Boston Scientific
Advancing science for life™

2019

Rhythm Management Product Performance Report

Q2 Edition

RESONATE™
FAMILY OF ICDs AND CRT-Ds

Emblem™ MRI S-ICD
System

ACUITY™ X4
Quadripolar LV Lead

Boston Scientific Quality Pledge:

I improve the quality of patient care and all things Boston Scientific

Advancing Science for Life.

Boston Scientific is committed to helping patients live healthier, longer lives. As part of that commitment, we provide detailed product performance data, which are accurate, transparent, and of clinical interest.

Boston Scientific Rhythm Management provides performance data for pulse generators and leads that meets or exceeds the 2014 revision of ISO 5841-2: 2014 (E), the AdvaMed Industry Guidance for Uniform Reporting of Clinical Performance. The performance data also addresses recommendations from the Heart Rhythm Society Task Force.

The Q2 2019 report includes data through April 15, 2019. This report provides a comprehensive presentation of rhythm management product performance data available to us, including:

- ✓ U.S. lead and pulse generator survival probability
- ✓ Worldwide malfunction counts and patterns
- ✓ Worldwide malfunctions during an implant procedure
- ✓ Acute (first month) lead observations
- ✓ Chronic (after first month) lead complications
- ✓ Reasons for out of service
- ✓ Return rates

Your feedback is always welcome and plays a vital role in our effort to continuously improve our products and services, advancing science to transform the lives of our patients.

Sincerely,

Renold J. Russie
Vice President, Quality Assurance

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Statistical Methodology

What Is Device Survival Probability?
Medical journals have traditionally used patient survival probability to display information on treatment option effectiveness. In the report, **pulse generator and lead** survival probabilities convey information about long-term performance of implantable cardiac rhythm management products.

Device survival probability shows the percentage of implanted devices that remain implanted and in service at various points in a product's service life, in the absence of competing risks, such as natural mortality or voluntary explants. Conceptually, a pulse generator of high reliability and large battery capacity or low current drain remains near 100% survival until eventually, normal battery depletion begins to cause significant numbers of devices to be removed, and the device survival probability drops rapidly. For example, a device survival probability of 99% indicates that within the stated implant duration, the pulse generator had a 1% risk of removal for battery depletion or for incurring a malfunction that required replacement. Survival probabilities are provided with and without normal battery depletions, depicted as “Battery Depletions and Malfunctions” and “Malfunctions Only,” respectively.

Boston Scientific estimates survival probability in compliance with the 2014 revision of international standard ISO 5841-2: 2014 (E). Survival probability is calculated at a given time by separately estimating the probability of surviving each interval and multiplying the survival probabilities of all intervals through which a device has passed. To estimate the probability of surviving any interval, the number of units that successfully functioned during the interval is divided by the number of units exposed to malfunction/depletion during the interval. The number of units exposed is calculated using the actuarial method, where device suspensions in an interval are distributed uniformly across the interval. Reasons for device suspension from survival probability statistics are detailed in the report section entitled U.S. Reason for Out of Service.

Inclusion Criteria for Pulse Generator and Lead Survival Probability Datasets
Pulse generator survival probability is reported for U.S. implanted devices in product families that meet inclusion criteria described below. Lead survival probability is reported for the U.S. Registered Implant population for product families that meet inclusion criteria described below.

To be included in survival probability statistics, a device must first be successfully implanted (defined in this report as occurring upon pocket closure). Prophylactic device removals are tracked as part of the active population up until the time the device is removed from service; devices removed prophylactically and are not identified as malfunctions at the time of explant do not contribute to a reduction in survival probability. Reasons for device explant or out of service, if known, are provided in this report for each pulse generator product/product grouping.

Survival probabilities are based on devices registered as implanted in the U.S. Privacy laws in many other geographies preclude manufacturers from obtaining specific patient implant and explant information, thus device survival probabilities cannot be constructed from these data. Boston Scientific considers U.S. experience representative of worldwide performance. The Malfunction Details for leads and pulse generators reflect worldwide malfunctions, inclusive of U.S. data.

Criteria for inclusion of product families in this report are in compliance with the AdvaMed *Industry Guidance for Uniform Reporting of Clinical Performance of Pulse Generators and Leads*. Survival estimates are provided for product families once they have at least 10,000 cumulative U.S. implant

months. The minimum interval sample size is 200 U.S. implanted units. Pulse generator product families with fewer than 500 total remaining estimated active U.S. devices are not included in this report. Lead product families that received original U.S. market release approval twenty or more years ago are not included in this report.

Estimated Longevity information is provided for pulse generator products in the U.S. Survival Probability - Battery Depletions and Malfunctions graphs, depicted as a blue bar on the x axis for Years Implanted. The estimated longevity values from the Instructions for Use for each product family are used to construct the blue longevity bars on their U.S. Survival Probability graph. They represent the range of estimated longevity based on a variety of programmed settings and therapy usage.

Survival probability data are presented in tabular and graphical formats online at www.bostonscientific.com/ppr. Not all products may be approved for use in all geographies, as product approval is geography specific.

Worldwide distribution, U.S. registered implant, and U.S. estimated active implant numbers have been rounded to provide population size context.

To convey implant experience for a product family, U.S. approval dates are provided. The U.S. approval date listed is the earliest date Boston Scientific received approval for one or more of the models in the family.

Survival Probability – Battery Depletions and Malfunctions (Pulse Generators)
Reduction in survival probability for **pulse generators** is due to:

- Devices removed for normal battery depletion
- Device malfunctions occurring while implanted, as confirmed by returned product analysis

Survival Probability – Malfunctions Only (Pulse Generators)
Reduction in survival probability for **pulse generators** is due only to:

- Device malfunctions occurring while implanted, as confirmed by returned product analysis; premature battery depletions are considered device malfunctions.

In this case, normal battery depletions do not contribute to the reduction in survival probability; rather, reduction in survival probability is due only to confirmed pulse generator malfunctions. Furthermore, unconfirmed reports of premature battery depletions do not reduce “Malfunctions Only” survival probability. Put another way, this information depicts the percentage of confirmed malfunction-free devices remaining in service at various intervals in the product's service life, based on returned product analysis.

Survival Probability — Complications and Malfunctions (Leads)
The 2014 version of ISO 5841-2: 2014(E) outlines a methodology for lead survival probability inclusion. Boston Scientific has applied this methodology for survival probability to all lead families implanted as of May 2009 and forward. Worldwide malfunctions are not included for previous lead families.

Reduction in survival probability is due to:

- Leads and lead segments returned for analysis and determined to be non-compliant in form, fit, or function at any time while implanted
- Leads removed from service with reported complications 30 days or more post-implant, whether returned or not. See the Chronic Lead Complications Table in this report for the observations which are included.

Further Adjustments for Device and Lead Survival
Because underreporting of patient deaths unrelated to device function would result in overestimation of pulse generator or lead survival by overstating the number of devices in service, Boston Scientific addresses this underreporting in two ways. First, regular updates are obtained from the Social Security Administration about deceased persons and compared to Boston Scientific patient data to identify patients who have died but whose deaths had not been reported to Boston Scientific. Second, Boston Scientific uses 10% annual patient mortality as a baseline and adjusts reported patient deaths in any interval for which reports are less than the baseline rate. No adjustment is applied to account for underreporting of malfunctions, as the rate of underreporting is unknown.

Boston Scientific does not make statistical adjustments to account for underreporting of battery depletion. However, as mentioned earlier, Boston Scientific includes non-returned devices removed from service for battery depletion with no associated complaint as normal battery depletions.

Categorization of Malfunctions for Survival Probability Reporting
Malfunctions represent pulse generators and leads removed from service and confirmed through laboratory analysis to have operated outside the specified performance limits established by Boston Scientific while implanted and in service. Device damage occurring during or after explant, or caused by external factors including those warned against in product labeling (such as ionizing therapeutic radiation), are not reported as device malfunctions in survival data. Damage to a pulse generator caused by a lead malfunction is reported as a lead malfunction. Malfunctions are further classified according to their impact on therapy, as follows:

- **Malfunction With Compromised Therapy —**
  The condition when a device is confirmed through laboratory analysis to have malfunctioned in a manner that compromised pacing or defibrillation therapy (including complete loss or partial degradation) while implanted and in service.

  Examples include (but are not limited to): sudden loss of battery voltage; accelerated current drain such that low battery was not detected before loss of therapy; sudden malfunction during defibrillation therapy resulting in aborted therapy delivery; intermittent malfunction in which therapy is compromised while in the malfunction state.

- **Malfunction Without Compromised Therapy —**
  The condition when a device is confirmed through laboratory analysis to have malfunctioned in a manner that did not compromise pacing or defibrillation therapy while implanted and in service. Malfunctions in which critical patient-protective pacing and defibrillation therapies remain available are included here.

  Examples include (but are not limited to): error affecting diagnostic functions, telemetry function, data storage; malfunction of a component that causes the battery to lose power quickly enough to result in premature battery depletion, but slowly enough that the condition is detected through normal follow-up before therapy is lost; mechanical problems with connector header that do not affect therapy.

Categorization of Normal Battery Depletion for Survival Probability Reporting
Per the AdvaMed *Industry Guidance for Uniform Reporting of Clinical Performance of Pulse Generators and Leads*, **Normal Battery Depletion** is defined as the condition when:

a) A device is returned with no associated complaint and the device has reached its elective replacement indicator(s) with implant time that meets or exceeds the nominal (50 percentile) predicted longevity at default (labeled) settings, or

b) A device is returned and the device has reached its elective replacement indicator(s) with implant time exceeding 75% of the expected longevity using actual device settings and therapeutic use.

Boston Scientific includes within this count both returned *and non-returned* devices removed from service for battery depletion with no associated complaint. In conformance with the AdvaMed guidance document, Boston Scientific performs battery usage analysis, including battery status verification, on all devices returned without a complaint. We continue to include non-returned devices reported by our customers as being removed from service due to normal battery depletion within this count.

Boston Scientific CRM's Corrective and Preventive Actions (CAPA) System
Boston Scientific strives to provide implantable devices of high quality and reliability. However, these devices are not perfect and may exhibit malfunctions at a low rate of occurrence. Device performance information is received from many sources through various channels. Boston Scientific monitors information from many sources including suppliers, testing, manufacturing and field performance to identify opportunities for improvement.

When a device is returned to Boston Scientific, laboratory technicians and engineers assess overall device function and perform analysis using specific tests related to the clinical observation(s). Test results are compared to original manufacturing records and design intent. Clinical observations are added to laboratory findings to help determine cause of the clinical observation(s). Each discrete event is then compared to other similar-appearing events. If a pattern is detected, actions are taken to identify a common root cause, and improvements intended to improve product reliability and/or performance may be implemented. Observations from supplier data and internal manufacturing operations also lead to opportunities for improvement. Improvements, when made, may include design changes in existing or subsequent generations, manufacturing and supplier process modifications, software updates, educational communications, and/or labeling changes as examples. Improvement implementation may vary by geography due to various factors including regulatory review timing. They may not be applied to every product susceptible to the malfunction pattern and may not mitigate or eliminate the potential for additional malfunctions. In cases where an improvement is made to an approved product line, devices made without the improvement may continue to be distributed where such products meet our high reliability and performance standards, particularly when changes are incremental and in accordance with our overall philosophy of continuous product improvement.

Improvements are closely monitored for effectiveness. Boston Scientific informs regulatory bodies of each significant event that poses potential risk to patient health to meet regulatory obligations, and shares returned product investigation findings with physicians. The malfunction details section for pulse generators and leads includes a summary of these findings.

In summary, thorough investigation of internal and external data coupled with low trigger levels for improvements creates a continuous product improvement system that is very responsive to patient and physician needs. Boston Scientific is committed to sharing an accurate picture of product performance and addressing identified opportunities for improvement in a timely fashion for our customers.

Malfunction Details: Overview

Boston Scientific CRM pursues product quality and reliability with a passion. We therefore continuously monitor product performance to make improvements whenever possible. Worldwide Malfunction tables provide a count and description of malfunctions associated with the majority of actively in-service Boston Scientific products. Information presented is based on malfunctions reported to and analyzed by Boston Scientific. Each table contains malfunction counts listed by category, pattern and therapy availability.

Category
Malfunctions are categorized by the nature of their root cause. For example, a malfunction due to the software within a pulse generator is listed in the Software category. There are four pulse generator malfunction categories and four malfunction categories for leads (described below).

Patterns
Patients and physicians have asked for more access to Quality System details; therefore, we provide information on patterns of product performance. Patterns listed are informational and do not represent actions that need to be taken. Boston Scientific is committed to direct communication when predicted product performance fails to achieve design or performance expectations or when actions may be taken to improve patient outcomes. Malfunctions associated with product advisories are denoted. Refer to the Product Advisories section for more information.

Each pattern description includes:

- ***Clinical Manifestation and Root Cause*** – Malfunctions for each product are characterized according to root cause. Descriptions provide clinical observations and/or analysis findings associated with each malfunction pattern listed in this report. Malfunctions listed within “Other” either do not yet have an identified root cause, or are related to a proprietary product feature, such as connectors or seal rings.

- ***Improvement Implementation*** – All of the patterns listed are thoroughly investigated and analyzed. As part of Boston Scientific's process of continuous improvement, when possible, improvements have been or will be implemented in response to identified malfunction patterns. Improvements may include product design changes in existing or subsequent generations, manufacturing process modifications, software updates, educational communications or labeling changes. Improvement implementation may vary by geography due to various factors, including regulatory review timing. They may not be applied to every product susceptible to the malfunction pattern, and may not completely mitigate or eliminate the potential for additional malfunctions.

Pattern information in this report is dynamic. Pattern names, superscript number assignments and descriptions may all change from quarter to quarter; as Boston Scientific's investigations progress and improvements are implemented, updated information is provided.

Therapy Availability
Malfunctions are further classified according to their impact on therapy, as follows:

- ***Malfunction With Compromised Therapy*** – The condition when a device is confirmed through laboratory analysis to have malfunctioned in a manner that compromised pacing or defibrillation therapy (including complete loss or partial degradation) while implanted and in service. Examples include (but are not limited to): sudden loss of battery voltage; accelerated current drain such that low battery was not detected before loss of therapy; sudden malfunction during defibrillation therapy resulting in aborted therapy delivery; intermittent malfunction in which therapy is compromised while in the malfunction state.

- ***Malfunction Without Compromised Therapy*** – The condition when a device is confirmed through laboratory analysis to have malfunctioned in a manner that did not compromise pacing or defibrillation therapy while implanted and in service. Malfunctions in which critical patient-protective pacing and defibrillation therapies remain available are included here. Examples include (but are not limited to): error affecting diagnostic functions, telemetry function, data storage; malfunction of a component that causes the battery to lose power quickly enough to result in premature battery depletion, but slowly enough that the condition is detected through normal follow-up before therapy is lost; mechanical problems with connector header that do not affect therapy.

Pulse Generator Malfunctions
Pulse generator malfunctions represent devices removed from service and confirmed through laboratory analysis to have operated outside the performance limits established by Boston Scientific while implanted and in service. Device damage occurring during or after explant, or caused by external factors including those warned against in product labeling (e.g. therapeutic radiation), are not considered device malfunctions. Damage to a pulse generator caused by a lead malfunction is reported as a lead malfunction.

Lead Confirmed Malfunctions
Lead confirmed malfunctions represent leads removed from service and confirmed through laboratory analysis to have operated outside the performance limits established by Boston Scientific while implanted and in service. The Boston Scientific Product Performance Report is in compliance with the 2014 version of ISO 5841-2: 2 (E), Reporting of Clinical Performance of Populations of Pulse Generators or Leads. This version categorizes leads with reported complications which are taken out of service and returned, but for which no malfunction can be confirmed, as Chronic Lead Complications. This methodology also addresses the Recommendations from the Heart Rhythm Society Task Force on Lead Performance Policies and Guidelines.

