Radiotherapy-Induced Malfunction in Cardiovascular Implantable Electronic Devices

Charles R. Thomas Jr, MD, PhD

Editor’s Note

Approximately two-thirds of all patients with cancer may receive a course of radiotherapy at some point during the management of their disease. Many of these individuals may have preexisting cardiac abnormalities, and the use of implantable cardiac devices may prevent life-threatening dysrhythmias. The use of modern computer-based treatment planning and delivery of radiotherapy should ideally involve interdisciplinary cooperation between the oncology team and the cardiac electrophysiology service in order to establish a safe and reproducible treatment environment for patients with such devices who are receiving treatment for cancer. In this issue of JAMA Oncology, Grant and colleagues from MD Anderson Cancer Center present one of the largest series of cancer patients receiving external-beam radiotherapy who have implantable cardiac devices and report that higher energy (>10 MV), neutron-producing forms of radiotherapy are more likely to be associated with device compromise.1 One-fifth of patients receiving higher-energy radiotherapy experienced malfunctions characterized as single-event upsets, defined as loss of data, parameter resets, and/or unrecoverable resets. Basically, these events represent device compromise due to a change in the memory state of the circuitry. Real-time and continuous monitoring of cardiac rhythms did not occur in this study. Hence, there exists an opportunity to design trials that incorporate next-generation and commercially available electronic monitoring devices in this patient population in order to detect more subtle dysrhythmias, device sensor adjustments, and/or transient threshold alterations.

Conflict of Interest Disclosures: None reported.

References


Related article page 624

Safe Delivery of Radiotherapy to Patients With Pacemakers or Cardioverter-Defibrillator Devices

Charles R. Thomas Jr, MD, PhD

Approximately two-thirds of all patients with cancer may receive a course of radiotherapy at some point during the management of their disease. Many of these individuals may have preexisting cardiac abnormalities, and the use of implantable cardiac devices may prevent life-threatening dysrhythmias. The use of modern computer-based treatment planning and delivery of radiotherapy should ideally involve interdisciplinary cooperation between the oncology team and the cardiac electrophysiology service in order to establish a safe and reproducible treatment environment for patients with such devices who are receiving treatment for cancer. In this issue of JAMA Oncology, Grant and colleagues from MD Anderson Cancer Center present one of the largest series of cancer patients receiving external-beam radiotherapy who have implantable cardiac devices and report that higher energy (>10 MV), neutron-producing forms of radiotherapy are more likely to be associated with device compromise. One-fifth of patients receiving higher-energy radiotherapy experienced malfunctions characterized as single-event upsets, defined as loss of data, parameter resets, and/or unrecoverable resets. Basically, these events represent device compromise due to a change in the memory state of the circuitry. Real-time and continuous monitoring of cardiac rhythms did not occur in this study. Hence, there exists an opportunity to design trials that incorporate next-generation and commercially available electronic monitoring devices in this patient population in order to detect more subtle dysrhythmias, device sensor adjustments, and/or transient threshold alterations.