In this work, we wish to present the implementation scheme and practical examples of its application.

Methods. The directive imposes to assess the EMF-related professional exposure risks by means of health and sensory Exposure Limit Values (ELVs) and Action Levels (ALs).Clinical MRI requires the use of a static magnetic field (0Hz), circularly polarized radiofrequency fields (42, 64, 128,300 MHz), and low-frequency switched gradient fields (0.5 kHz < f < 3 kHz). Because of this various frequency range, the occupational risks must be assessed in regard to several ELVs and ALs.Our implementation scheme is based on the use of specifications provided by the manufacturers and bibliographical data. Based on occupational health and safety requirements for healthcare professionals, the risk assessment process starts with the identification and stratification of the risks.Then, we list out all the workstations within the MR department and the different working situations in which workers can be exposed to MRI EMFs.Tremendous attention is paid to youth, pregnant, and medical-device-implanted workers. Finally, we thoroughly analyze the possibilities that ELVs and ALs are exceeded in some working situations, some of which may require extensive calculation.

Results. As a result, a detailed risk assessment report is issued to the sites with a clear exhibit of cases in which ELVs or ALs are exceeded.The report also details the prevention actions that need to be implemented and the required safety teaching program.

Conclusions. The directors and managers of these clinical MRI sites are responsible for the implementation of the health and safety requirements in the frame of the 2013/35/EU directive.They need to rely on trained MR physicists and MRSE.Our implementation scheme is an excellent solution to numerous clinical sites where none of their staff is trained in MR physics or on safety requirements.

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[P075] Non-ionizing millimeter electromagnetic waves increase thermodynamic parameters of the binding of anticancer drugs mitoxantrone and doxorubicin with DNA

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Purpose. The aim of this study was to reveal the influence of non-ionizing electromagnetic waves on thermodynamic parameters of the binding of anticancer agents with DNA.

Methods. Interaction of mitoxantrone (MTX) and doxorubicin (DX) with DNA is reflected in alteration of the absorption spectra in visible regions of the spectrum. From the absorption spectra the concentration of free and bound drug in the solution was determined and the binding isotherms were constructed.

Results. Our research shows that MTX and DX interact with non-irradiated and irradiated DNA by intercalatiny mode. Thermodynamic parameters of the binding: change of Gibbs free energy (ΔG), enthalphy (ΔH) and entropy (ΔS) were determined from analysis of dependence of binding constant (K) on temperature (T). For this aim the absorption isotherms were obtained at three temperature, where it becomes know from the melting curves of DNA-ligand complexes that DNA is in double-stranded state. For non-irradiated and irradiated complexes the dependence of lnK on 1/T was constructed. In each plot through three experimental points a direct line was passed using the least square method and from this curve the values of ΔH and ΔS were determined.

Conclusion. Based on the obtained values of the binding thermodynamic parameters it can be concluded that at complex-formation MTX and DX with DNA irradiated by resonant frequencies, the enhancement of absolute value of the thermodynamic parameters of the binding is observed as compared to non-irradiated complexes: the drugs form more strong complex with irradiated DNA. This means that same antitumor effect can be achieved at much lower doses of medicines. This is essential from the point of view of the application of gentle therapies for patients and the reduction of expenses associated with acquisition of expensive medicines. The obtained results indicate the perspective of elaboration of new regimes of the application of anticancer drugs in combination with non-ionizing millimeter waves.

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[P076] High frequency occupational electromagnetic field exposure assessment of field workers/climbers in mobily industry

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Purpose. Maintenance procedures of electromagnetic field (EMF) emitting equipment are of great significance concerning occupational EMF exposure assessment; mobile industry field workers/-climbers are a characteristic case.

Methods. The climbers are equipped with EMF personal monitors, which exhibit shaped frequency response (100 kHz–100 GHz) matched to the ICNIRP's occupational standards[2] (that are also adopted by the Greek legislation). Implemented thermocouple detectors yield accurate true RMS results even from extremely narrow radar pulses. The monitors are used both as logging devices and alarm indicators at preselected levels of the occupational limits. The assessed monitors' records involve maintenance procedures at rural and urban mobile base stations.

Results. The workers' exposure extracted both numerically and graphically, indicates that the majority of the electric field strength falls below 50% of the limit. As the climbers are exposed to many other hazards apart from EMFs, the overall risk assessment is overviewed according to the Greek Mobile Operators strategy and the Occupational Health and Safety (OHS) principles.

Conclusions. Occupational limits[3] ensure personal safety, prohibiting any adverse health effect[4,5], even in cases where many RF masts/-sources are installed. Moreover, the evolution to digital Radio/TV signals in combination with standard working procedures/instructions and several precaution measures (i.e. power 'shut down' of the base station), has significantly decreased exposure. Nevertheless, the exact workers' exposure identification (mostly from unidentified RF sources) remains a crucial EMF exposure assessment issue; in this sense, future correlation of the monitors' results to direct measurements using spectrum analyzers is challenging.

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