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Evoked Response Characteristics from Different Defibrillation Leads for Capture Verification in ICD/CRT-D

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Abstract: Introduction: Automatic pacing Threshold (AT) testing with output adjustment may simplify device follow-up and prolong device longevity. An RV AT algorithm based on RVcoil to Can evoked response (ER) sensing was developed for ICD/CRT-D. This analysis evaluated whether ER characteristics were related to defibrillation lead type. Methods: Patients (pts) scheduled for ICD/CRT-D implant, replacement or upgrade were enrolled. An external pacing system (Boston Scientific, St. Paul, MN) with customized software was used to perform threshold tests and data acquisition. RV manual threshold and AT tests were conducted. The RVcoil to Can ER was evaluated offline using minimum ER amplitude (ERmin), maximum pacing artifact (ARTmax), signal to artifact ratio (SAR = ERmin/ARTmax), ER peak timing (tER) stability (delta T = tERmax - tERmin). Signal quality sufficient for capture detection was defined as SAR > 2 and delta T < 45ms. Results: Data from 106 pts (80 M/26 F, 67±11 years, LVEF: 28% ± 11%, 64 ICD/42 CRT-D) were analyzed. Chronic leads had smaller ER amplitude and artifact ($p < 0.05$) than those of acute leads. No statistical difference was seen in any ER measures between dedicated and integrated configuration. SAR > 2 was observed in all pts. However, 3 pts had delta T ≥ 45ms, 2 with acute and 1 with dedicated lead. Conclusions: Both acute/chronic, dedicated/integrated defibrillation leads studied had similar and acceptable RVcoil to Can ER signals for capture verification. The RV AT algorithm using RVcoil to Can ER sensing may function for a wide range of defibrillation leads.

Lead Type	# of Pts with acceptable ER	ERmin (mV)	ARTmax (mV)	SAR	Delta T (ms)
Acute	78/80	4.13±1.64	0.22±0.14	26.7±21.1	16.5±9.67
Chronic	25/26	3.32±1.26	0.13±0.08	34.2±24.7	16.0±8.86
Dedicated	29/30	3.89±1.49	0.20±0.14	31.1±27.1	20.3±8.59
Integrated	74/76	3.95±1.63	0.20±0.13	27.6±20.0	14.8±9.37

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Author Disclosure Information: **S. Greer**, Medtronic, M,I; Boston Scientific, M,I; St. Jude Medical, M,I; **J. Lowy**, None; **M. Saeed**, None; **J.L. Schutzman**, None; **R. Bazaz**, None; **A. Swearingen**, Boston Scientific, S,K; **Y. Dong**, Boston Scientific, S,D; Boston Scientific, S,K; **K.N. Hayes**, Boston Scientific, S,K; **M.R. Gold**, Boston Scientific, S,A; Medtronic, S,A; Boston Scientific, S,I; Medtronic, S,I; Boston Scientific, S,J; Medtronic, S,J.
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