Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

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Table S1. **Generator Models Studied and Corresponding Estimated United States Active Implants with Similar Electronic Platform**

Manufacturer	**Boston Scientific Inc.**			**Medtronic Inc.**			**St Jude Medical Inc.**		
Device Type	**Model**	**Number of patients**	**U.S. Estimated Active Implants†**	**Model**	**Number of Patients**	**U.S. Estimated Active Implants‡**	**Model**	**Number of Patients**	**U.S. Estimated Active Implants§**
Permanent Pacemaker‖	S603	4	58,000	ADDR01	80	320,831	5826	77	85,292
	1290	16	16,000	P15101	18	48,385	5816	23	20,008
	1298	8	10,000	E2DR01	19	22,819	5386	37	15,751
	1291	6	N/A	VEDR01	15	76,935	PM2210	71	202,637
	1297	1	N/A	KDR901	16	15,339	5376	12	5,251
	S602	3	15,000	SDR303	18	23,077	5820	11	24,880
	S601	6	18,000	SESR01	14	69,355	5380	2	4,312
	1194	1	3,000	ADSR01	13	54,282	5810	3	4,228
	1286	1	N/A	ADDRL1	95	94,428	5626	6	10,455
	1294	1	N/A	ADDRS1	6	28,715	5342/5346	13	2,211
	1283	3	N/A	KSR901	2	3,984	5330	5	2,524
	1198	2	2,000	E2SR01	5	3,557	5356/5357	3	5,531
	K062	1	10,000	KSR701	6	4,309	5370	3	2,456
	1190	1	5,000	E2DR21	15	1,544	5180	2	2,983
	S606	16	45,000	SDR203	16	2,430	5172	3	1,324

	K137	2	N/A	8160	1	N/A	5130	3	1,655
	K173	8	63,000	KDR401*/KDR403	3	2,787	5326	2	801
	K172	1	11,000	AT501	1	N/A	5142	2	828
	K273	2	4.000	7860/7862	2	N/A	2360	4	N/A
				8968*	2	N/A	2002	1	N/A
				8085	1	N/A	2022	1	N/A
				KVDD901	1	15,339	Pacesetter AFP262	1	N/A
				KDR701	7	17,293	5620	2	8,950
				KDR601	1	N/A	1210	8	31,361
				Vitatron C60A3	2	N/A	2210	71	202,637
				RVDR01	39	60,005	2240	3	48,528
				SEDR01	8	100,149	2110	14	35,517
				ADVDD01	2	657	2400	1	N/A
				8168	1	N/A	5366	3	2,016
				7960	1	N/A	2218	1	N/A
				Thera VDD	2	N/A	1110	1	9,573
							5626	2	10,455
							5360	1	N/A
ICD‖	E110	24	43,000	D154AWG	21	25,470	2207-36	13	9,403
	E102	27	25,000	D154VWC	19	16,372	V193	6	3,928
	T165	10	N/A	7232	18	149	V243	3	2,056
	T175	22	3,000	7278	4	4,094	1207-36	5	6,119
	T180	3	4,000	D154ATG	15	3,680	V268	5	1,986

	T125	7	N/A	7288	5	2,870	V168	5	2,698
	T135	9	2,000	D154VRC	15	5,673	V196	2	521
	1860	8	N/A	7230	2	1,814	V239	2	3,711
	E030	2	4,000	D224VRC	21	15,474	V158	3	N/A
	T177	1	2,000	7274	3	2,616	V240	2	N/A
	T167	1	2,000	7231	1	1,474	V230/232	5	NA
	1861	2	N/A	7275	1	N/A	V197	3	N/A
	E160	4	35,000	7271*	1	N/A	V199	3	N/A
	1852	1	N/A	7229	2	N/A	V235	2	N/A
	E142, 162,143.163	8	41,000	D314VRG	4	12,514	V194	1	N/A
	E101	1	N/A	D314DRM	3	12,669	1359-40Q	1	N/A
	E161	2	35,000	D334VRG	3	5,584	2257-40	1	3,343
				D334VRM	3	1,990	2231-40	20	7,704
				D284DRG	3	14,936	1311-36	1	3,727
				D284VRC	4	10,210	1257-40	2	1,824
				D224DRG	26	37,187	1231-40	8	10,422
				DDBB1D4	5	15,650	1211-36	5	2,507
				DVBB1D4	2	12,086	2211-36	2	3,424
				D284DRG	3	14,936	2215-36	1	N/A
				DR7278	4	4,094	2357-40	1	4,883
				DR7865	1	N/A			
Cardiac Resynchronization	N119/N120	17	43,000	C154DWK	8	13,363	V343	2	1,041
	H210/215	4	N/A	D224TRK	19	33,720	V366	1	467

