearable medical devices must comply with requirements specified in technical standards, usually followed by the manufacturers. However, despite the growing diffusion of the active implantable or wearable medical devices and their diversification in terms of types and medical indications, other technical standards specifically devoted to workers carrying these devices and exposed to EMF are not yet available. For passive implanted medical devices, the risk assessment has to be performed mainly based on the available scientific literature. The case of pregnant women deserves special considerations while biological and pathological conditions making the worker at potential higher