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Supporting Greater Return of Explanted Devices

The Heart Rhythm Society (HRS) Task Force on Device Performance Policies and Guidelines stated that knowledge, confidence, and trust in cardiac rhythm management devices can be strengthened through enhancing systems that increase the return of devices to the manufacturer. Boston Scientific CRM shares in this belief and supports the HRS-specified actions geared toward achieving the goal of greater device return to the manufacturer, including post-mortem device interrogation, explantation and return to the manufacturer.[1] Approximately 60% of ICD, CRT-D, and PM pulse generators are returned for analysis.

Help Us Provide You With More Complete Product Performance Data

Reporting Adverse Events

The data in this report reflect Boston Scientific's understanding of product performance. We acknowledge that there is underreporting. If you have product performance observations to report, please contact your local Boston Scientific sales representative or Boston Scientific's Technical Services department at:
United States: Phone 1.800.CARDIAC (1.800.227.3422) or 1.651.582.2698.
International: Please refer to the Country Offices List for local contact information.
E-mail: crmevent@bsci.com

Returning Products to Boston Scientific

Boston Scientific provides a Returned Products Kit (Model 6499) that includes proper forms, shipping/packaging (biohazard bags), and a prepaid shipping label. It can be ordered at no charge through Boston Scientific's Customer Service department at 1.800.CARDIAC (1.800.227.3422) or 1.651.582.2698, or you can order a Returned Products Kit online at www.bostonscientific.com/ppr.

[1] Carlson et al. Recommendations from the Heart Rhythm Society Task Force. Heart Rhythm. October 2006; 3(special issue):1251 — 1252.

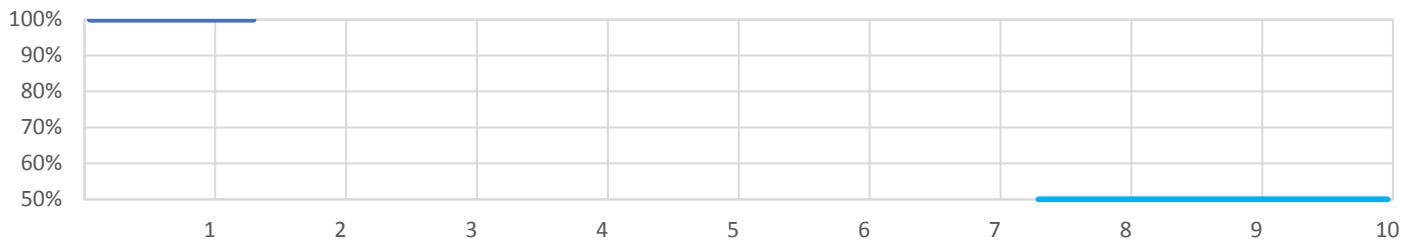
RESONATE/MOMENTUM/CHARISMA/VIGILANT CRT-D

Models: G124/G125/G126/G128/G138/G224/G225/G228/G237/G247/G248/G324/G325/G347/G348/ G424/G425/G426/G428/G437/G447/G448/G524/G525/G526/G528/G537/G547/G548

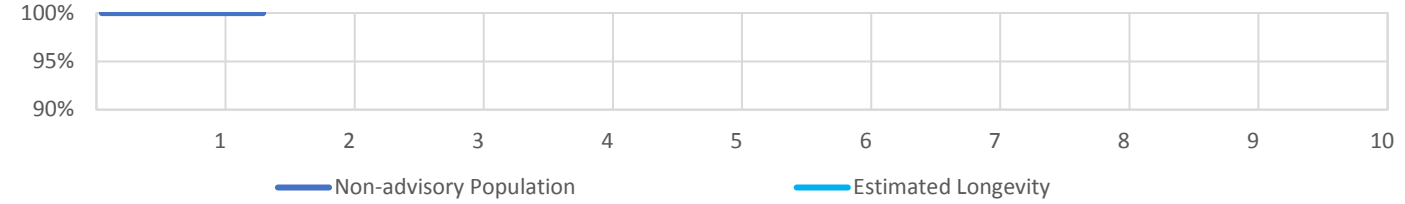
US Summary

US Registered Implants:	11,000	US Normal Battery Depletions:	-
US Approval Date:	September 2017	US Malfunctions:	1
US Estimated Active Implants:	11,000	Without Compromised Therapy:	1
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	--	--	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	--	--	--	--	--	--	--	--
11,000	Effective Sample Size	1903	292	--	--	--	--	--	--	--	--

@ 17 months

RESONATE/MOMENTUM/CHARISMA/VIGILANT CRT-D

Models: G124/G125/G126/G128/G138/G224/G225/G228/G237/G247/G248/G324/G325/G347/ G348/G424/G425/G426/G428/G437/G447/G448/G524/G525/G526/G528/G537/G547/G548

Worldwide Confirmed Malfunctions	**2**
Worldwide Distribution	**25,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Integrated circuit (63)	0	1	1
Software			
Memory errors (51)	0	1	1
Grand Total	**0**	**2**	**2**

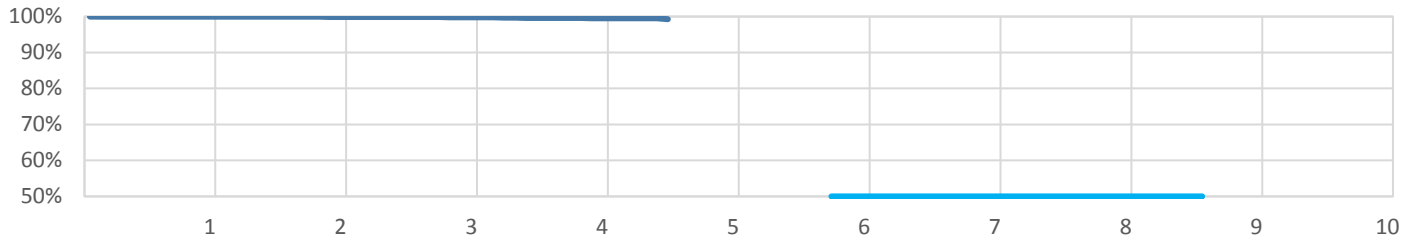
References cited in table above (link)

DYNAGEN/INOGEN/ORIGEN CRT-D

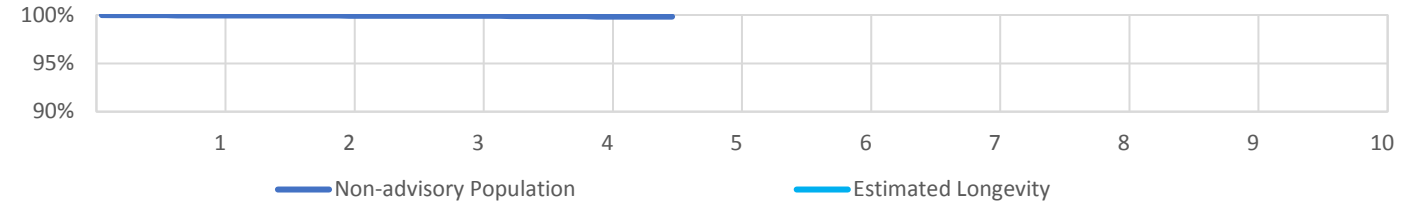
Models: G050/G051/G056/G058/G140/G141/G146/G148/G150/G151/G154/G156/G158

US Summary			
US Registered Implants:	60,000	US Normal Battery Depletions:	40
US Approval Date:	April 2014	US Malfunctions:	35
US Estimated Active Implants:	54,000	Without Compromised Therapy:	29
		With Compromised Therapy:	6

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.5%	99.3%	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.9%	99.8%	99.8%	--	--	--	--	--
60,000	Effective Sample Size	43845	27058	12751	2890	408	--	--	--	--	--

@ 55 months

DYNAGEN/INOGEN/ORIGEN CRT-D

Models: G050/G051/G056/G058/G140/G141/G146/G148/G150/G151/G154/G156/G158

Worldwide Confirmed Malfunctions	**55**
Worldwide Distribution	**90,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High voltage circuit component (62)	0	13	13
Integrated circuit (63)	2	11	13
Low-voltage capacitor (69)	0	3	3
High voltage capacitor (75)	1	0	1
Software			
Memory errors (51)	2	14	16
Safety Core-unintended biventricular pacing (64)	0	2	2
Other			
Non-patterned, other	5	2	7
Grand Total	**10**	**45**	**55**

References cited in table above (link)

AUTOGEN CRT-D

Models: G160/G161/G164/G166/G168/G172/G173/G175/G177/G179

Worldwide Confirmed Malfunctions	**18**
Worldwide Distribution	**23,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High voltage circuit component (62)	0	7	7
Integrated circuit (63)	2	4	6
Low-voltage capacitor (69)	0	1	1
Software			
Safety Core-unintended biventricular pacing (64)	0	1	1
Other			
Non-patterned, other	1	2	3
Grand Total	**3**	**15**	**18**

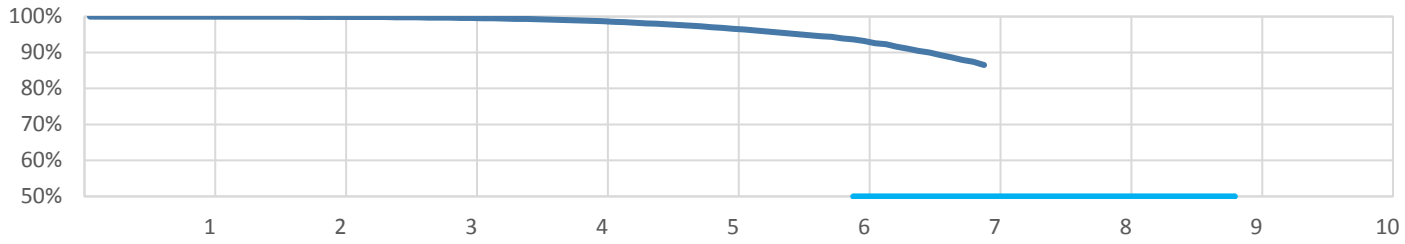
References cited in table above (link)

INCEPTA/ENERGEN/PUNCTUA CRT-D

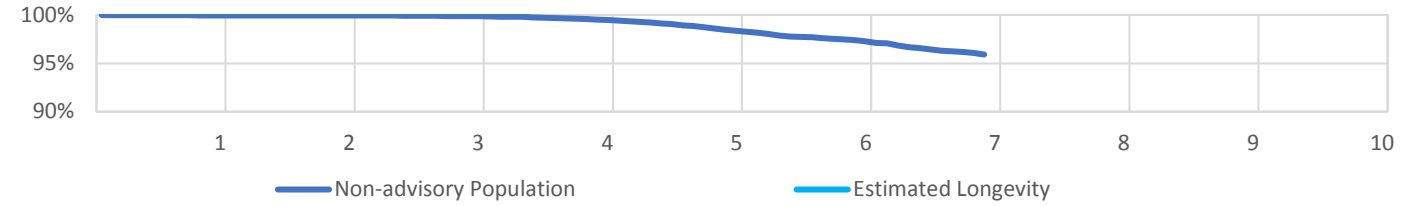
Models: N050/N051/N052/N053/N140/N141/N142/N143/N160/N161/N162/N163/N164/N165/P052/P053/P142/P143/P162/P163/P165

US Summary			
US Registered Implants:	53,000	US Normal Battery Depletions:	967
US Approval Date:	November 2011	US Malfunctions:	630
US Estimated Active Implants:	36,000	Without Compromised Therapy:	614
		With Compromised Therapy:	16

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.6%	98.8%	96.8%	93.6%	86.5%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.5%	98.5%	97.4%	95.9%	--	--	--
53,000	Effective Sample Size	46316	41466	36633	30529	19421	8112	588	--	--	--

@ 84 months

INCEPTA/ENERGEN/PUNCTUA CRT-D

Models: N050/N051/N052/N053/N140/N141/N142/N143/N160/N161/N162/N163/N164/N165/ P052/P053/P142/P143/P162/P163/P165

Worldwide Confirmed Malfunctions	**1,012**
Worldwide Distribution	**81,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Safety Core-electrocautery (42)	1	5	6
High-voltage capacitor (43)	4	0	4
Low-voltage capacitors (47)	0	1	1
Integrated circuit (50)	7	2	9
Battery (53)	1	8	9
Low-voltage capacitor (54)	3	946	949
Low-voltage capacitor (69)	0	4	4
Mechanical			
Transformer (38)	6	0	6
Software			
Memory errors (51)	0	8	8
Other			
Non-patterned, other	5	11	16
Grand Total	**27**	**985**	**1012**

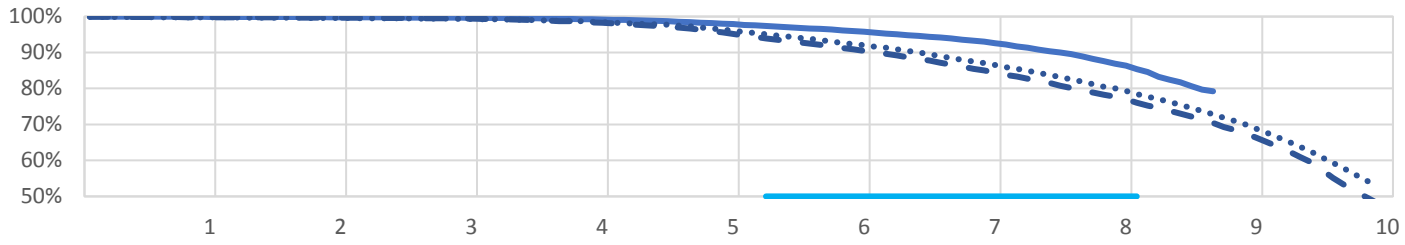
References cited in table above (link)

COGNIS CRT-D

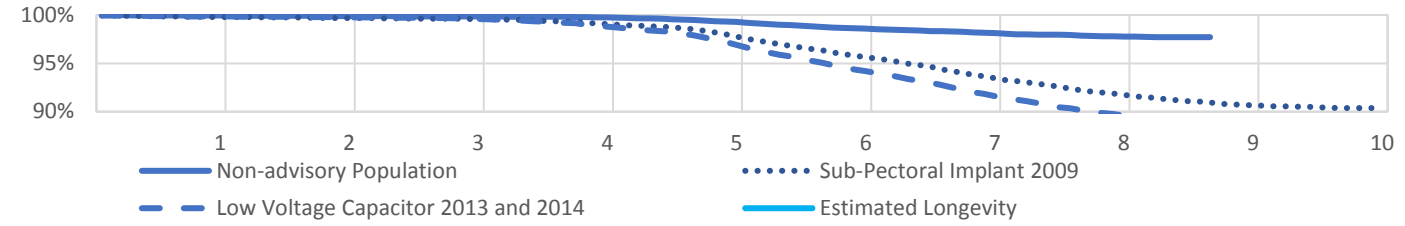
Models: N106/N107/N108/N118/N119/N120/P106/P107/P108

US Summary			
US Registered Implants:	75,000	US Normal Battery Depletions:	6,515
US Approval Date:	March 2008	US Malfunctions:	1,987
US Estimated Active Implants:	28,000	Without Compromised Therapy:	1,799
		With Compromised Therapy:	188

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.7%	99.2%	98.0%	96.0%	93.0%	86.9%	79.2%	--
Registered Implants:	Malfunctions Only	99.9%	99.9%	99.9%	99.8%	99.3%	98.6%	98.2%	97.8%	97.7%	--
36,000	Effective Sample Size	31266	28036	25107	22383	19831	17223	14302	5624	357	--

@ 105 months

COGNIS CRT-D

Models: N106/N107/N108/N118/N119/N120/P106/P107/P108

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Subpectoral Implant 2009 Registered Implants: 32,000	Depletions and Malfunctions	99.8%	99.6%	99.4%	98.5%	96.4%	92.4%	87.1%	80.0%	70.0%	52.6%
	Malfunctions Only	99.8%	99.7%	99.6%	99.1%	98.0%	95.8%	93.7%	91.9%	90.7%	90.4%
	Effective Sample Size	27250	24143	21547	19120	16698	14228	11912	9694	7502	1701
Low Voltage Capacitor 2013 and 2014 Registered Implants: 26,000	Depletions and Malfunctions	99.8%	99.7%	99.5%	98.4%	95.6%	90.9%	85.0%	77.8%	67.5%	48.2%
	Malfunctions Only	99.8%	99.8%	99.6%	98.9%	97.2%	94.4%	91.8%	89.8%	88.3%	87.7%
	Effective Sample Size	22405	19881	17769	15729	13689	11556	9584	7745	4560	332