Therapy	H217/219	4	N/A	8042	6	11,744	3207-36	3	5,310
	H170/175	10	N/A	7299	2	1,974	V341	1	N/A
	H177	1	N/A	7304	2	1454	3265-40	3	10,969
	H227	1	2,000	8040	1	1142	3210 (CRT-P)	9	13,733
	1823	1	N/A	7303	1	N/A	3231-40	6	12,079
	N140	2	12,000	7272	3	N/A	3211-36	1	N/A
	N118	2	43,000	8024	1	N/A	3249	5	6,731
	V173	2	6,000	D354TRM	1	1	365	4	509
	H120	3	7,000	CVTRO1	3	N/A			
	H227	2	N/A	B334TRG	6	N/A			
	N140/141	9	44,000	D274TRK	1	16,579			
	H210	2	N/A	D314TRM	2	11,144			
	H217	3	N/A	DTBA1D1	3	21,273			
	N164	2	44,000	D314DRG	11	30,503			
	H120	3	7,000	D314TRG	1	34,909			
	HE215	2	N/A						
	H120	3	7,000						
	HE215	2	N/A						

ICD = implantable cardioverter defibrillator; N/A: Estimate not available

*Prone to power-on-reset in magnetic resonance imaging environment

†Data from Boston Scientific Inc. (Natick, Massachusetts) Cardiac Rhythm Management Product Performance Report 2016 Quarter 1 at http://www.bostonscientific.com/templatedata/imports/HTML/CRM/Product_Performance_Resource_Center/report_archives/q4_10_ppr.pdf

‡Data from Medtronic Inc. (Minneapolis, Minnesota) Cardiac Rhythm Disease Management Product Performance Report Feb 2015 Second Edition at

http://www.medtronic.com/crm/performance/downloads/mdt-prod-performance-2010-2-en.pdf

§Data from St. Jude Medical Inc. (St. Paul, Minnesota) Cardiac Rhythm Management Division Product Performance Report July 2015 Second edition at http://www.sjmprofessional.com/Resources/reference-guides/

‖Additional devices included in the series but not in the table: Biotronik Inc. (Berlin, Germany) Evia DR/DR-T pacemaker, 18 scanned (U.S. estimated active implants 52, 700); Axios pacemaker, 1 scanned (321 US estimated active implants); Cylos pacemaker, 3 scanned (3700 U.S. estimated implants); Lumax 740 pacemaker, 2 scanned (U.S. estimated active implants 1450); Lumax 340 pacemaker, 2 scanned (U.S. estimated implants 2,330); Lumax 740 pacemaker, 1 scanned (U.S. estimated U.S estimated implants 3,510); Ilesto 7-HFT CRT, 1 scanned (2,250 U.S. estimated active implants).

Data from: http://www.biotronik.com/sixcms/media.php/72/Product_performance_report_july2015.pdf).

Table S2. **Lead Models Studied and Corresponding Estimated United States Active Implants**

Manufacturer	**Boston Scientific Inc.**				**Medtronic Inc.**				**St Jude Medical Inc.**			
Lead Type / Implanted Chamber	**Model**	**Lead Length**	**Number of Patients**	**U.S. Estimated Active Implants†**	**Model**	**Lead Length**	**Number of Patients**	**U.S. Estimated Active Implants‡**	**Model**	**Lead Length**	**Number of Patients**	**U.S. Estimated Active Implants§**
Pacing / Right Atrium	4015	N/A	2	N/A	4076	53	1	361,111	1018T	50	1	N/A
	4054	45	1	1,000	4076	52	16		1188T	N/A	2	N/A
	4058	58	1	N/A	4076	45	9		1242T	46	1	N/A
	4058	N/A	2	N/A	4076	N/A	7		1242T	N/A	1	N/A
	4063	N/A	1	3,000	4558M	45	1	2,714	1346T/TC	N/A	1	39,392
	4068	52	2	22,048	4568	53	1	15,564	1388T/TC	52	39	53,526
	4068	N/A	3		4568	45	1		1388T/TC	46	34	
	4086	52	1	100,000	4568	N/A	2		1388T/TC	45	2	
	4086	45	14		4574	53	24	43,821	1388T/TC	N/A	20	
	4086	N/A	6		4574	52	2		1488T/TC	58	2	60,416
	4087	52	25		4574	45	22		1488T/TC	52	5	
	4087	N/A	4		4574	N/A	11		1488T/TC	46	9	
	4096	52	1	N/A					1488T/TC	N/A	7	
	4096	N/A	2	N/A					1642T/TC	52	4	11,268
	4135	53	1	N/A					1642T/TC	46	4	
	4135	45	25	N/A					1642T/TC	40	1	
	4136	53	17	N/A					1642T/TC	N/A	1	

