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Pacemaker/Implantable Cardiac Defibrillator SAVI Dose Predictions Using HDR Brachytherapy

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BACKGROUND – Pacemakers and Implantable Cardiac Defibrillators are extremely sensitive to radiation. To minimize the exposure of radiation to these devices, doctors and physicists may choose to use APBI via brachytherapy, using the SAVI device to best cover the PTV. For physicists to best plan for these patients, there needs to be an understanding regarding the dose delivered at differing distances to describe the dose a pacemaker/ICD would receive.

METHODS – The four different SAVI sizes, 6-1 Mini, 6-1, 8-1, and 10-1, were scanned from a CT scanner and digitized using brachyvision treatment planning system. Three different aspects of the SAVI were then tested to see which had importance on the dose delivered at various distances. These aspects were the orientation of the SAVI, the size of the SAVI, and channel weighting. The TPS was then used to calculate the dose at various distances, and the data was compiled and compared.

RESULTS – We found in our study that the aspects of the SAVI that most affected dose calculations were the orientation and the SAVI size. The channel weighting did not matter as much. Using varying guidance from TG-203, if accumulated device dose is preferred as less than 5 Gy, for each size the device should be at least 5 cm from the tip or 6 cm from the perpendicular bisector. If accumulated dose is preferred as less than 2 Gy, then for each size the device should be 10 cm away from either tip or perpendicular bisector.

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