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

COGNIS CRT-D

Models: N106/N107/N108/N118/N119/N120/P106/P107/P108

Worldwide Confirmed Malfunctions	**2,764**
Worldwide Distribution	**109,000**

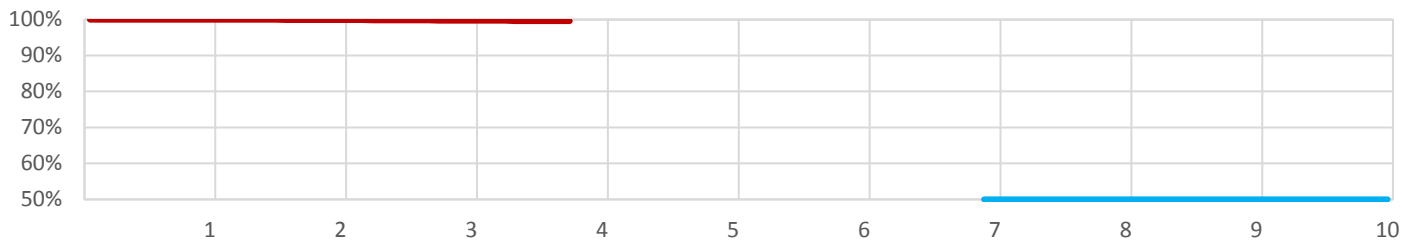
	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low Voltage Capacitor 2014 - August 29, 2013 and September 17, 2014 Voluntary Physician Advisory (3)	78	1596	1674
Safety Core-electrocautery (42)	25	54	79
High-voltage capacitor (43)	6	1	7
Low-voltage capacitors (47)	0	7	7
Integrated circuit (50)	21	8	29
High voltage circuit (52)	1	0	1
Battery (53)	7	47	54
Low-voltage capacitor (54)	11	698	709
Low-voltage capacitor (69)	0	1	1
Mechanical			
Transformer (38)	9	0	9
Difficulty securing lead (41)	8	8	16
Header contacts (45)	8	10	18
Subpectoral implant 2009 - December 01, 2009 Voluntary Physician Advisory (6)	47	19	66
Header (74)	24	9	33
Software			
Safety Core-programming (46)	0	1	1
Alert messages not displayed post-EOL (48)	0	2	2
Memory errors (51)	2	15	17
Other			
Non-patterned, other	10	31	41
Grand Total	**257**	**2507**	**2764**

VISIONIST/VALITUDE

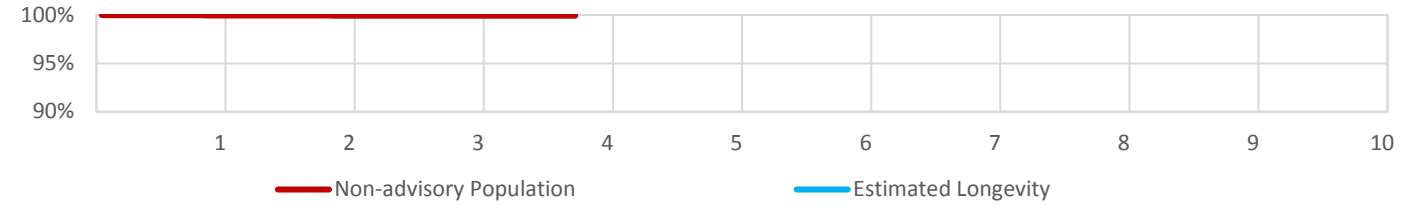
Models: U125/U128/U225/U226/U228

US Summary			
US Registered Implants:	23,000	US Normal Battery Depletions:	14
US Approval Date:	October 2014	US Malfunctions:	16
US Estimated Active Implants:	21,000	Without Compromised Therapy:	15
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.7%	99.6%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.9%	99.9%	--	--	--	--	--	--
23,000	Effective Sample Size	14867	8019	2460	237	--	--	--	--	--	--

@ 46 months

VISIONIST/VALITUDE

Models: U125/U128/U225/U226/U228

Worldwide Confirmed Malfunctions	**21**
Worldwide Distribution	**48,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	1	1
Integrated circuit (63)	1	5	6
Telemetry (68)	0	1	1
Hydrogen induced premature depletion - September 2018 (70)	0	6	6
Software			
Memory errors (51)	0	3	3
Other			
Non-patterned, other	0	4	4
Grand Total	**1**	**20**	**21**

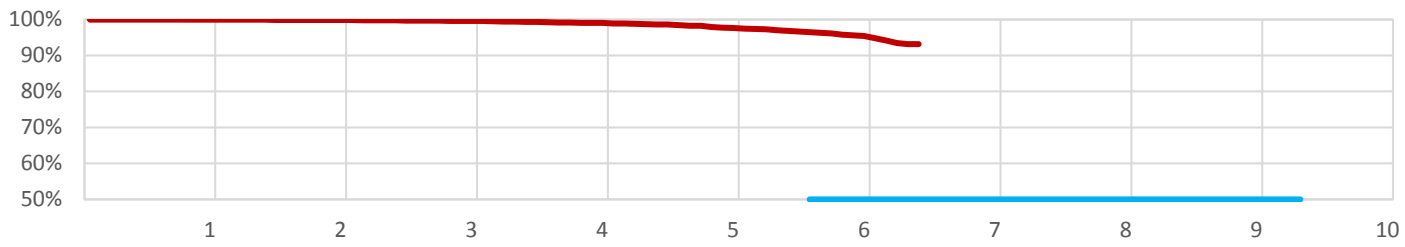
References cited in table above (link)

INVIVE

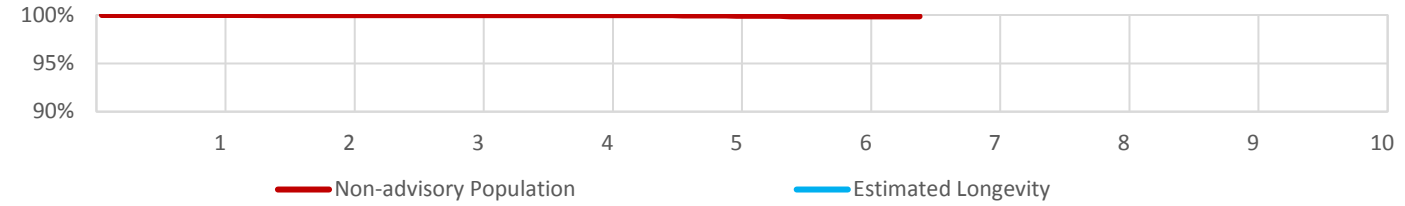
Models: V172/V173/V182/V183/W172/W173

US Summary			
US Registered Implants:	8,000	US Normal Battery Depletions:	137
US Approval Date:	May 2012	US Malfunctions:	4
US Estimated Active Implants:	5,000	Without Compromised Therapy:	4
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.6%	99.1%	97.8%	95.6%	93.2%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	--	--	--
8,000	Effective Sample Size	6723	6002	5285	4281	2710	825	236	--	--	--

@ 78 months

INVIVE

Models: V172/V173/V182/V183/W172/W173

Worldwide Confirmed Malfunctions	**7**
Worldwide Distribution	**18,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	1	0	1
Software			
Memory errors (51)	0	3	3
Other			
Non-patterned, other	1	2	3
Grand Total	**2**	**5**	**7**

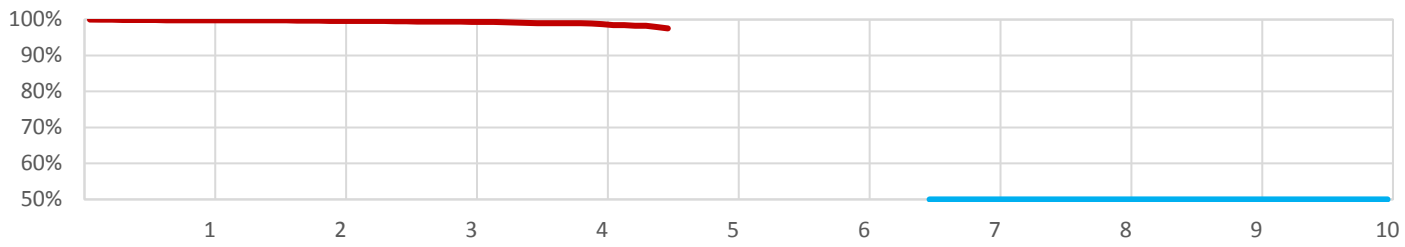
References cited in table above (link)

INTUA

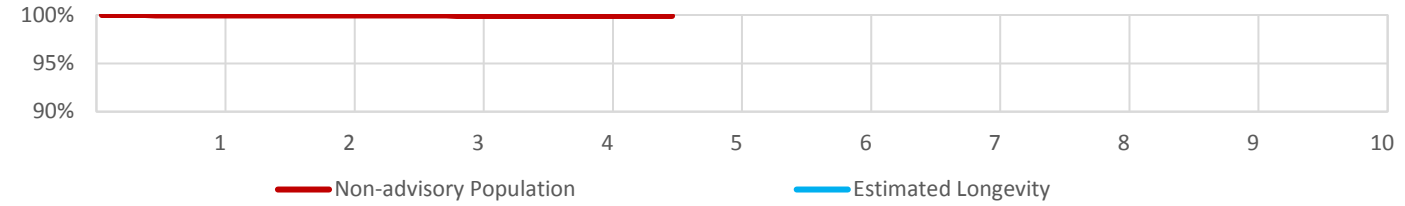
Models: V272/V273/V282/V283/W272/W273

US Summary			
US Registered Implants:	3,000	US Normal Battery Depletions:	25
US Approval Date:	May 2012	US Malfunctions:	2
US Estimated Active Implants:	2,000	Without Compromised Therapy:	1
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.8%	99.6%	99.4%	98.9%	97.5%	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.9%	--	--	--	--	--
3,000	Effective Sample Size	2270	2003	1646	845	242	--	--	--	--	--

@ 55 months

INTUA

Models: V272/V273/V282/V283/W272/W273

Worldwide Confirmed Malfunctions	**2**
Worldwide Distribution	**3,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	1	1	2
Grand Total	**1**	**1**	**2**

References cited in table above (link)

CONTAK RENEWAL TR 2

Models: H140/H145

Worldwide Confirmed Malfunctions	**38**
Worldwide Distribution	**31,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	1	1
Mechanical			
Seal plug (19)	0	2	2
Setscrew block (25)	0	2	2
Seal plug (33)	0	1	1
Software			
Memory error (23)	0	1	1
Stored EGMs (28)	0	20	20
Other			
Non-patterned, other	1	10	11
Grand Total	**1**	**37**	**38**

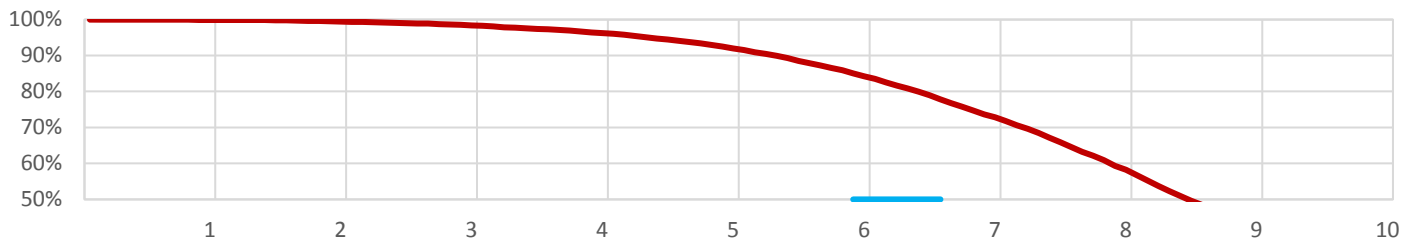
References cited in table above (link)

CONTAK RENEWAL TR

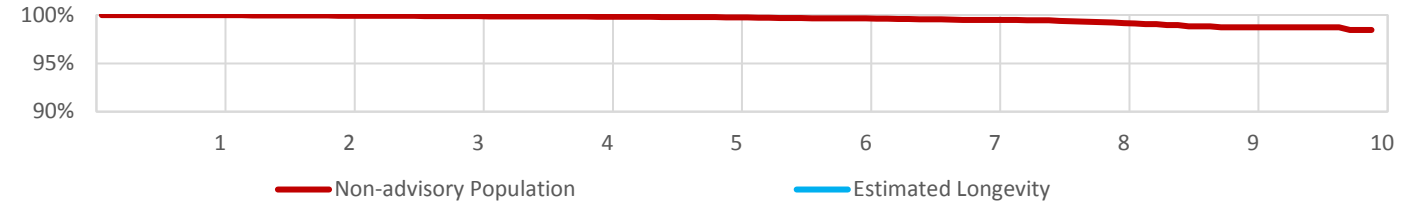
Models: H120/H125

US Summary			
US Registered Implants:	19,000	US Normal Battery Depletions:	3,747
US Approval Date:	January 2004	US Malfunctions:	67
US Estimated Active Implants:	4,000	Without Compromised Therapy:	66
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.5%	98.6%	96.4%	92.5%	85.0%	73.7%	59.3%	43.9%	30.8%
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.9%	99.8%	99.8%	99.6%	99.5%	99.2%	98.7%	98.5%
19,000	Effective Sample Size	15201	13189	11511	9979	8480	6890	4924	2722	1018	241

CONTAK RENEWAL TR

Models: H120/H125

Worldwide Confirmed Malfunctions	**67**
Worldwide Distribution	**19,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	1	0	1
Low-voltage capacitor - June 23, 2006	0	1	1
Voluntary Physician Advisory (8)			
Mechanical			
Seal plug (19)	0	5	5
Software			
Stored EGMs (28)	0	39	39
Other			
Non-patterned, other	0	13	13
Alert messages (31)	0	7	7
Magnet rate (44)	0	1	1
Grand Total	**1**	**66**	**67**

References cited in table above (link)

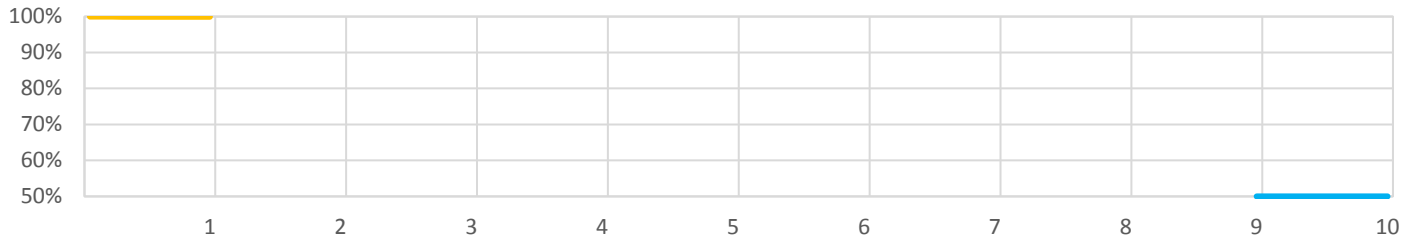
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD DR

Models: D121/D221/D233/D321/D333/D421/D433/D521/D533

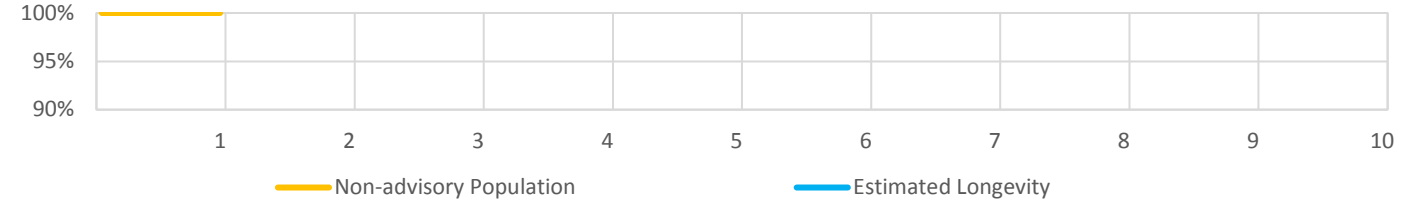
US Summary

US Registered Implants:	3,000	US Normal Battery Depletions:	1
US Approval Date:	July 2017	US Malfunctions:	-
US Estimated Active Implants:	3,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	--	--	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	--	--	--	--	--	--	--	--
3,000	Effective Sample Size	378	252	--	--	--	--	--	--	--	--

