Radiotherapy and pacemaker: 80 Gy to target close to the device may be feasible

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Modern pacemakers using complementary metal-oxide semiconductors (CMOS) technology are sensitive to radiation. The guidelines recommend caution at doses above 2 Gray (Gy). Repositioning should be discussed if cumulative dose and dose rate exceeds 10 and 0.2 Gy/min.

We report a case of a man with mechanical mitral valve prosthesis and pacemaker due to sick sinus syndrome (Vitatron T20w). Five years later, a left-sided lung cancer was diagnosed. Radiotherapy was planned. Moving the pacemaker out of the radiation field would require either use of a lead extender and tunneling or implantation of a third electrode through the right subclavian vein already occupied by a venous port. The pacemaker was left in site and the patient received hyperfractionated intensity modulated radiotherapy with 1.6 Gy twice daily to a total dose of 80 Gy. The calculated maximum, minimum and mean doses to the pacemaker were 48, 9, and 25 Gy, respectively. For short periods, the pacemaker received up to 7 Gy/min through direct radiation. At control afterwards, the technical parameters were normal. The radiation dose significantly exceeded the pacemaker guidelines. The circuits in Vitatron T20, similar to current Medtronic®, Sorin®, and Boston Scientific® devices have thin CMOS gates (≤1.5 μm). This may contribute to their resistance to irradiation. The approach must however be carefully individualized. Leaving the pacemaker in place during high dose radiotherapy can be considered if the patient is not pacemaker-dependent and the drawbacks of a repositioning are significant.

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The full-length version of this report can be viewed at: http://www.escardio.org/communities/EHRA/publications/ep-case-reports/Documents/chagas-disease-vt-pacemaker.pdf

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