	4244	52	7	N/A					1688T/TC	52	62	250,979
	4269	52	2	1,500					1688T/TC	48	1	
	4269	45	45						1688T/TC	46	48	
	4243	45	2	7,000					1688T/TC	N/A	22	
	4459	N/A	1	5,000					1699/T/TC	52	2	11,497
	4469	45	8	254,000					1699T/TC	46	4	
	4469	N/A	4						1782T/TC	52	1	7,848
	4470	52	8						1782T/TC	46	3	
	4472	N/A	1	24,000					1788T/TC	N/A	1	
	4473	52	5						1882T/TC	52	3	26,867
	4479	45	3	31,000					1882T/TC	46	5	
	4479	N/A	3						1882T/TC	N/A	1	
	4480	52	9						1888T/TC	52	29	168,571
	4480	N/A	7						1888T/TC	46	18	
	4480	47	1						1888T/TC	45	7	
	4496	N/A	1	N/A					1888T/TC	N/A	11	
	4538	N/A	1	7,000					1944	46	2	9,491
	4592	53	1	15,000					1999T	46	1	N/A
	4592	45	4						2088TC	58	1	327,035
									2088TC	52	10	
									2088TC	46	10	
									2088TC	45	1	
									2088TC	N/A	5	
Pacing / Right	4087	52	7	100,000	4024	N/A	2	28,834	282	59	1	N/A

Ventricle	4088	59	2		4068	52	1	22,048	1015M	60	1	N/A
	4088	N/A	2		4068	N/A	2		1018TC	58	4	N/A
	4035	58	1	13,000	4074	52	12	59,080	1158	N/A	13	7691
	4035	59	1		4074	58	18		1188T	N/A	1	N/A
	4136	53	7	N/A	4074	N/A	3		1146T	N/A	1	N/A
	4136	N/A	3	N/A	4076	52	8	361,111	1226T	N/A	1	N/A
	4137	60	6	N/A	4076	58	7		1246T	52	2	N/A
	4137	N/A	2	N/A	4076	N/A	3		1246T	58	3	N/A
	4244	52	3	N/A	4092	52	4	69,522	1246T	N/A	3	N/A
	4261	N/A	1	N/A	4092	58	8		1336T	N/A	1	39,497
	4285	52	1	N/A	4193	N/A	1	25,264	1346T	52	28	
	4285	59	1	N/A	5007	55	1	N/A	1346T	58	21	
	4457	55	1	88,000	5024M	52	5	N/A	1346T	N/A	7	
	4457	58	4		5024M	58	11	N/A	1368	58	1	835
	4458	N/A	5	5,000	5024M	N/A	3	N/A	1368	N/A	1	
	4456	52	8	88,000	5032	58	1	890	1488TC	52	9	59,416
	4459	N/A	2	5,000	5034	52	4	9237	1488TC	58	4	
	4459	58	5		5034	58	7		1488TC	N/A	3	
	4459	N/A	2		5035	58	1	N/A	1561	65	2	352
	4245	59	2	7,000	5038	52	1	3,167	1571	65	9	2,966
	4470	52	4	254,000	5038	38	3		1580	60	1	18,612
	4471	58	6		5054	52	5	35,024	1580	65	3	
	4480	N/A	1	31,000	5054	58	7		1580	N/A	3	
					5058	N/A	2	N/A	1581	65	6	

					5068	52	4	21,612	1581	N/A	3	
					5068	58	4		1582	52	1	
					5074	58	1	N/A	1591	65	1	3,181
					5076	52	71	1,211,004	1591	N/A	1	
					5076	58	65		1646T	52	12	36,323
					5076	N/A	15		1646T	58	12	
					5076	65	2		1646T	N/A	4	
					5086	52	19	N/A	1688TC	52	37	260,979
					5086	58	22	N/A	1688TC	58	32	
					5086	N/A	14	N/A	1688TC	N/A	25	
					5092	52	15	54,348	1782TC	58	1	7,848
					5092	58	24		1788TC	52	1	28,597
					5092	N/A	9		1788TC	N/A	1	
									1888TC	52	10	168,571
									1888TC	58	4	
									1888TC	N/A	3	
									1948	52	15	35.836
									1948	58	27	
									1948	N/A	7	
									2088TC	52	9	327,035
									2088TC	58	6	
									2088TC	N/A	4	
Pacing / Left	4087	90	1	100,000	2187	.N/A	1	1,900	1056T	86	8	11,797
Ventricle	4524	80	3	10,000	4193	88	4	25,264	1056T	75	1	

