

Cardiovascular implantable electronic devices and electromagnetic interference

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Introduction Most frequently used cardiovascular implantable electronic devices for the treatment of arrhythmias are pacemakers and implantable cardioverter defibrillators (ICDs). It has been shown that the function of these cardiac rhythm devices can be impaired by electromagnetic interference from the devices and systems emitting magnetic fields, causing either temporary or permanent system malfunction.

Methods Literature review [1-3] and own results [4] from the studies examining the potential electromagnetic interference of hand metal detectors among the patients with implanted cardiovascular implantable electronic devices performed in Deutsches Herzzentrum Munich will be used.

Results Sources of electromagnetic interference are frequently encountered in daily life, emanating from cellular phones, anti-theft devices, metal detectors, various remote controls, improperly wired/grounded appliances coming into the contact with the body, MP3 players, induction ovens and many other devices [1-3] Increasing global efforts to intensify security screening measures in the past decade have also brought into focus the use of metal detectors (which create a magnetic field that might interfere with the function of cardiovascular implantable electronic devices); they are nowadays routinely used in many settings to detect ferrous and other dangerous items. Patients with pacemakers and implantable cardioverter defibrillators are often advised to avoid screening with metal detectors because of the risk for electromagnetic interference. Another important group of sources of electromagnetic interference is that which is encountered in workplace and/or industrial environments, such as high voltage power lines, transformers, welders, electric motors, and many others. Last, but not least, are those sources are found in the medical environment: magnetic resonance image scanners, electrosurgery, defibrillation, neurostimulators, TENS devices, radiofrequency catheter ablation, and therapeutic diathermy.

Conclusions Although the majority of data available is based on case reports, there are a few studies examining effects of electromagnetic interference on cardiovascular implantable electronic devices. Majority of problems that occur are transient in nature, and, more important, easily avoidable. Physicians should be aware of and familiarized with the most common interactions of electromagnetic interference and cardiovascular implantable electronic devices.

Keywords Cardiovascular implantable electronic device • Pacemaker • Implantable cardioverter defibrillator • Electromagnetic interference

Literature

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