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Beneficial Effect of Bradycardia Tachycardia Response (BTR) Algorithm on VT Detection in the Presence of Rate Smoothing

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Background: We have previously shown that rate smoothing (RS) algorithms despite their obvious advantages may potentially affect ventricular tachycardia (VT) detection by ICDs in certain programming settings. A recently developed algorithm named Bradycardia Tachycardia Response (BTR), is designed to solve this problem

Objective: The aim of this study was to assess how effective BTR is in preventing VT underdetection in the presence of RS.

Methods: Two ICD models (model 1 and model 2) bearing identical rate smoothing algorithms were connected to a VT simulator. Of these two, only model 2 has the BTR feature. Both devices were programmed to detect VT at 160 bpm and were tested with simulated VT at a rate starting from 160 and increasing by 10 bpm every 10 seconds, with 125 different combinations of AV delay, rate smoothing down and upper rate limit being programmed. The rate at which VT was detected served as a measure of appropriate prompt detection of arrhythmia.

Results: Device model 2 detected all VTs at a rate of 170bpm i.e. as soon as their rate exceeded the programmed detection rate. Device 1 had delayed detection in 71/115 cases and was able to detect only when VT reached rates of 180 (17.4%), 190 (11.3%), 200 (12.2%), 210 (9.6%), 220 (6.1%), 230 (3.5%), 250 (1.7%). Conclusion: The BTR algorithm effectively counteracts delayed VT detection in the presence of Rate Smoothing.