	4525	80	1		4193	78	3		1058T	86	1	4,610
	4548	80	2		4193	N/A	3		1058T	N/A	1	
	4548	N/A	1		4194	88	5	55,675	1156T	86	2	13,617
	4549	90	7		4194	N/A	2		1156T	N/A	1	
	4549	N/A	3		4195	88	2	11,604	1158T	N/A	2	7691
	4518	90	2		4195	N/A	1		1258T	86	10	
	4542	90	1		4196	88	6	46,740	1258T	75	5	29,778
	4542	80	8	44,000	4196	N/A	7		1258T	N/A	3	
	4542	N/A	3		4296	88	2	26,671	1458Q	86	6	69,487
	4543	90	6		4396	N/A	1	5,535				
	4543	N/A	5									
	4512	N/A	1									
	4513	90	3									
	4513	N/A	1	7,000								
	4538	90	2									
	4538	88	1									
	4538	N/A	2									
	4555	90	3	17,000								
	4591	80	1									
	4591	N/A	3	15,000								
	4592	90	2									
Defibrillating/	0138	52	1	22,000	6931	58	1		1590	60	1	3181
Right	0138	64	4		6931	65	4	2,458	7000	60	1	12,963
Ventricle	0157	59	10	139,000	6931	58	1		7001	52	1	

	0158	64	15		6935	55	1		7001	65	1	
	0158	N/A	2		6935	58	1	44,672	7040	60	1	1,595
	0184	64	2		6935	N/A	1		7042	65	1	N/A
	0184	59	13		6943	65	2	4,857	7120Q	58	4	
	0184	N/A	5		6944	58	3		7120Q	60	1	
	0185	64	14		6944	65	6	20,456	7120Q	N/A	3	74,227
	0185	N/A	5		6944	N/A	9		7121Q	58	1	
	0128	N/A	1		6947	62	1		7121Q	60	1	
	0170	N/A	1	1,000	6947	65	16	211,961	7122Q	52	1	
	0171	N/A	2		6947	N/A	10		7122Q	58	3	43,746
	0171	64	2		6948	58	1	3460	7122Q	65	2	
	0265	59	1		6948	65	1					
	0265	N/A	1		6949	58	3					
	0266	N/A	1		6949	65	6	53,112				
	0266	58	1	2,000	6949	N/A	4					
	0285	59	1									
	0286	64	1									
	0286	N/A	1									
	0275	59	2									
	0276	N/A	1	48,000								
	0295	59	2									
	0296	64	3									
	0144	64	3	4,000								
	0145	70	3									

	0145	52	1									
	0145	N/A	3									
	0137	59	1									
	0138	52	1									
	0138	65	4									
	0180	59	4	22,000								
	0180	N/A	1									
	0181	64	3									
	0181	N/A	1									
	0147	59	10									
	0147	N/A	1									
	0148	64	17									
	0148	N/A	5									
	0174	59	8	17,000								
	0175	64	9									
	0175	59	1									
	0175	N/A	3									
	0154	64	1									
	0154	N/A	2	7,000								
	0155	70	4									
	0155	N/A	2									
	0125	70	9	N/A								
	0125	64	1	N/A								

	0125	N/A	5	N/A								
	0283	N/A	1	1,000								
	0292	59	1	54,000								
	0295	N/A	1	48,000								
	0296	64	2									
	0296	N/A	2									

N/A: Estimate not available

†Data from Boston Scientific Inc. (Natick, Massachusetts) Cardiac Rhythm Management Product Performance Report 2016 Quarter 3 at http://www.bostonscientific.com/templatedata/imports/HTML/CRM/Product_Performance_Resource_Center/report_archives/q4_10_ppr.pdf

‡Data from Medtronic Inc. (Minneapolis, Minnesota) Cardiac Rhythm Disease Management Product Performance Report April 2016 First Edition at http://www.medtronic.com/crm/performance/downloads/mdt-prod-performance-2010-2-en.pdf

§Data from St. Jude Medical Inc. (St. Paul, Minnesota) Cardiac Rhythm Management Division Product Performance Report April 2016 First Edition at http://www.sjmprofessional.com/Resources/reference-guides/

‖Additional leads included in the series but not in the table: Biotronik Inc. (Berlin, Germany) Setrox 45 cm (4 leads), 53cm (9 leads), and 60 cm (1 lead) (U.S. estimated active implants 167,000); Arox 53 cm (1 lead) and 58 cm (1 lead) (U.S. estimated active implants 4,650); Linox 65 cm (2 leads) (U.S. estimated active implants 2010). Data from Biotronik Inc. (Berlin, Germany) Cardiac Rhythm Management Product Performance Report, January 2014 at https://www.biotronik.com/files/9A51078D1ABE9B35C1257D1800429672/$FILE/2014-01%20PPR.pdf