@ 13 months

RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD DR

Models: D121/D221/D233/D321/D333/D421/D433/D521/D533

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**8,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

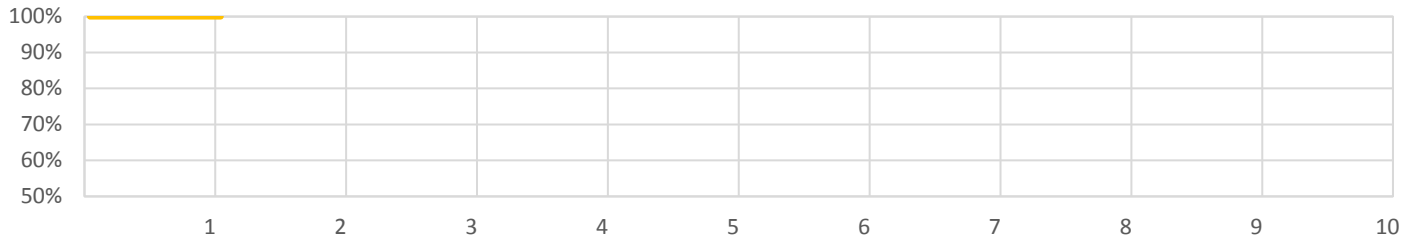
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD VR

Models: D120/D220/D232/D320/D332/D420/D432/D520/D532

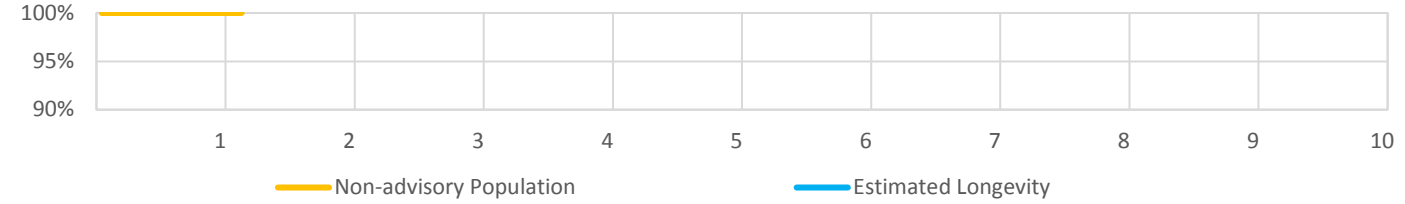
US Summary

US Registered Implants:	4,000	US Normal Battery Depletions:	-
US Approval Date:	July 2017	US Malfunctions:	-
US Estimated Active Implants:	4,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	--	--	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	--	--	--	--	--	--	--	--
4,000	Effective Sample Size	532	213	--	--	--	--	--	--	--	--

@ 14 months

RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD VR

Models: D120/D220/D232/D320/D332/D420/D432/D520/D532

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**7,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

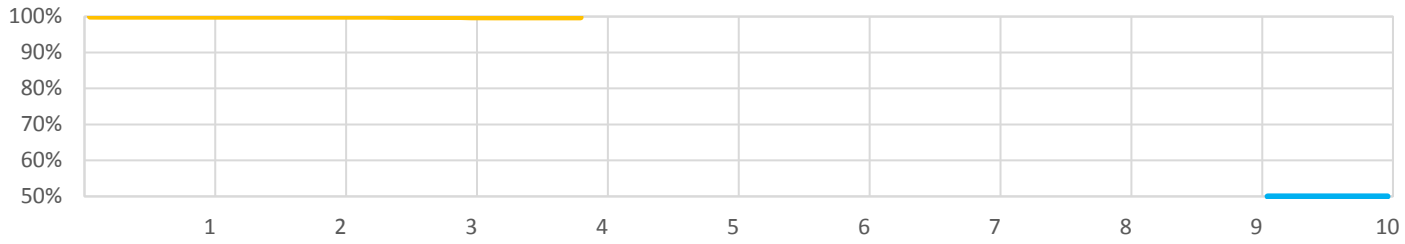
References cited in table above (link)

DYNAGEN/INOGEN/ORIGEN ICD EL DR

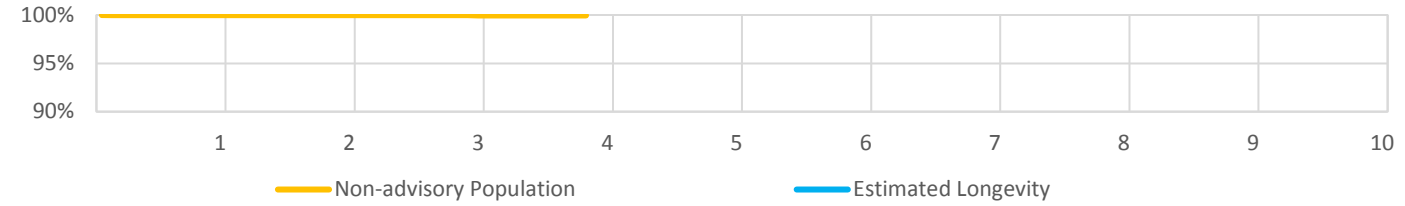
Models: D052/D053/D142/D143/D152/D153

US Summary			
US Registered Implants:	35,000	US Normal Battery Depletions:	15
US Approval Date:	April 2014	US Malfunctions:	7
US Estimated Active Implants:	32,000	Without Compromised Therapy:	4
		With Compromised Therapy:	3

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	99.9%	99.8%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	--	--	--	--	--	--
35,000	Effective Sample Size	24011	13145	5121	291	--	--	--	--	--	--

@ 47 months

DYNAGEN/INOGEN/ORIGEN ICD EL DR

Models: D052/D053/D142/D143/D152/D153

Worldwide Confirmed Malfunctions	**11**
Worldwide Distribution	**49,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	1	1
High voltage circuit component (62)	0	3	3
Integrated circuit (63)	1	0	1
Low-voltage capacitor (69)	0	1	1
High voltage capacitor (75)	3	0	3
Software			
Memory errors (51)	0	1	1
Other			
Non-patterned, other	0	1	1
Grand Total	**4**	**7**	**11**

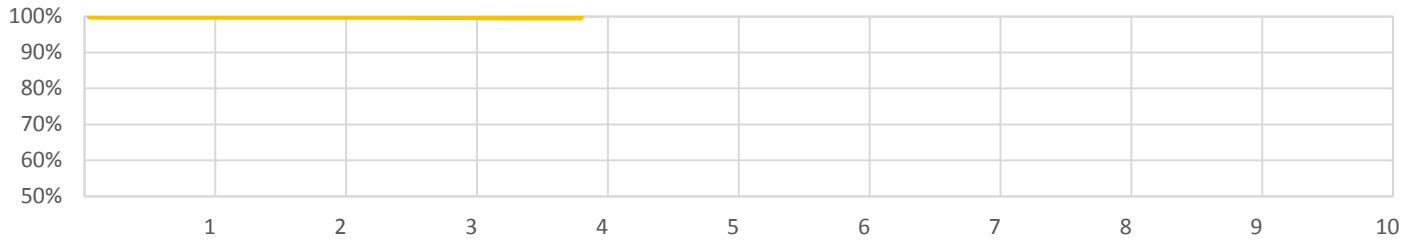
References cited in table above (link)

DYNAGEN/INOGEN/ORIGEN ICD EL VR

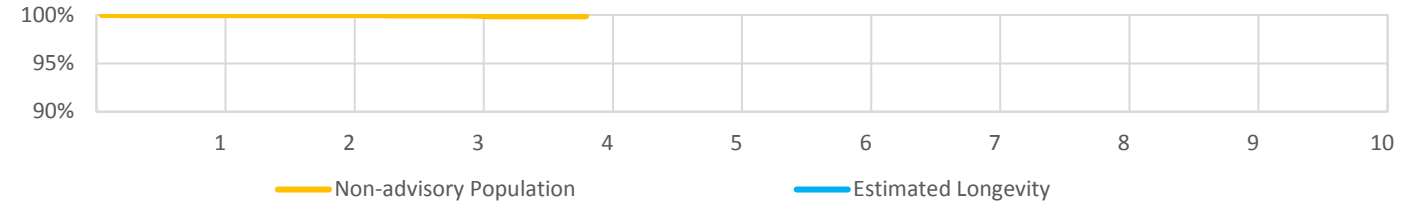
Models: D050/D051/D140/D141/D150/D151

US Summary			
US Registered Implants:	30,000	US Normal Battery Depletions:	9
US Approval Date:	April 2014	US Malfunctions:	11
US Estimated Active Implants:	28,000	Without Compromised Therapy:	11
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.8%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	--	--	--	--	--	--
30,000	Effective Sample Size	21006	12177	5053	261	--	--	--	--	--	--

@ 47 months

DYNAGEN/INOGEN/ORIGEN ICD EL VR

Models: D050/D051/D140/D141/D150/D151

Worldwide Confirmed Malfunctions	**18**
Worldwide Distribution	**48,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	1	1
High voltage circuit component (62)	0	1	1
Integrated circuit (63)	0	1	1
Low-voltage capacitor (69)	0	8	8
Software			
Memory errors (51)	0	3	3
Other			
Non-patterned, other	1	3	4
Grand Total	**1**	**17**	**18**

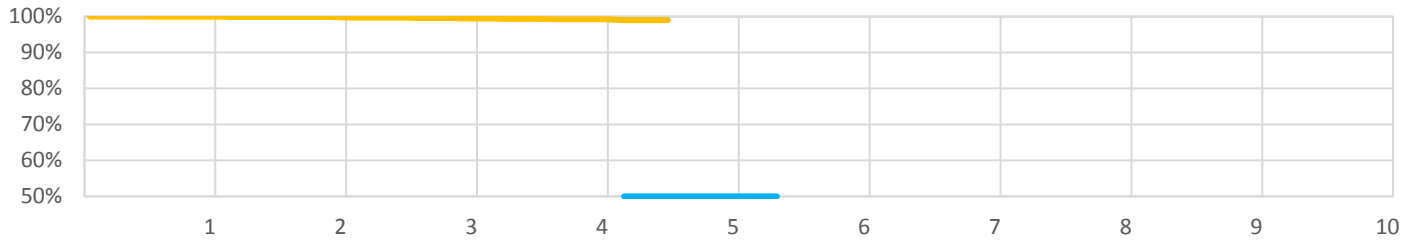
References cited in table above (link)

DYNAGEN/INOGEN/ORIGEN ICD MINI DR

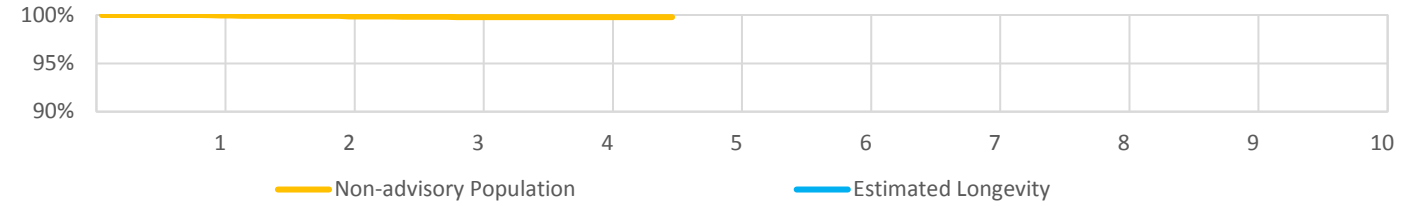
Models: D002/D003/D012/D013/D022/D023

US Summary			
US Registered Implants:	8,000	US Normal Battery Depletions:	19
US Approval Date:	April 2014	US Malfunctions:	10
US Estimated Active Implants:	7,000	Without Compromised Therapy:	8
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.5%	99.3%	99.0%	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.8%	99.8%	99.8%	--	--	--	--	--
8,000	Effective Sample Size	6164	4288	2718	1086	262	--	--	--	--	--

@ 55 months

DYNAGEN/INOGEN/ORIGEN ICD MINI DR

Models: D002/D003/D012/D013/D022/D023

Worldwide Confirmed Malfunctions	**14**
Worldwide Distribution	**21,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High voltage circuit component (62)	0	9	9
High voltage capacitor (75)	2	0	2
Other			
Non-patterned, other	1	2	3
Grand Total	**3**	**11**	**14**

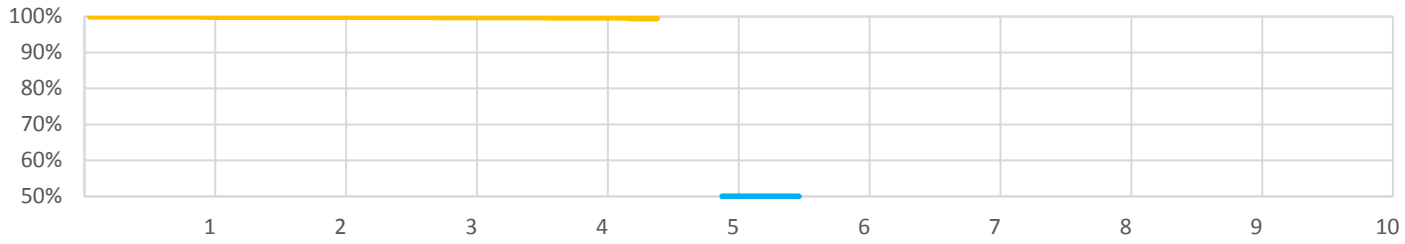
References cited in table above (link)

DYNAGEN/INOGEN/ORIGEN ICD MINI VR

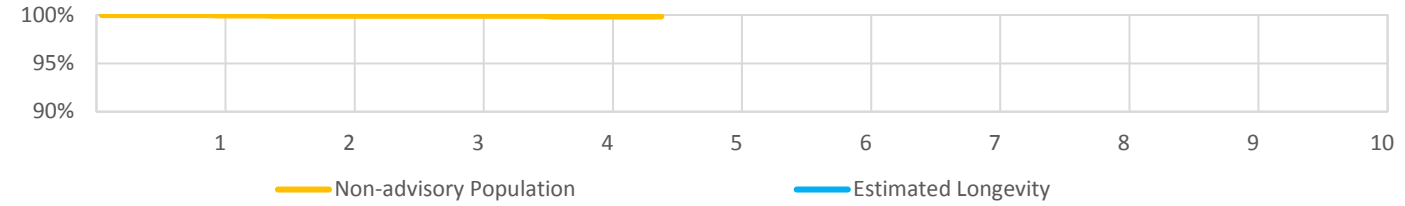
Models: D000/D001/D010/D011/D020/D021

US Summary			
US Registered Implants:	8,000	US Normal Battery Depletions:	8
US Approval Date:	April 2014	US Malfunctions:	6
US Estimated Active Implants:	7,000	Without Compromised Therapy:	5
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.7%	99.5%	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.9%	99.8%	99.8%	--	--	--	--	--
8,000	Effective Sample Size	5976	4263	2676	981	286	--	--	--	--	--

@ 54 months

DYNAGEN/INOGEN/ORIGEN ICD MINI VR

Models: D000/D001/D010/D011/D020/D021

Worldwide Confirmed Malfunctions	**13**
Worldwide Distribution	**22,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	2	2
High voltage circuit component (62)	0	4	4
High voltage capacitor (75)	2	0	2
Low-voltage capacitor (69)	0	1	1
Software			
Memory errors (51)	1	1	2
Other			
Non-patterned, other	0	2	2
Grand Total	**3**	**10**	**13**

