Static fields: highly exposed groups (MRI, NMR, electrolysis, etc), limited exposure assessment guidelines

Jolanta Karpowicz, Krzysztof Gryz

Central Institute for Labour Protection - National Research Institute (CIOP-PIB)
Warszawa, Poland

jokar@ciop.pl

Static electric and magnetic fields exist in work environment as a component of combined electromagnetic fields. Examples of workplaces with such exposure exist in the vicinity of: MRI scanners, NMR spectrometers, electrolytic installations, PVC production installations.

Static magnetic fields may interact with biological systems in a number of ways, although the most likely means of causing health effects are via field-induced effects on charged molecules and alterations in the rate of biochemical reactions. For static electric fields, spark discharges and electrically charged air ions should be also consider. In both cases, the characteristic and conditions of workers activity within exposed area can significantly modify the internal results of exposure in exposed human body. It is difficult to assess such interaction taking only the results of unperturbed fields, existing in the workplace without presence of workers. Theoretical and computational studies are needed to investigate the magnitude and direction of induced currents and fields under various magnetic and electric field exposure conditions.

There are many gaps in knowledge of biological effects and interaction mechanisms of workers static fields sources. Current knowledge on static fields health effects is based on the studies focused on general public and patients exposure, which are significantly different from workers exposure conditions. The ability of non-error performing of work can be also of high importance in the particular workplace (eg. in health care activities), and should be also considered within occupational risk assessment. The more detailed methods for workers exposure conditions, referring not only to static fields level, but also to workers activities type should be developed for such occupational risk assessment. High priority research should cover the studies to fill important gaps in knowledge focused on health risk and occupational risk assessment for workers exposed in static fields.

The level of the workers' exposure during selected activities in static fields, problems with assessment of exposure level, existing recommendations for permissible exposure and basic problems with occupational risk assessment will be summarised.

References

1. Directive 2004/40/EC, O.J. nr L-184 of 24 May 2004.
2. Environmental Health Criteria 232, Static Fields, World Health Organization, 2006
3. IEEE Standard for Safety Levels with Respect to Human Exposure to Electromagnetic Fields, 0-3 kHz, Std C.95.6, 2002.
4. Karpowicz J., Gryz K. - Health Risk Assessment of Occupational Exposure to a Magnetic Field From Magnetic Resonance Imaging Devices, JOSE, 2006, vol. 12, No. 2, 155-167.
5. Reilly P.J., Applied Bioelectricity. From Electrical Stimulation to Electropathology, Springer-Verlag New York, Inc., 1998.
6. WHO Research Agenda for Static Fields, World Health Organization, Geneva, 2006.