Table S3. **Comparison of baseline characteristics and acute changes in device parameters among patients with and without long-term follow-up**

	Long-Term Follow-Up		
	Available (1327 exams/958 patients)	**Unavailable (776 exams/551 patients)**	**P**
Age, years	69.1 (58.2, 77.4)	69.4 (57.2, 79.0)	0.338
Female	337 (35%)	211 (38%)	0.721
Ejection Fraction, %	50 (30, 60)	50 (25, 60)	0.132
Coronary Artery Disease	289 (30%)	212 (38%)	0.071
Prior Coronary Artery Bypass Surgery	135 (14%)	98 (18%)	0.314
Prior AVR	31 (3%)	23 (4%)	0.592
Prior MVR	17 (2%)	18 (3%)	0.130
Implantable Cardioverter Defibrillator	395 (41%)	234 (42%)	0.202
Cardiac Resynchronization Therapy	100 (10%)	63 (11%)	0.901
Reason for Implant*			
Symptomatic Bradycardia	285 (30%)	184 (33%)	0.943
Tachycardia-Bradycardia Syndrome	64 (7%)	35 (6%)	0.430
Complete Heart Block	104 (11%)	59 (11%)	0.421
Primary Prevention of Sudden Death	250 (26%)	148 (27%)	0.362
Secondary Prevention of Sudden Death	86 (9%)	53 (10%)	0.806
Duration of Generator Implant, days	845 (368, 1554)	887 (347, 1585)	0.795
Duration of Lead Implant, days			
Right Atrial	1164 (476, 2144)	1244 (411, 2608)	0.222

	Right Ventricular	1171 (477, 2164)	1198 (418, 2459)	0.464
	Left Ventricular	760 (314, 1697)	815 (274, 1692)	0.828
Dependence upon Pacing during MRI		82 (9%)	45 (8%)	0.376
Number of Scans †				
	First	919 (69%)	590 (76%)	
	Second	215 (16%)	105 (14%)	0.003
	Third or Greater	193 (15%)	81 (10%)	
Lead Length ‡				
Right Atrial				
	≤ 45 cm	262 (32%)	130 (28%)	
	46-50 cm	134 (17%)	95 (21%)	0.115
	> 50 cm	413 (51%)	237 (51%)	
Right Ventricular				
	≤ 55 cm	347 (34%)	183 (32%)	
	56-60 cm	451 (45%)	250 (44%)	0.274
	> 60 cm	216 (21%)	142 (25%)	
Left Ventricular				
	≤ 85 cm	29 (30%)	14 (28%)	
	86-90 cm	48 (50%)	23 (46%)	0.690
	≥ 90 cm	19 (20%)	13 (26%)	
Region of Imaging †				
	Extremity	127 (10%)	69 (9%)	
	Head and Neck	675 (51%)	416 (54%)	0.220
	Thoracic	153 (12%)	101 (13%)	
	Abdomen/Pelvis	371 (28%)	188 (24%)	

Baseline Lead and Device Parameters ‡			
P-wave amplitude, mV	3.0 (2.0, 4.7)	2.9 (2.0, 4.2)	0.093
Right Ventricular R-wave amplitude, mV	11.2 (8.0, 14.0)	11.2 (8.0, 14.0)	0.554
Left Ventricular R-wave amplitude, mV	12.8 (8.0, 24.2)	10.0 (6.8, 16.9)	0.107
Atrial lead impedance, Ω	475 (413, 544)	470 (411, 539)	0.422
Right Ventricular lead impedance, Ω	540 (448, 646)	530 (448, 624)	0.285
Left Ventricular lead impedance, Ω	647 (540, 823)	589 (490, 684)	0.007
Atrial capture, V	0.8 (0.5, 1)	0.8 (0.5, 1)	0.605
Right Ventricular capture, V	0.8 (0.7, 1)	0.8 (0.7, 1)	0.151
Left Ventricular capture, V	1 (0.8, 1.5)	1.3 (0.8, 1.8)	0.023
Battery voltage, V	2.8 (2.77, 3.01)	2.79 (2.76, 3.00)	0.004
Median Percent Acute Change Compared to Baseline ‡			
P-wave amplitude, mV	0 (-10.2, 2.3)	0 (-10.3, 0)	0.627
Right Ventricular R-wave amplitude, mV	0 (-7.3, 0)	0 (-6.0, 0)	0.281
Left Ventricular R-wave amplitude, mV	-1.6 (-10.0, 1.1)	-7.5 (-13.7, 0)	0.193
Atrial lead impedance, Ω	-1.2 (-3.3, 0)	-0.8 (-2.8, 0)	0.045
Right Ventricular lead impedance, Ω	-1.4 (-3.6, 0)	-1.3 (-3.5, 0)	0.156
Left Ventricular lead impedance, Ω	-1.7 (-5.5, 0)	0 (-4.7, 1.2)	0.177
Atrial capture, V	0 (0, 0)	0 (0, 0)	0.483
Right Ventricular capture, V	0 (0, 0)	0 (0, 0)	0.602
Left Ventricular capture, V	0 (0, 0)	0 (0, 2.5)	0.922
Battery voltage, V	0 (0, 0)	0 (0, 0)	<0.001 §
Power-on-reset	6 (0.5%)	3 (0.4%)	1.000
No acute events (power-on-reset, or early termination of examination) or notable lead parameter changes	1270 (95.7%)	752 (96.9%)	0.196