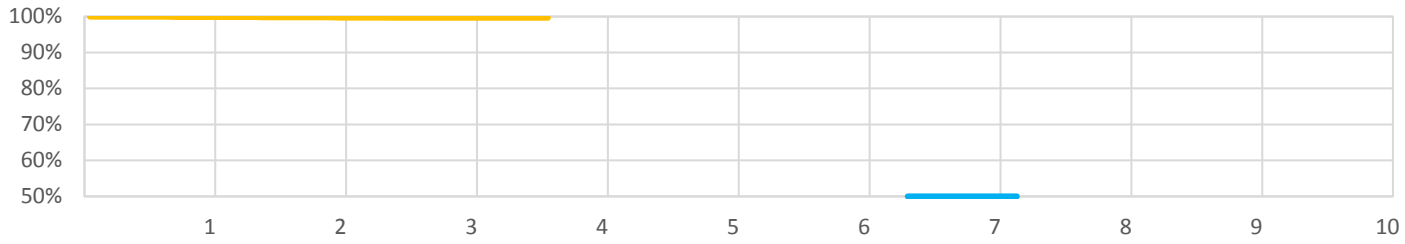
References cited in table above (link)

EMBLEM S-ICD

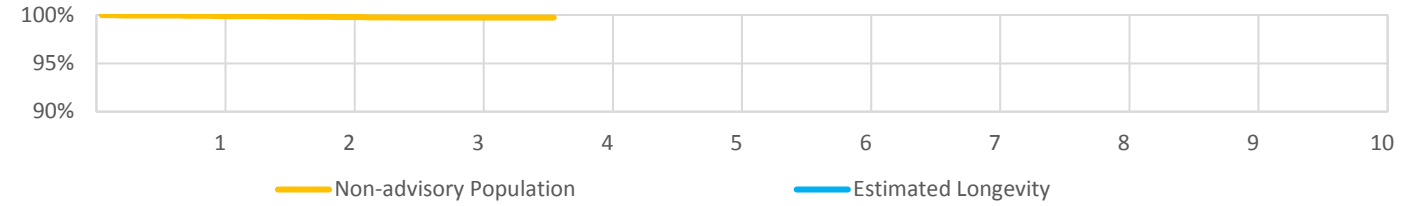
Models: A209/A219

US Summary			
US Registered Implants:	25,000	US Normal Battery Depletions:	7
US Approval Date:	March 2015	US Malfunctions:	35
US Estimated Active Implants:	23,000	Without Compromised Therapy:	22
		With Compromised Therapy:	13

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.7%	99.7%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	99.9%	99.8%	99.7%	99.7%	--	--	--	--	--	--
25,000	Effective Sample Size	15506	8524	3145	348	--	--	--	--	--	--

@ 44 months

EMBLEM S-ICD

Models: A209/A219

Worldwide Confirmed Malfunctions	**69**
Worldwide Distribution	**52,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High-voltage capacitor (43)	1	0	1
Capacitor (72)	0	19	19
Software			
Memory corruption (65)	1	0	1
Misaligned markers (73)	0	1	1
Other			
Non-patterned, other	18	16	34
Telemetry (56)	7	6	13
Grand Total	**27**	**42**	**69**

References cited in table above (link)

AUTOGEN ICD EL DR

Models: D162/D163/D176/D177

Worldwide Confirmed Malfunctions	**9**
Worldwide Distribution	**15,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High voltage circuit component (62)	0	3	3
Integrated circuit (63)	2	0	2
Low-voltage capacitor (69)	0	2	2
Other			
Non-patterned, other	1	1	2
Grand Total	**3**	**6**	**9**

References cited in table above (link)

AUTOGEN ICD EL VR

Models: D160/D161/D174/D175

Worldwide Confirmed Malfunctions	**3**
Worldwide Distribution	**16,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High voltage capacitor (75)	1	0	1
Software			
Memory errors (51)	1	1	2
Grand Total	**2**	**1**	**3**

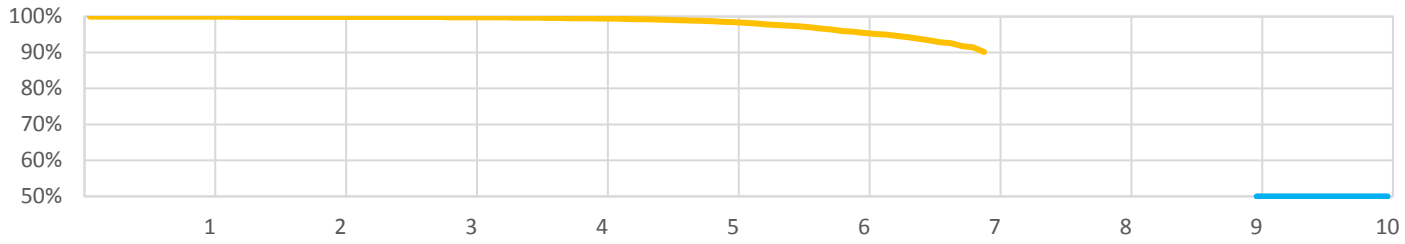
References cited in table above (link)

INCEPTA/ENERGEN/PUNCTUA ICD DR

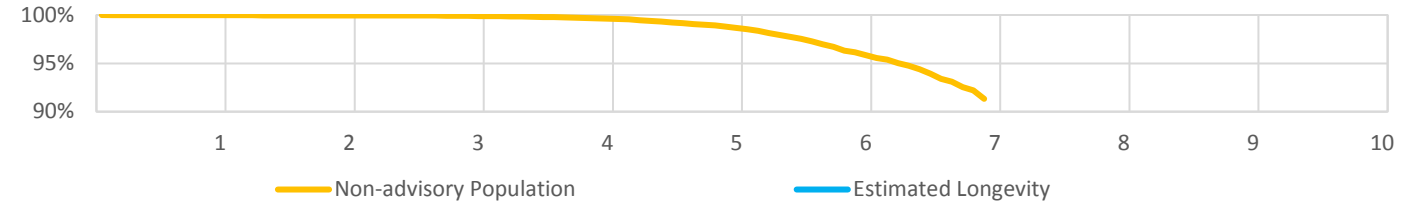
Models: E052/E053/E142/E143/E162/E163/F052/F053/F142/F143/F162/F163

US Summary			
US Registered Implants:	47,000	US Normal Battery Depletions:	92
US Approval Date:	November 2011	US Malfunctions:	673
US Estimated Active Implants:	34,000	Without Compromised Therapy:	659
		With Compromised Therapy:	14

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.5%	98.6%	95.8%	90.2%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.7%	98.8%	96.1%	91.3%	--	--	--
47,000	Effective Sample Size	41216	36528	31906	26277	15847	6513	424	--	--	--

@ 84 months

INCEPTA/ENERGEN/PUNCTUA ICD DR

Models: E052/E053/E142/E143/E162/E163/F052/F053/F142/F143/F162/F163

Worldwide Confirmed Malfunctions	**1,043**
Worldwide Distribution	**72,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Mechanical			
Transformer (38)	2	0	2
Electrical			
High-voltage capacitor (43)	4	1	5
Low-voltage capacitors (47)	0	4	4
Integrated circuit (50)	4	7	11
Battery (53)	5	49	54
Low-voltage capacitor (54)	3	935	938
High voltage circuit (58)	0	1	1
Low-voltage capacitor (69)	0	3	3
Software			
Memory errors (51)	0	5	5
Other			
Non-patterned, other	5	15	20
Grand Total	**23**	**1020**	**1043**

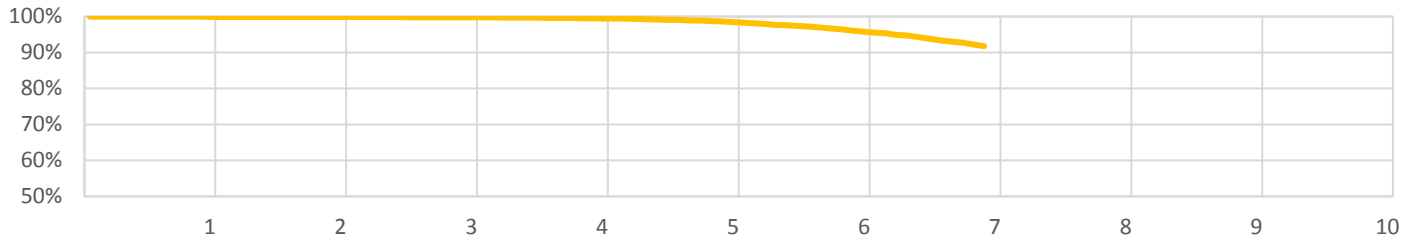
References cited in table above (link)

INCEPTA/ENERGEN/PUNCTUA ICD VR

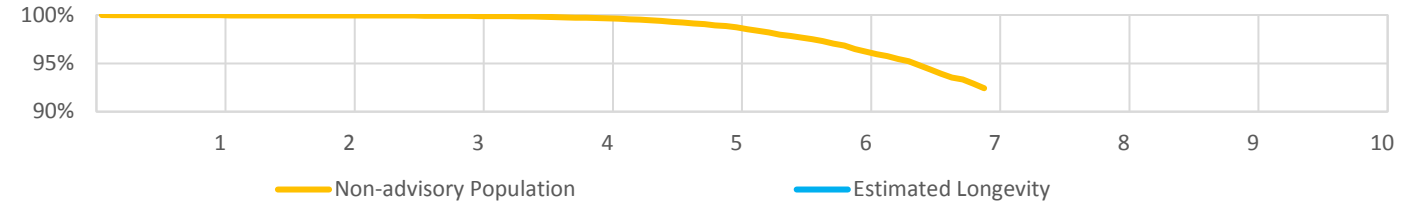
Models: E050/E051/E140/E141/E160/E161/F050/F051/F140/F141/F160/F161

US Summary			
US Registered Implants:	39,000	US Normal Battery Depletions:	82
US Approval Date:	November 2011	US Malfunctions:	514
US Estimated Active Implants:	30,000	Without Compromised Therapy:	489
		With Compromised Therapy:	25

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.5%	98.6%	96.0%	91.8%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.7%	98.8%	96.5%	92.4%	--	--	--
39,000	Effective Sample Size	34700	30728	26904	22007	13104	5327	381	--	--	--

@ 84 months

INCEPTA/ENERGEN/PUNCTUA ICD VR

Models: E050/E051/E140/E141/E160/E161/F050/F051/F140/F141/F160/F161

Worldwide Confirmed Malfunctions	**849**
Worldwide Distribution	**68,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
High-voltage capacitor (43)	3	1	4
Integrated circuit (50)	5	3	8
Battery (53)	8	57	65
Low-voltage capacitor (54)	7	730	737
High voltage circuit (58)	1	0	1
Mechanical			
Transformer (38)	6	0	6
Software			
Memory errors (51)	1	6	7
Other			
Non-patterned, other	10	11	21
Grand Total	**41**	**808**	**849**

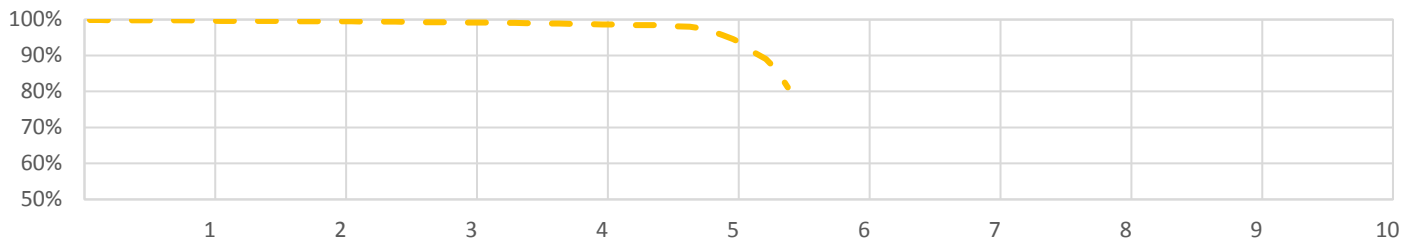
References cited in table above (link)

SQ-RX S-ICD

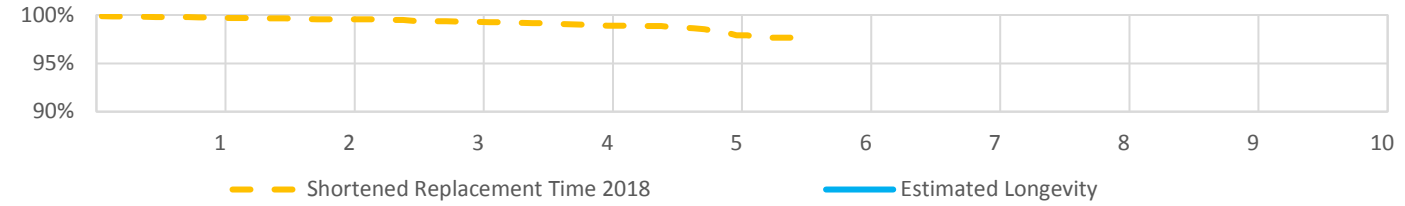
Models: 1010

US Summary			
US Registered Implants:	8,000	US Normal Battery Depletions:	253
US Approval Date:	September 2012	US Malfunctions:	78
US Estimated Active Implants:	6,000	Without Compromised Therapy:	32
		With Compromised Therapy:	46

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Shortened Replacement Time 2018	Depletions and Malfunctions	99.7%	99.5%	99.2%	98.7%	95.7%	81.1%	--	--	--	--
Registered Implants:	Malfunctions Only	99.7%	99.6%	99.3%	98.9%	98.2%	97.7%	--	--	--	--
8,000	Effective Sample Size	6460	5691	5026	3580	814	209	--	--	--	--

@ 66 months

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

SQ-RX S-ICD

Models: 1010

Worldwide Confirmed Malfunctions	**173**
Worldwide Distribution	**11,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Unintended Fuse Activation 2013 (4)	3	0	3
Charge Timeout Alert (61)	0	10	10
Mechanical			
High cathode condition (5)	1	1	2
Shortened replacement time 2018 (55)	47	31	78
Software			
Unintended Battery Depletion Alert (57)	0	10	10
Other			
Non-patterned, other	36	21	57
Telemetry (56)	10	3	13
Grand Total	**97**	**76**	**173**

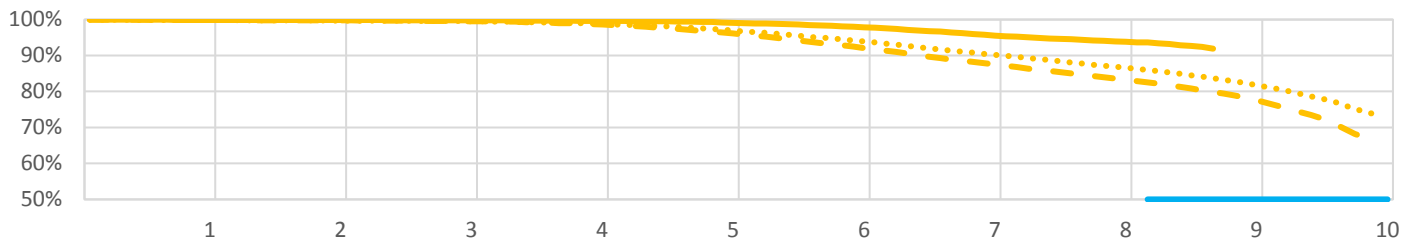
References cited in table above (link)

TELIGEN DR

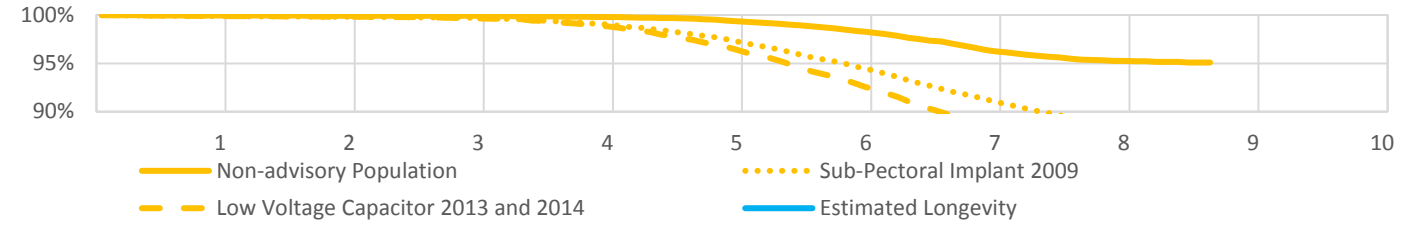
Models: E110/E111/F110/F111

US Summary			
US Registered Implants:	66,000	US Normal Battery Depletions:	1,342
US Approval Date:	March 2008	US Malfunctions:	2,709
US Estimated Active Implants:	32,000	Without Compromised Therapy:	2,567
		With Compromised Therapy:	142

