Digital cellular telephones and ICDs

See page 1337 for the article to which this Editorial refers

For several years, various sources of electromagnetic interference have been described, stimulating engineers and physicians to investigate this field, but also inducing a significant amount of concern in the population of pacemaker patients.

Many studies have clearly demonstrated the possibility that an implanted pulse generator may be triggered to its programmed upper rate limit or temporarily inhibited by external electromagnetic interference. The clinical impact of this negative interaction is clearly dependent on the type of interference. The type of pulse generator (differing significantly by brand and even by different models of the same brand), the type of excitation or conduction trouble by which the patient is affected (pacemaker inhibition, for example, is potentially more dangerous in pacemaker-dependent patients than in others with spontaneous cardiac activity).

In the era of mobile phones and electronic antitheft devices, the debate has re-opened, with a particular interest in understanding whether a pacemaker patient can have a normal quality of life using, his/her cellular phone.

This problem, felt very strongly by industry, cardiologists and the general population (significantly influenced by the media) stimulated a large body of research in order to clearly define its clinical importance. This need was applicable, not only to pacemakers, but also and particularly, to ICD patients, for whom the fear of potential interference is doubled. ICD patients may have to contend with an interaction between external electromagnetic waves and the antibrady or antitachy section of the defibrillator.

Much research has been recently carried out on this topic, clearly demonstrating that cellular phones may indeed interfere with implanted pacemakers if they are located within 10 cm of the pulse generator. In a study made by our group on 200 patients paced by several pacemaker models from 11 manufacturers, pacing inhibition and triggering, or asynchronous pacing, was randomly observed with a different incidence according to the pacemaker model and the type of telephone used (GSM or TACS). There were 131 interference episodes during ringing vs 26 during the on/off phase; \( P<0.0001 \); 106 at the maximum sensitivity level vs 51 at the ‘base’ value; \( P<0.0001 \). Prolonged pacing inhibition (>4 s) was seen at the pacemaker ‘base’ sensing value in six patients using the GSM, but in only one patient using the TACS telephonic system.

No permanent malfunctioning or changes in the programmed parameters were detected. No interference was observed using the mobile phone at a distance longer than 10 cm from the pacemaker site. Similar results were shown in vivo by other research, while a higher incidence of interference was observed...
only in studies performed with pulse generators in air\cite{10,11}. No significant interference was observed between mobile phones and ICDs in vivo\cite{12,13,14}.

With regard to antitheft electronic devices, great concern was roused by a recent paper\cite{15}. This showed potential interference in implanted pacemakers and ICDs when the patients entered into the field of action of these devices. Considerable emphasis was given by the media to this observation and there was great alarm in the population of patients treated by pacemakers or defibrillators.

A number of other experiments, performed in many countries, confirmed the potential interference and consequent inhibition of the pacemaker or inappropriate discharge of the ICD, but only if the patients linger in the surveillance system; walking through the system is of no danger to the patient\cite{16}.

The article by Chiladakis and co-workers\cite{17} is indeed in line with the data of the international literature and underlines once more that the use of mobile phones is safe for ICD patients and should therefore be allowed.

No damage, no reprogramming no inappropriate ICD discharge or pacing inhibition were in fact observed by the authors in their 36 patients. Furthermore, they underlined how sometimes a false over-sensing phenomenon may be induced by the interference between the mobile phone and the head of the programmer, without interfering with the implanted devices. It should also be stressed that the ICDs examined were produced by the two most relevant ICD manufacturers and that the results of this study may therefore be applied to the majority of ICD patients.

In conclusion, the data from the literature and confirmed by the research by Chiladakis and co-workers should reassure patients submitted to permanent pacing or ICD therapy. They may use all the electronic devices available without endangering themselves. Mobile phones may be safely used by everybody, with regard to their implanted devices, provided that the phone is located at a distance longer than approximately 10 cm from the device location. They should not be used during the interrogation or reprogramming of the pulse generators or ICD. Antitheft electronic devices are not dangerous for pacemakers or ICD patients if they walk directly through their field of action without lingering.

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References


