Magnetic resonance imaging scanning on different body regions at 3.0 Tesla in patients with pacemakers

Xiaohui Ning
Xiaofei Li
Xiaohan Fan
Keping Chen
Wei Hua
Zhimin Liu
Xiuyu Chen
Minjie Lu
Shihua Zhao
Shu Zhang

**Introduction**: Magnetic resonance imaging (MRI) at 3.0 tesla (3.0T) is becoming more common, but the information afforded by 3.0T MRI scanning of different body regions, including the heart, in patients implanted with cardiac pacemakers is still not well known. This study aimed to evaluate the safety and practical concerns of 3.0T MRI assessment for patients with MR-conditional pacemakers.

**Methods**: Fourteen consecutive patients with an MR-conditional pacemaker were involved. A rigorous standardized workflow was jointly developed by electrophysiologists, pacemaker engineers and radiologists. Pacemaker interrogation was performed immediately before and after MRI scanning. Significant changes in parameters were defined as a lead threshold increase >1V, sensing amplitude drop >50% and impedance value change >50 Ω. Scan-related adverse events were documented, and imaging qualities were evaluated by radiologists.

**Result**: A total of 16 MRI examinations of different body regions (brain=8, lumbar spine=3, cervical spine=2, and heart=3) were successfully completed. No significant changes in interrogation parameters were noted except two ventricular impedance values change >50 Ω in cardiac MRI scans. No adverse events were detected. Artifacts of the pulse generator and leads were observed in 3 cardiac MRI scans, with 2 pacemakers in the right pectoral and 1 in the left pectoral. The imaging quality was classified as grade 2 according to the grading criteria, with interpretable diagnostic value.

**Conclusion**: A standardized workflow allows patients with MR-conditional pacemakers to safely undergo 3.0T MRI scanning of different body regions. For 3.0T cardiac MRI assessment, right- and left-sided pacemakers may both yield interpretable imaging quality.