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.6%	99.2%	98.0%	95.8%	93.9%	91.9%	--
Registered Implants:	Malfunctions Only	99.9%	99.9%	99.9%	99.8%	99.4%	98.4%	96.4%	95.3%	95.1%	--
30000	Effective Sample Size	26322	23343	20695	18274	16075	13976	11680	5113	376	--

@ 105 months

TELIGEN DR

Models: E110/E111/F110/F111

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Subpectoral Implant 2009 Registered Implants: 30000	Depletions and Malfunctions	99.9%	99.7%	99.6%	98.9%	97.2%	94.2%	90.5%	86.9%	82.3%	73.5%
	Malfunctions Only	99.9%	99.8%	99.7%	99.1%	97.5%	94.7%	91.3%	88.6%	86.6%	85.5%
	Effective Sample Size	26547	23426	20702	18166	15784	13437	11299	9445	7751	2244
Low Voltage Capacitor 2013 and 2014 Registered Implants: 23000	Depletions and Malfunctions	99.9%	99.8%	99.6%	98.8%	96.4%	92.5%	87.9%	83.6%	78.3%	65.2%
	Malfunctions Only	99.9%	99.8%	99.6%	98.8%	96.4%	92.5%	87.9%	83.6%	78.3%	65.2%
	Effective Sample Size	20544	18150	16029	14056	12110	10193	8466	6995	4535	449

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

TELIGEN DR

Models: E110/E111/F110/F111

Worldwide Confirmed Malfunctions	**3,639**
Worldwide Distribution	**91,000**

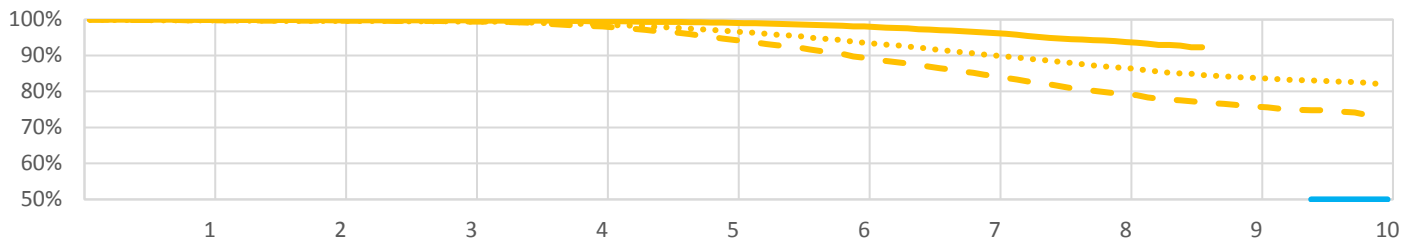
	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low Voltage Capacitor 2014 - August 29, 2013 and September 17, 2014 Voluntary Physician Advisory (3)	48	2201	2249
Safety Core-electrocautery (42)	1	4	5
High-voltage capacitor (43)	7	1	8
Low-voltage capacitors (47)	0	8	8
Integrated circuit (50)	21	21	42
Battery (53)	35	236	271
Low-voltage capacitor (54)	5	920	925
Low-voltage capacitor (69)	0	1	1
Mechanical			
Transformer (38)	20	0	20
Seal plug (40)	0	3	3
Difficulty securing lead (41)	7	7	14
Header contacts (45)	13	3	16
Subpectoral implant 2009 - December 01, 2009 Voluntary Physician Advisory (6)	8	3	11
Header (74)	7	3	10
Software			
Alert messages not displayed post-EOL (48)	0	3	3
Memory errors (51)	0	15	15
Other			
Non-patterned, other	10	28	38
Grand Total	**182**	**3457**	**3639**

TELIGEN VR

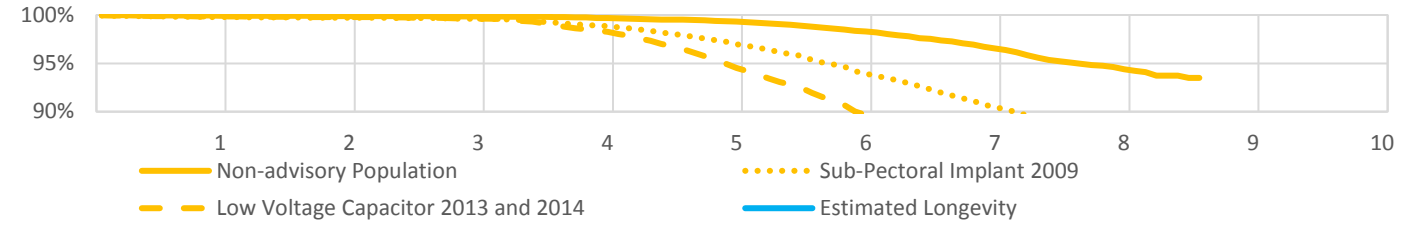
Models: E102/E103/F102/F103

US Summary			
US Registered Implants:	38,000	US Normal Battery Depletions:	174
US Approval Date:	March 2008	US Malfunctions:	1,875
US Estimated Active Implants:	19,000	Without Compromised Therapy:	1,762
		With Compromised Therapy:	113

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.8%	99.6%	99.1%	98.1%	96.4%	94.0%	92.3%	--
Registered Implants:	Malfunctions Only	99.9%	99.9%	99.9%	99.7%	99.3%	98.4%	96.7%	94.6%	93.5%	--
18000	Effective Sample Size	16191	14324	12640	11143	9781	8504	7104	2370	211	--

@ 104 months

TELIGEN VR

Models: E102/E103/F102/F103

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Subpectoral Implant 2009 Registered Implants: 16000	Depletions and Malfunctions	99.8%	99.6%	99.5%	98.7%	96.9%	93.8%	90.3%	86.8%	83.9%	82.2%
	Malfunctions Only	99.8%	99.7%	99.6%	98.9%	97.2%	94.2%	90.7%	87.4%	84.8%	83.9%
	Effective Sample Size	13608	11986	10557	9230	7971	6783	5694	4741	3976	1343
Low Voltage Capacitor 2013 and 2014 Registered Implants: 12000	Depletions and Malfunctions	99.8%	99.7%	99.5%	98.2%	94.8%	89.7%	84.7%	79.5%	75.9%	73.3%
	Malfunctions Only	99.8%	99.7%	99.5%	98.2%	94.8%	89.7%	84.7%	79.5%	75.9%	73.3%
	Effective Sample Size	10806	9536	8403	7325	6224	5159	4216	3414	2012	287

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

TELIGEN VR

Models: E102/E103/F102/F103

Worldwide Confirmed Malfunctions	**3,105**
Worldwide Distribution	**66,000**

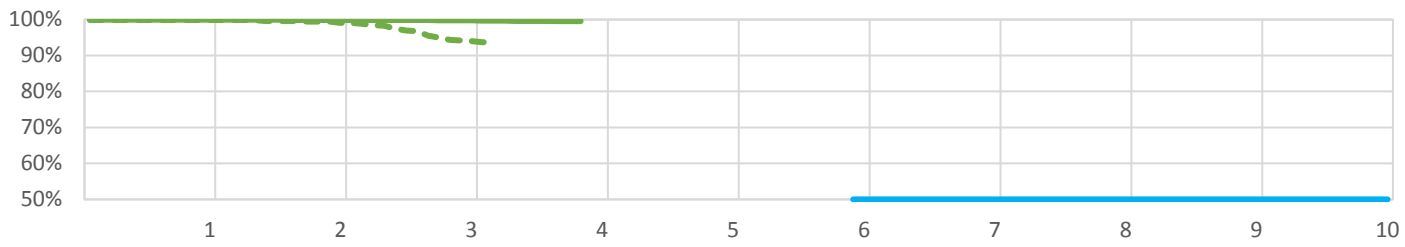
	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low Voltage Capacitor 2014 - August 29, 2013 and September 17, 2014 Voluntary Physician Advisory (3)	38	1768	1806
Safety Core-electrocautery (42)	1	1	2
High-voltage capacitor (43)	3	0	3
Low-voltage capacitors (47)	0	5	5
Integrated circuit (50)	16	11	27
Battery (53)	38	357	395
Low-voltage capacitor (54)	3	722	725
Low-voltage capacitor (69)	0	1	1
Mechanical			
Transformer (24)	1	0	1
Transformer (38)	14	0	14
Seal plug (40)	0	1	1
Difficulty securing lead (41)	9	0	9
Header contacts (45)	22	16	38
Subpectoral implant 2009 - December 01, 2009 Voluntary Physician Advisory (6)	15	6	21
Header (74)	13	4	17
Software			
Alert messages not displayed post-EOL (48)	0	4	4
Memory errors (51)	0	11	11
Respiratory Sensor Oversensing - March 23, 2009 Voluntary Physician Advisory (7)	0	2	2
Other			
Non-patterned, other	11	12	23
Grand Total	**184**	**2921**	**3105**

ACCOLADE/PROPONENT/ESSENTIO DR

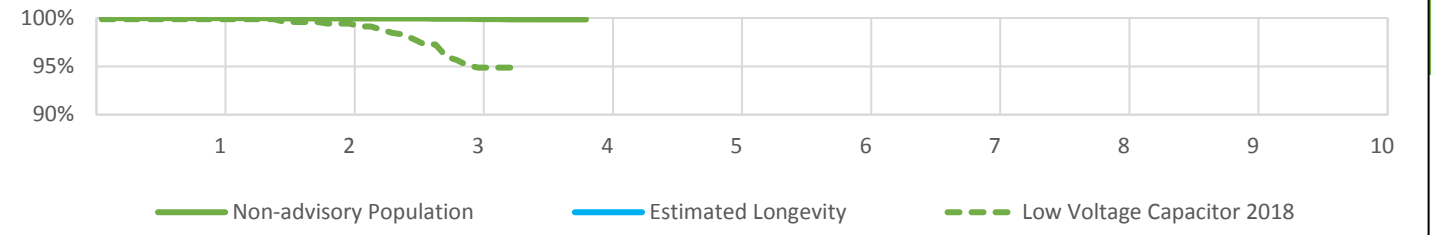
Models: L101/L111/L201/L211/L301/L311

US Summary			
US Registered Implants:	139,000	US Normal Battery Depletions:	84
US Approval Date:	October 2014	US Malfunctions:	96
US Estimated Active Implants:	127,000	Without Compromised Therapy:	89
		With Compromised Therapy:	7

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.6%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.8%	--	--	--	--	--	--
24000	Effective Sample Size	94807	53633	18759	228	--	--	--	--	--	--

@ 47 months

ACCOLADE/PROPONENT/ESSENTIO DR

Models: L101/L111/L201/L211/L301/L311

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Low Voltage Capacitor 2018	Depletions and Malfunctions	99.9%	99.4%	94.4%	93.7%	--	--	--	--	--	--
Registered Implants: 800	Malfunctions Only	99.9%	99.4%	95.1%	94.9%	--	--	--	--	--	--
	Effective Sample Size	713	640	497	222	--	--	--	--	--	--

@ 40 months

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

ACCOLADE/PROPONENT/ESSENTIO DR

Models: L101/L111/L201/L211/L301/L311

Worldwide Confirmed Malfunctions	**174**
Worldwide Distribution	**282,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	2	2
Integrated circuit (63)	6	16	22
Capacitor (67)	0	39	39
Telemetry (68)	1	8	9
Hydrogen induced premature depletion - September 2018 (70)	0	51	51
Software			
Memory errors (51)	0	18	18
Other			
Non-patterned, other	6	27	33
Grand Total	**13**	**161**	**174**

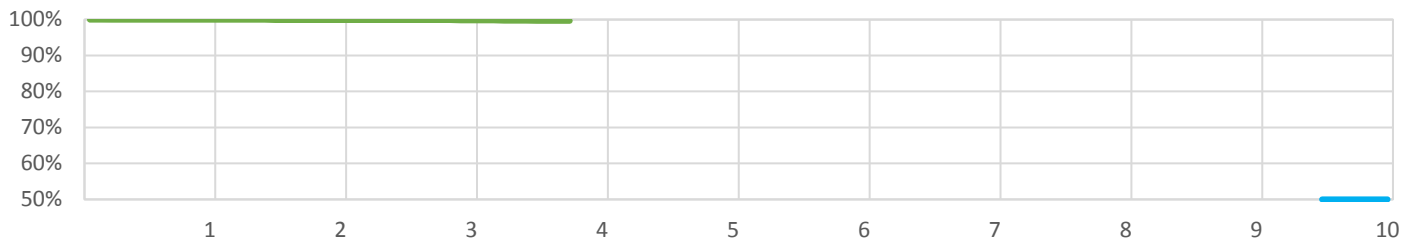
References cited in table above (link)

ACCOLADE/PROPONENT/ESSENTIO DR EL

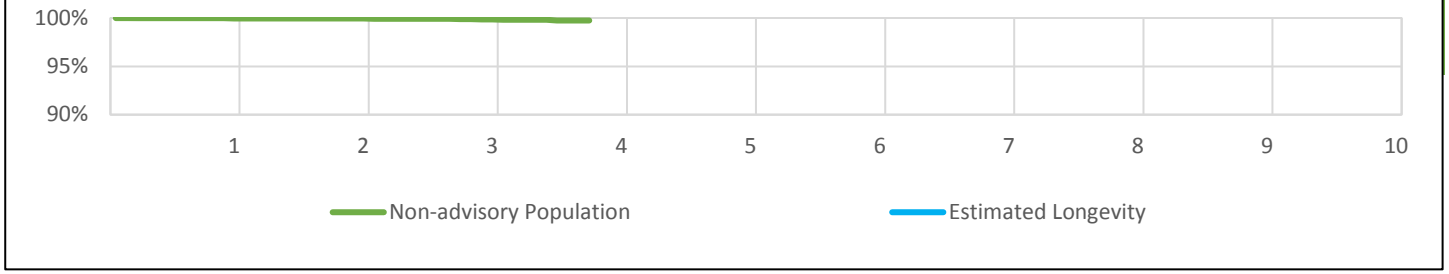
Models: L121/L131/L221/L231/L321/L331

US Summary			
US Registered Implants:	60,000	US Normal Battery Depletions:	12
US Approval Date:	October 2014	US Malfunctions:	39
US Estimated Active Implants:	56,000	Without Compromised Therapy:	37
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.7%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	99.9%	99.9%	99.7%	--	--	--	--	--	--
60,000	Effective Sample Size	38251	19127	5566	311	--	--	--	--	--	--

@ 46 months

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

ACCOLADE/PROPONENT/ESSENTIO DR EL

Models: L121/L131/L221/L231/L321/L331

Worldwide Confirmed Malfunctions	**100**
Worldwide Distribution	**148,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	2	2
Integrated circuit (63)	1	4	5
Capacitor (67)	0	29	29
Telemetry (68)	0	9	9
Hydrogen induced premature depletion - September 2018 (70)	2	17	19
Software			
Memory errors (51)	0	18	18
Other			
Non-patterned, other	1	17	18
Grand Total	**4**	**96**	**100**