Any Notable (>50%) Acute Lead Parameter Change	48 (4%)	20 (3%)	0.193

Values are presented as median and IQR, or number and percentage of all patients (n=1512), with exception of percentages specified below.

* Reason for implant was unknown to our imaging and electrophysiology staff in 357 (24%) participants at the time of presentation for MRI. Additionally, not all reasons for implant were mutually exclusive.

† Percentages reported with all MRI examinations (2103) as the denominator.

‡ Percentages reported with all MRI examinations in those with available right atrial (1271), right ventricular (1589), or left ventricular (146) lead information as the denominator.

§ Although the median and IQR were the same, there were more decreases in acute battery voltage among patients without long-term follow-up.

Table S4. **Anticipated Adverse Events and Incidence During the Study**

	Incidence
Generator failure resulting in inability to communicate with the pacemaker or ICD	0
Power-on-reset	9 (0.43%, 95% CI 0.15-0.71%)
Significant pacing threshold or sensing changes requiring system revision or changes in programmed sensitivity or pacing output	0
Battery depletion*	1 (0.05%, 95% CI 0-0.14%)
Sustained arrhythmia attributable to current induction in pacemaker or ICD system leads (i.e. co-incident with MRI sequence initiation, rhythmic pulse sequences, or sequence termination)	0
Inhibition of necessary pacing	2 (0.10%, 95% CI 0-0.23%)
Activation of unnecessary pacing	NA †
Inappropriate delivery of anti-tachycardia pacing or shocks	0
Sensation of pressure/pushing/pulling at generator site or heating within chest	1 (0.05%, 95% CI 0-0.14%)

Values expressed as number, percentage of all examinations, and 95% CI for incidence.

*Following power-on-reset, in a device with <1 month of battery longevity remaining prior to MRI, with inability to change mode from ventricular inhibited pacing due to end-of-life battery status. The device was replaced.

† In pacemakers without magnet-mode programming capability, reed switch activation by MRI led to transient, asymptomatic asynchronous pacing at the pacemaker specific magnet rate (typically 85 ppm). This behavior of pacemaker generators, which is designed to quickly notify physicians regarding battery longevity, typically entails asynchronous pacing at a rate of 85 ppm at “beginning of life” and 65 ppm at the “estimated replacement interval” or “end of life”, respectively. No symptoms were reported and there were no clinical effects. Due to the frequent incidence and benign nature of this event, we did not record its incidence.

Table S5. **Device Variables Before and After MRI**

	Number of Scans (n)	Median Value at Baseline (IQR)	Immediately After MRI*		P‡
			Median Difference (IQR)	Median Percent Change Compared to Baseline (IQR)	
P-wave amplitude, mV	1347	3 (2, 4.6)	0 (-0.3, 0)	0 (-10.3, 0)	<0.001
Right Ventricular R-wave amplitude, mV	1799	11.2 (8.0, 14)	0 (-0.7, 0)	0 (-7.1, 0)	<0.001
Left Ventricular R-wave amplitude, mV	72	11.4 (7.0, 19.7)	-0.3 (-1.2, 0)	-3.0 (-12.2, 0)	0.003
Atrial lead impedance, Ω	1559	473 (413, 540)	-5 (-16, 0)	-1.1 (-3.1, 0)	<0.001
Right Ventricular lead impedance, Ω	2021	532 (448, 640)	-8 (-20, 0)	-1.4 (-3.6, 0)	<0.001
Left Ventricular lead impedance, Ω	202	629 (512, 769)	-10 (-32, 0)	-1.5 (-5.1, 0)	<0.001
Atrial capture, V	1339	0.8 (0.5, 1)	0 (0, 0)	0 (0, 0)	0.550
Right Ventricular capture, V	1969	0.8 (0.7, 1)	0 (0, 0)	0 (0, 0)	0.002§
Left Ventricular capture, V	201	1 (0.8, 1.5)	0 (0, 0)	0 (0, 0)	0.199
Battery voltage, V	1578	2.8 (2.8, 3)	0 (0, 0)	0 (0, 0)	<0.001‖
			Long-term Follow-Up After MRI†		
P-wave amplitude, mV	832	3.1 (2, 4.7)	0 (-0.7, 0.2)	0 (-20.4, 8.0)	<0.001
Right Ventricular R-wave amplitude, mV	1073	11.2 (8.0, 13.8)	0 (-1.4, 0.6)	0 (-13.1, 6.3)	<0.001
Left Ventricular R-wave amplitude, mV	26	19.7 (10, 25)	0 (-0.4, 0.4)	0 (-2.6, 2.6)	0.618
Atrial lead impedance, Ω	1021	475 (416, 548)	-6 (-37, 15)	-1.4 (-7.4, 3.1)	<0.001
Right Ventricular lead impedance, Ω	1287	535 (447, 644)	-9 (-38, 16)	-1.6 (-6.9, 3.2)	<0.001
Left Ventricular lead impedance, Ω	106	675 (538, 830)	0 (-40, 38)	0 (-5.7, 6.4)	0.772
Atrial capture, V	729	0.8 (0.5, 1)	0 (-0.1, 0.1)	0 (-11.1, 12.5)	0.710