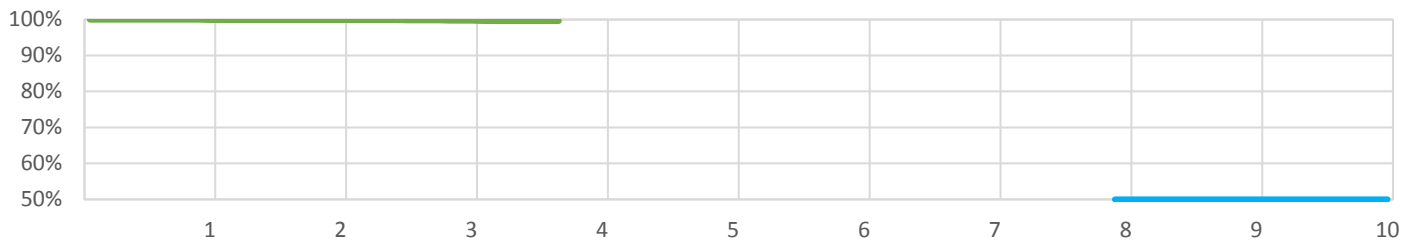
References cited in table above (link)

ACCOLADE/PROPONENT/ESSENTIO SR

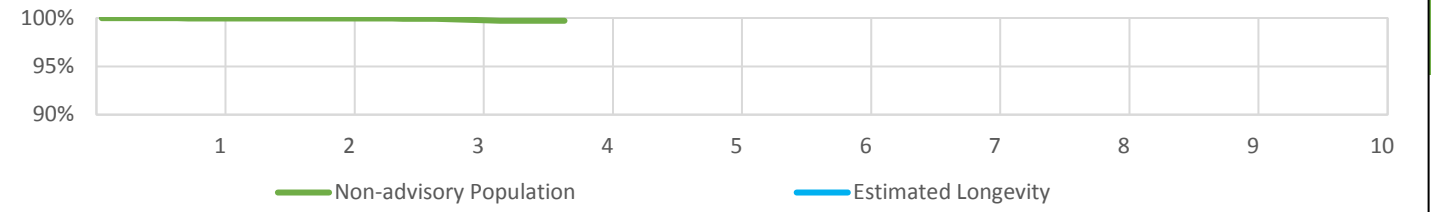
Models: L100/L110/L200/L210/L300/L310

US Summary			
US Registered Implants:	28,000	US Normal Battery Depletions:	15
US Approval Date:	October 2014	US Malfunctions:	25
US Estimated Active Implants:	24,000	Without Compromised Therapy:	23
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.7%	99.6%	--	--	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.8%	99.7%	--	--	--	--	--	--
28,000	Effective Sample Size	18503	10308	3402	414	--	--	--	--	--	--

@ 45 months

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

ACCOLADE/PROPONENT/ESSENTIO SR

Models: L100/L110/L200/L210/L300/L310

Worldwide Confirmed Malfunctions	**63**
Worldwide Distribution	**100,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	2	2
Integrated circuit (63)	4	3	7
Capacitor (67)	0	25	25
Telemetry (68)	0	4	4
Hydrogen induced premature depletion - September 2018 (70)	1	14	15
Software			
Memory errors (51)	0	4	4
Other			
Non-patterned, other	0	6	6
Grand Total	**5**	**58**	**63**

References cited in table above (link)

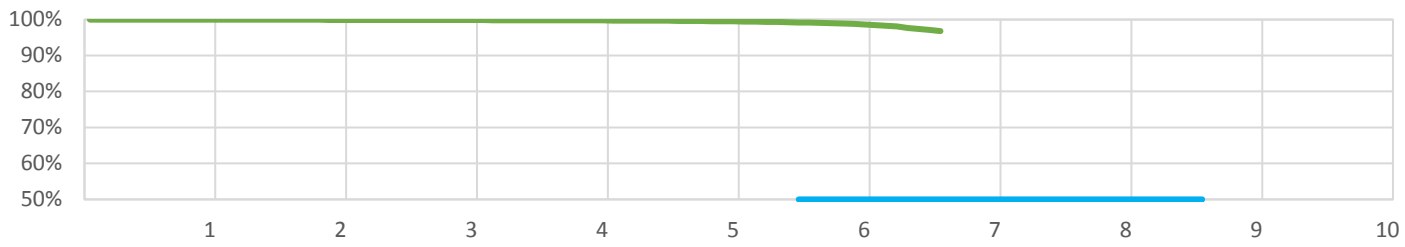
ADVANTIO/INGENIO/VITALIO/FORMIO DR

Models: J063/J066/J173/J176/J273/J276/J278/J279/K063/K066/K083/K086/K173/K176/K183/K186/K273/K276/K278/K279/K283/K286/K288/K289

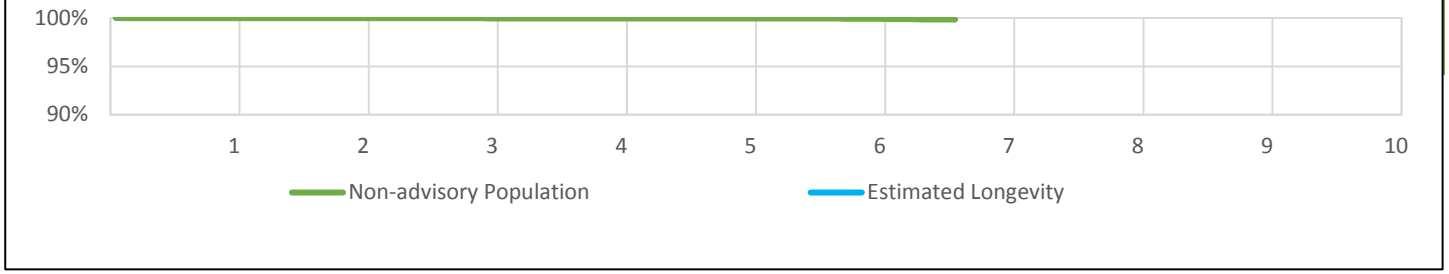
US Summary

US Registered Implants:	121,000	US Normal Battery Depletions:	540
US Approval Date:	May 2012	US Malfunctions:	58
US Estimated Active Implants:	93,000	Without Compromised Therapy:	47
		With Compromised Therapy:	11

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.8%	99.5%	98.8%	96.8%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.8%	--	--	--
121,000	Effective Sample Size	107321	95741	85344	70769	38694	12649	1064	--	--	--

@ 80 months

ADVANTIO/INGENIO/VITALIO/FORMIO DR

Models: J063/J066/J173/J176/J273/J276/J278/J279/K063/K066/K083/K086/K173/K176/K183/K186/K273/K276/ K278/K279/K283/K286/K288/K289

Worldwide Confirmed Malfunctions	**93**
Worldwide Distribution	**219,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	0	8	8
Integrated circuit (50)	7	3	10
Titanium case material (60)	3	0	3
Software			
Memory errors (51)	1	22	23
Other			
Non-patterned, other	8	41	49
Grand Total	**19**	**74**	**93**

References cited in table above (link)

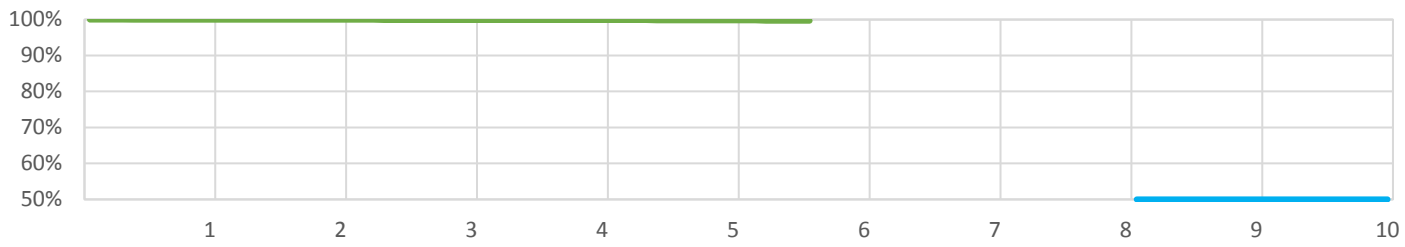
ADVANTIO/INGENIO/VITALIO EL DR

Models: J064/J067/J174/J177/J274/J277/K064/K067/K084/K087/K174/K177/K184/K187/K274/K277/K284/K287

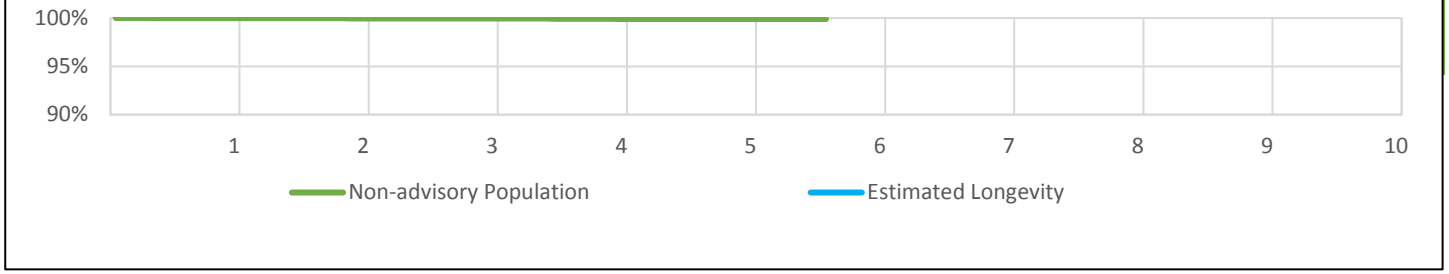
US Summary

US Registered Implants:	11,000	US Normal Battery Depletions:	6
US Approval Date:	May 2012	US Malfunctions:	8
US Estimated Active Implants:	9,000	Without Compromised Therapy:	6
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.9%	99.8%	99.7%	--	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%	--	--	--	--
11,000	Effective Sample Size	9672	8582	7529	5709	1535	247	--	--	--	--

@ 68 months

ADVANTIO/INGENIO/VITALIO/FORMIO EL DR

Models: J064/J067/J174/J177/J274/J277/K064/K067/K084/K087/K174/K177/K184/K187/K274/K277/K284/K287

Worldwide Confirmed Malfunctions	**48**
Worldwide Distribution	**75,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	1	5	6
Integrated circuit (50)	2	0	2
Titanium case material (60)	2	0	2
Software			
Memory errors (51)	0	4	4
Respiratory sensor (59)	0	1	1
Other			
Non-patterned, other	4	29	33
Grand Total	**9**	**39**	**48**

References cited in table above (link)

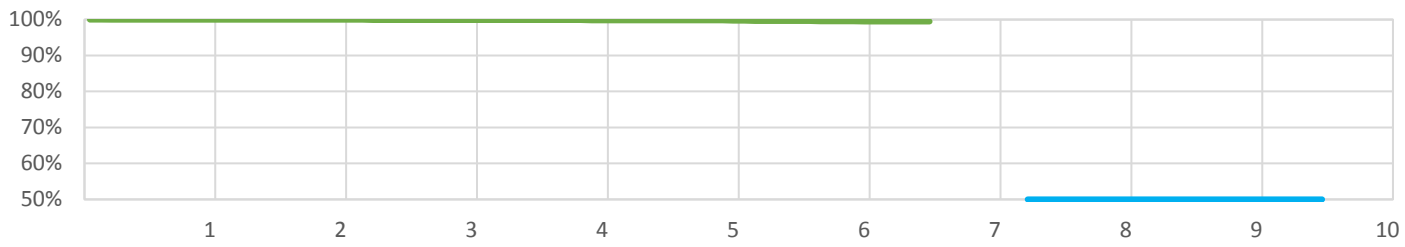
ADVANTIO/INGENIO/VITALIO/FORMIO SR

Models: J062/J065/J172/J175/J272/J275/K062/K065/K082/K085/K172/K175/K182/K185/K272/K275/K282/K285

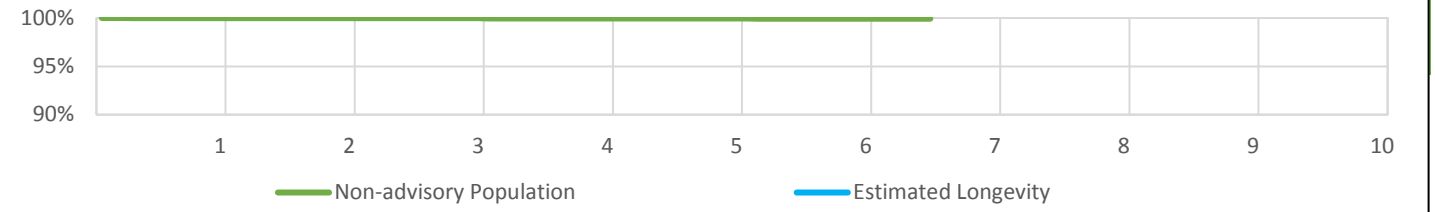
US Summary

US Registered Implants:	27,000	US Normal Battery Depletions:	42
US Approval Date:	May 2012	US Malfunctions:	11
US Estimated Active Implants:	18,000	Without Compromised Therapy:	10
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.8%	99.8%	99.5%	99.5%	--	--	--
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	--	--	--
27,000	Effective Sample Size	22925	20399	17980	14172	7508	2314	348	--	--	--

@ 79 months

ADVANTIO/INGENIO/VITALIO SR

Models: J062/J065/J172/J175/J272/J275/K062/K065/K082/K085/K172/K175/K182/K185/K272/K275/K282/K285

Worldwide Confirmed Malfunctions	**24**
Worldwide Distribution	**86,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Low-voltage capacitors (47)	1	3	4
Integrated circuit (50)	3	2	5
Titanium case material (60)	1	0	1
Software			
Memory errors (51)	0	9	9
Other			
Non-patterned, other	3	2	5
Grand Total	**8**	**16**	**24**

References cited in table above (link)

ALTRUA 2 DR

Models: S702

Worldwide Confirmed Malfunctions	**1**
Worldwide Distribution	**6,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Software			
Memory errors (51)	0	1	1
Grand Total	**0**	**1**	**1**

References cited in table above (link)

ALTRUA 2 DR EL

Models: S722

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**2,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

ALTRUA 2 SR

Models: S701

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**5,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

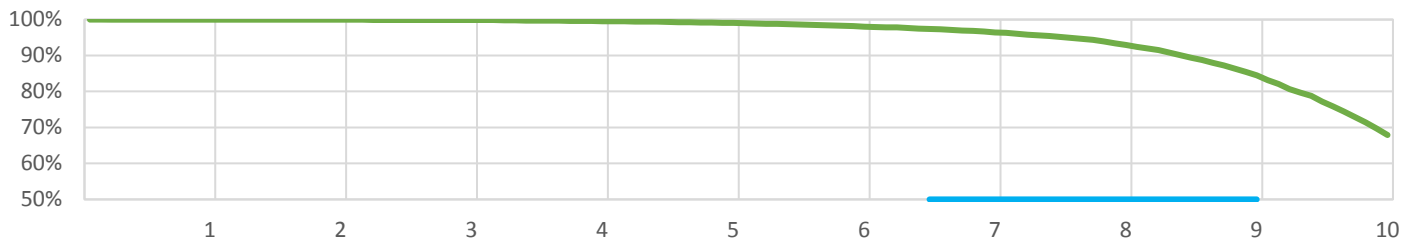
ALTRUA 60 DR

Model: S602

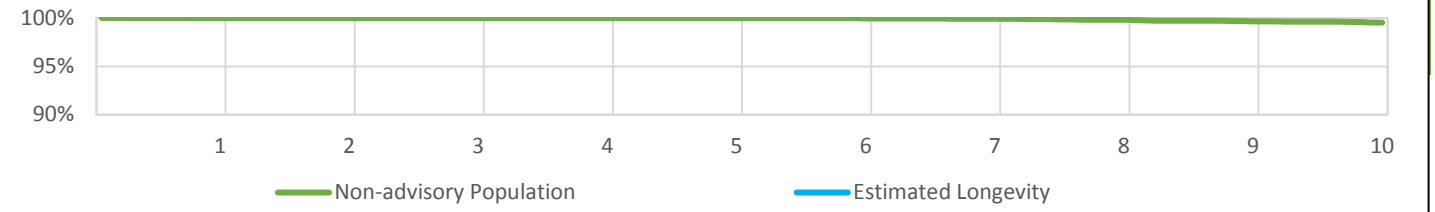
US Summary

US Registered Implants:	22,000	US Normal Battery Depletions:	1,935
US Approval Date:	April 2008	US Malfunctions:	32
US Estimated Active Implants:	11,000	Without Compromised Therapy:	30
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.6%	99.1%	98.2%	96.6%	93.4%	85.5%	69.7%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.8%	99.7%	99.5%
22,000	Effective Sample Size	19570	17449	15506	13718	12058	10474	8870	6880	4785	1834