Right Ventricular capture, V	1113	0.8 (0.7, 1)	0 (-0.1, 0.1)	0 (-13.3, 16.7)	0.753
Left Ventricular capture, V	105	1 (0.8, 1.4)	0 (-0.1, 0.2)	0 (-12.5, 20)	0.956
Battery voltage, V	930	2.8 (2.8, 3.0)	-0.01 (-0.04, 0)	-0.4 (-1.4, 0)	<0.001

The number of comparisons for each device variable is unique, primarily owing to variability in the number of leads, the absence of intrinsic P- or R-waves, the presence of atrial arrhythmia, and pulse widths during measurement of capture threshold at follow-up interrogation. The proportion of missing data for each variable is discussed in the Limitations section.

IQR = interquartile range; MRI = magnetic resonance imaging.

*Data from lead and generator parameters of 1513 patients undergoing 2103 MRI examinations.

†Based on long-term (1.2±0.9 years) follow-up results available for 960 (63.5%) patients undergoing 1327 MRI examinations.

‡ Obtained by using the Wilcoxon signed-rank test

§ Of the 1969 comparisons for right ventricular capture, 216 (11.0%) were decreases, 293 (14.9%) were increases, and 1460 (74.1%) did not change.

|| Of the 1578 comparisons for battery voltage, 191 (12.1%) were decreases, 39 (2.5%) were increases, and 1348 (85.4%) did not change.

Table S6. **Persistence of Change and De Novo Changes at Long-Term Follow-up in the Subset of Patients with Long-term Follow-up**

	Expectable Change (20-50%)		
	Immediately Following MRI n (%)	**Immediately Following MRI and Persistent at Long-Term Follow-up n (%)**	**De Novo at Long-Term Follow-up n (%)**
P-wave amplitude, n=832	170 (21)	84 (11)	183 (22)
Right Ventricular R-wave amplitude, n=1073	113 (11)	57 (5)	242 (23)
Left Ventricular R-wave amplitude, n=26	6 (24)	3 (12)	3 (12)
Atrial lead impedance, n=1021	4 (0.4)	2 (0.2)	42 (4)
Right Ventricular lead impedance, n=1287	5 (0.4)	3 (0.2)	64 (5)
Left Ventricular lead impedance, n=106	1 (1)	0 (0)	6 (6)
Atrial capture, n=729	92 (13)	42 (6)	180 (25)
Right Ventricular capture, n=1113	166 (15)	83 (8)	271 (25)
Left Ventricular capture, n=105	18 (17)	6 (6)	32 (31)
Battery voltage, n=930	1 (0.1)	0 (0)	5 (0.5)

		Notable Change (>50%)	
P-wave amplitude, n=832	18 (2)	10 (1.2)	51 (6)
Right Ventricular R-wave amplitude, n=1073	10 (1)	2 (0.2)	39 (4)
Left Ventricular R-wave amplitude, n=26	0 (0)	0 (0)	0 (0)
Atrial lead impedance, n=1021	0 (0)	0 (0)	2 (0.2)
Right Ventricular lead impedance, n=1287	0 (0)	0 (0)	5 (0.4)
Left Ventricular lead impedance, n=106	0 (0)	0 (0)	0 (0)
Atrial capture, n=729	5 (0.7)	2 (0.3)	32 (4)
Right Ventricular capture, n=1113	10 (0.9)	4 (0.4)	54 (5)
Left Ventricular capture, n=105	1 (1)	0 (0)	3 (3)
Battery voltage, n=930	0 (0)	0 (0)	0 (0)

The number of comparisons for each device variable is unique, primarily owing to variability in the number of leads, the absence of intrinsic P- or R-waves, the presence of atrial arrhythmia, and pulse widths during measurement of capture threshold at follow-up interrogation. The proportion of missing data for each variable is discussed in the Limitations section. Values are reported as numbers and row percentages.

Table S7. **Determinants of Percent Change from Baseline in Device Variables***

Variable	Repeated Scans	Lead Length	Device Type	Region of Imaging
Acute percent change in P-wave amplitude	No association	No association	Pacemaker: 0 (-9.1, 0) ICD: 0 (-11.5, 5.0) *P* = 0.001	No association
Acute percent change in right ventricular R-wave amplitude	No association	No association	Pacemaker: 0 (-6.2, 0) ICD: 0 (-7.6, 0) *P* < 0.001	No association
Acute percent change in left ventricular R-wave amplitude	No association	No association	No association	No association
Acute percent change in atrial lead impedance	No association	No association	Pacemaker: -1.3 (-3.2, 0) ICD: 0 (-2.7, 0) *P* = 0.003	No association
Acute percent change in right ventricular lead impedance	First scan: -1.2 (–3.4, 0) Second scan: -1.6 (–3.6, 0) Third or more scan: -1.9 (-4.3, 0) *P* = 0.003	≤55 cm: -1.5 (–3.8, 0) 56-60 cm: -1.5 (–3.4, 0) >60 cm: -1.0 (-3.4, 0) *P* = 0.044	Pacemaker: -1.5 (-3.7, 0) ICD: -1.2 (-3.2, 0) *P* = 0.022	Extremity: –1.6 (-4.3, 0) Head and Neck: -1.3 (-3.6, 0) Thoracic: -0.1 (-2.9, 0) Abdomen/Pelvis: -1.7 (-3.6, 0) *P* < 0.001
Acute percent change in left ventricular lead impedance	No association	No association	No association	No association
Acute percent change in atrial capture threshold	No association	No association	No association	No association

Acute percent change in right ventricular capture threshold	No association	No association	No association	No association
Acute percent change in left ventricular capture threshold	No association	No association	No association	No association
Acute percent change in battery voltage	No association	N/A	No association	No association
Long-term percent change in P-wave amplitude	No association	No association	Pacemaker: 0 (-22.2, 4.5) ICD: 0 (-17.6, 12.5) $P < 0.001$	No association
Long-term percent change in right ventricular R-wave amplitude	No association	≤55 cm: 0 (-10.3, 13.1) 56-60 cm: 0 (-14.8, 5.8) >60 cm: -2.5 (-14.1, 2.1) $P = 0.036$	No association	No association
Long-term percent change in left ventricular R-wave amplitude	No association	No association	No association	No association
Long-term percent change in atrial lead impedance	First scan: -2.0 (-7.8, 2.7) Second scan: -1.6 (–6.2, 3.5) Third or more scan: 0 (-4.9, 4.7) $P = 0.003$	No association	No association	No association
Long-term percent change in right ventricular lead impedance	First scan: -2.0 (-7.3, 3.0) Second scan: -1.6 (–6.8, 2.4) Third or more scan: 0 (-4.4, 4.5)	No association	No association	No association

	P = 0.001			
Long-term percent change in left ventricular lead impedance	No association	No association	No association	Extremity: 5.3 (0, 11.1) Head and Neck: 2.6 (-4.9, 9.4) Thoracic: -2.6 (-12.8, 4.1) Abdomen/Pelvis: -2.2 (-4.9, 0.1) *P* = 0.049
Long-term percent change in atrial capture threshold	No association	≤45 cm: 0 (0, 16.7) 46-50 cm: 0 (-12.5, 16.7) >50 cm: 0 (-14.3, 20) P = 0.027	No association	No association
Long-term percent change in right ventricular capture threshold	First scan: 0 (-10.7, 16.7) Second scan: 0 (–14.3, 0) Third or more scan: 0 (-16.7, 12.5) *P* = 0.040	No association	No association	No association
Long-term percent change in left ventricular capture threshold	No association	No association	No association	No association
Long-term percent change in battery voltage	No association	N/A	Pacemaker: 0 (-0.7, 0) ICD: -1.3 (-4.1, -0.3) *P* < 0.001	No association

* Values are median percent change from baseline (interquartile ranges).

† Of all exams 1263 (64%) were performed with contrast administration. There was no association between contrast administration and the magnitude of change in device variables.

N/A – Not applicable