ALTRUA 60 DR

Models: S602

Worldwide Confirmed Malfunctions	**50**
Worldwide Distribution	**56,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	1	1
Mechanical			
Capacitor array (16)	0	1	1
Difficulty securing lead (41)	1	0	1
Other			
Non-patterned, other	2	3	5
Battery depletion (26)	1	1	2
Battery status (49)	0	40	40
Grand Total	**4**	**46**	**50**

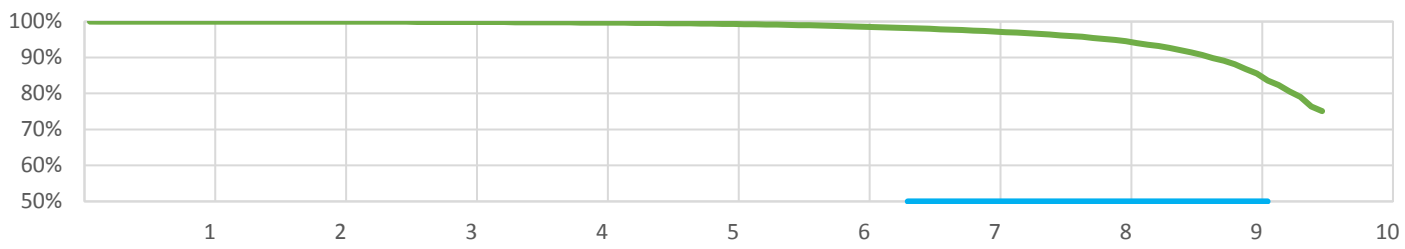
References cited in table above (link)

ALTRUA 60 DR EL

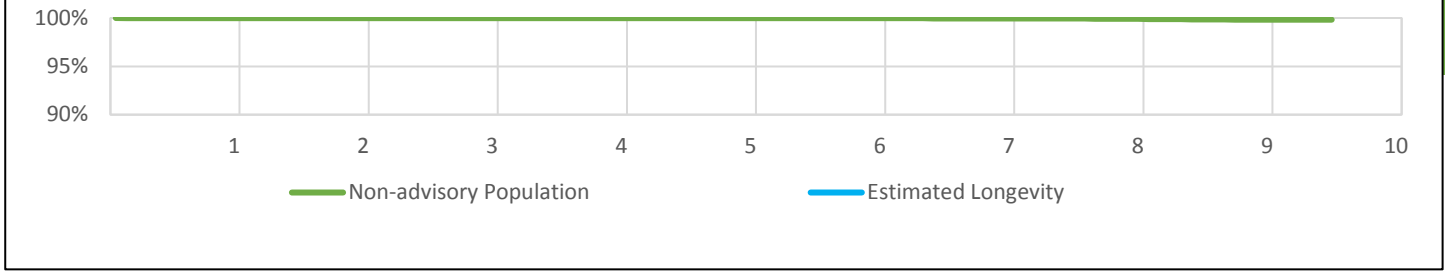
Model: S606

US Summary			
US Registered Implants:	59,000	US Normal Battery Depletions:	1,901
US Approval Date:	April 2008	US Malfunctions:	27
US Estimated Active Implants:	36,000	Without Compromised Therapy:	22
		With Compromised Therapy:	5

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.9%	99.7%	99.4%	98.6%	97.4%	94.9%	86.8%	75.1%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.8%	99.8%
59,000	Effective Sample Size	52500	46917	41872	37328	33206	28940	21892	11248	3181	415

@ 115 months

ALTRUA 60 DR EL

Models: S606

Worldwide Confirmed Malfunctions	**34**
Worldwide Distribution	**90,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	3	3
Integrated circuit (17)	0	1	1
Mechanical			
Difficulty securing lead (41)	1	0	1
Other			
Non-patterned, other	2	2	4
Battery depletion (26)	2	0	2
Battery status (49)	0	22	22
Magnet rate (44)	0	1	1
Grand Total	**5**	**29**	**34**

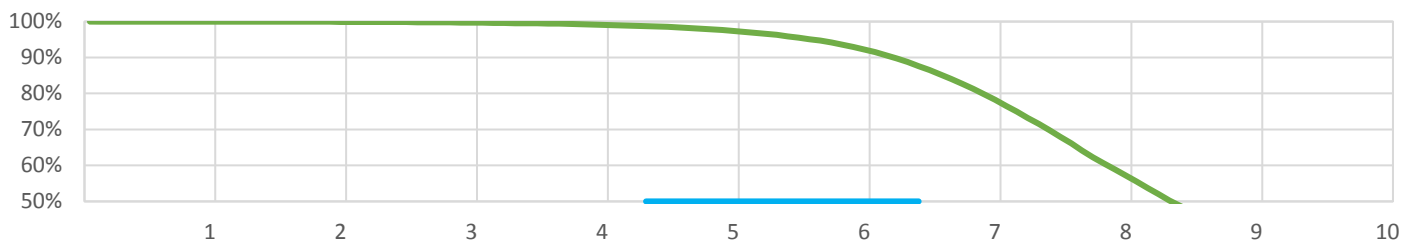
References cited in table above (link)

ALTRUA 60 DR (Downsize)

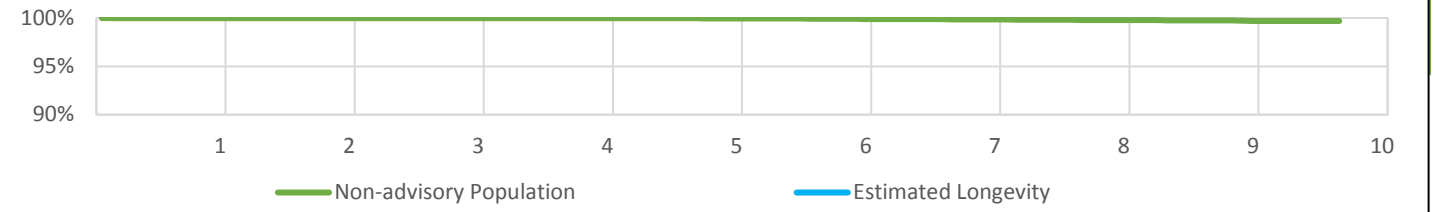
Model: S603

US Summary			
US Registered Implants:	90,000	US Normal Battery Depletions:	18,452
US Approval Date:	April 2008	US Malfunctions:	88
US Estimated Active Implants:	33,000	Without Compromised Therapy:	78
		With Compromised Therapy:	10

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.7%	99.2%	97.6%	93.0%	79.7%	58.9%	39.2%	18.8%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.8%	99.7%	99.7%
90,000	Effective Sample Size	78562	70259	62736	55816	49088	41242	28364	12931	3755	399

@ 117 months

ALTRUA 60 DR (Downsize)

Models: S603

Worldwide Confirmed Malfunctions	**115**
Worldwide Distribution	**132,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	7	4	11
Integrated circuit (30)	1	1	2
Mechanical			
Difficulty securing lead (41)	0	1	1
Connector block (39)	0	1	1
Software			
Underestimation of battery status (34)	0	1	1
Other			
Non-patterned, other	4	4	8
Battery depletion (26)	1	3	4
Battery status (49)	0	85	85
Magnet response (21)	0	2	2
Grand Total	**13**	**102**	**115**

References cited in table above (link)

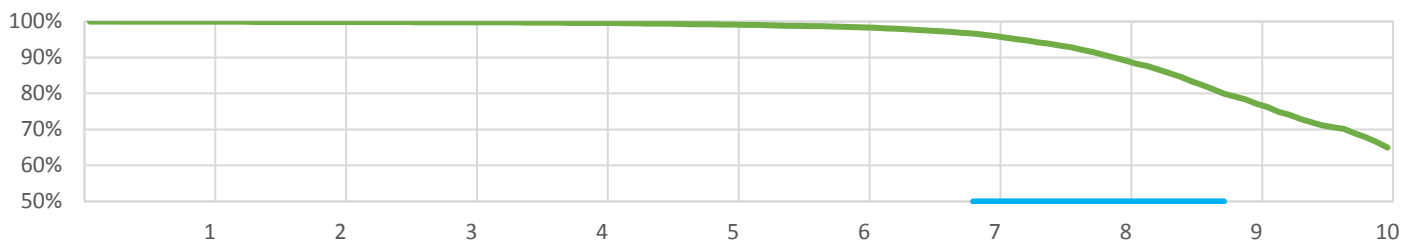
ALTRUA 60 SR

Model: S601

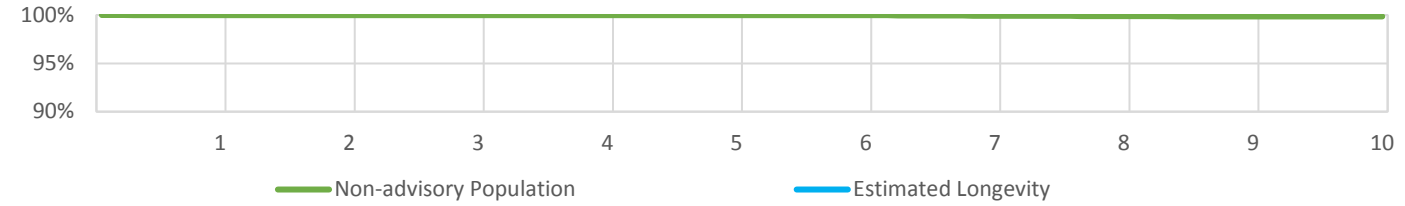
US Summary

US Registered Implants:	32,000	US Normal Battery Depletions:	1,917
US Approval Date:	April 2008	US Malfunctions:	16
US Estimated Active Implants:	12,000	Without Compromised Therapy:	14
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.6%	99.2%	98.4%	96.3%	89.9%	78.3%	66.5%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%
32,000	Effective Sample Size	26340	23151	20601	18379	16336	14186	10972	6320	2730	547

ALTRUA 60 SR

Models: S601

Worldwide Confirmed Malfunctions	**30**
Worldwide Distribution	**68,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	2	1	3
Integrated circuit (30)	2	0	2
Other			
Non-patterned, other	2	1	3
Battery depletion (26)	1	0	1
Battery status (49)	0	21	21
Grand Total	**7**	**23**	**30**

References cited in table above (link)

ALTRUA 50 DR (Downsize)

Models: S502

Worldwide Confirmed Malfunctions	**33**
Worldwide Distribution	**48,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	1	2	3
Integrated circuit (30)	0	1	1
Other			
Non-patterned, other	0	1	1
Battery depletion (26)	0	2	2
Battery status (49)	0	26	26
Grand Total	**1**	**32**	**33**

References cited in table above (link)

ALTRUA 50 SR

Models: S501

Worldwide Confirmed Malfunctions	**12**
Worldwide Distribution	**25,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	4	1	5
Other			
Non-patterned, other	1	0	1
Battery depletion (26)	2	0	2
Battery status (49)	0	4	4
Grand Total	**7**	**5**	**12**

References cited in table above (link)

ALTRUA 50 DDD (Downsize)

Models: S504

Worldwide Confirmed Malfunctions	**9**
Worldwide Distribution	**12,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Battery depletion (26)	3	0	3
Battery status (49)	0	6	6
Grand Total	**3**	**6**	**9**

References cited in table above (link)

ALTRUA 50 VDD (Downsize)

Models: S504

Worldwide Confirmed Malfunctions	**5**
Worldwide Distribution	**6,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Battery status (49)	0	5	5
Grand Total	**0**	**5**	**5**

References cited in table above (link)

ALTRUA 50 SSI

Models: S508

Worldwide Confirmed Malfunctions	**4**
Worldwide Distribution	**6,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Battery depletion (26)	1	0	1
Battery status (49)	0	3	3
Grand Total	**1**	**3**	**4**

References cited in table above (link)

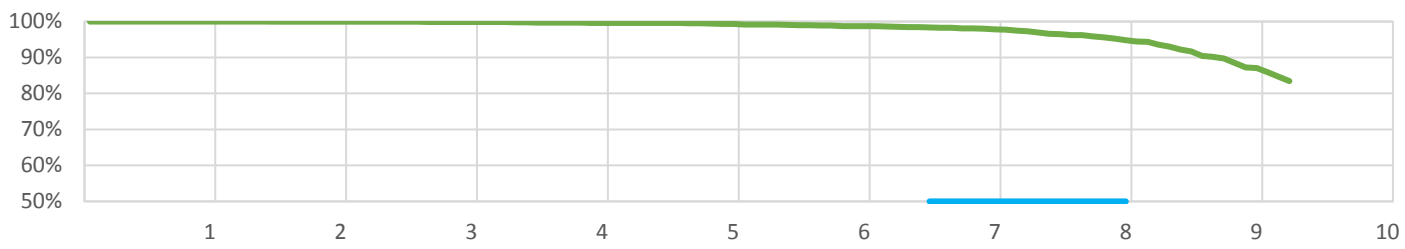
ALTRUA 40 DR EL

Model: S404

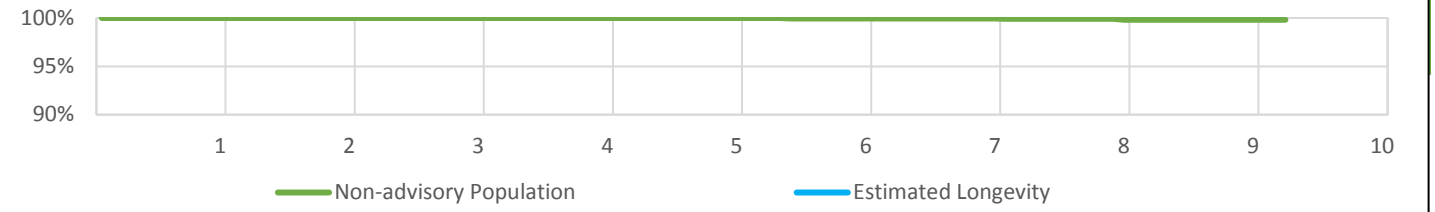
US Summary

US Registered Implants:	5,000	US Normal Battery Depletions:	173
US Approval Date:	April 2008	US Malfunctions:	3
US Estimated Active Implants:	3,000	Without Compromised Therapy:	3
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	99.9%	99.7%	99.3%	98.7%	98.0%	95.2%	87.3%	83.5%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.8%	99.8%
5,000	Effective Sample Size	4427	3958	3554	3174	2836	2505	2028	1158	443	214

@ 112 months

ALTRUA 40 DR EL

Models: S404

Worldwide Confirmed Malfunctions	**4**
Worldwide Distribution	**11,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	1	1
Other			
Battery status (49)	0	3	3
Grand Total	**0**	**4**	**4**

References cited in table above (link)

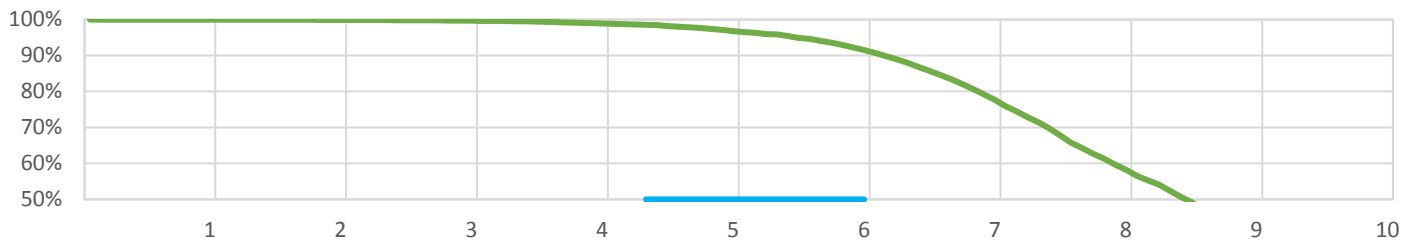
ALTRUA 40 DR (Downsize)

Model: S403

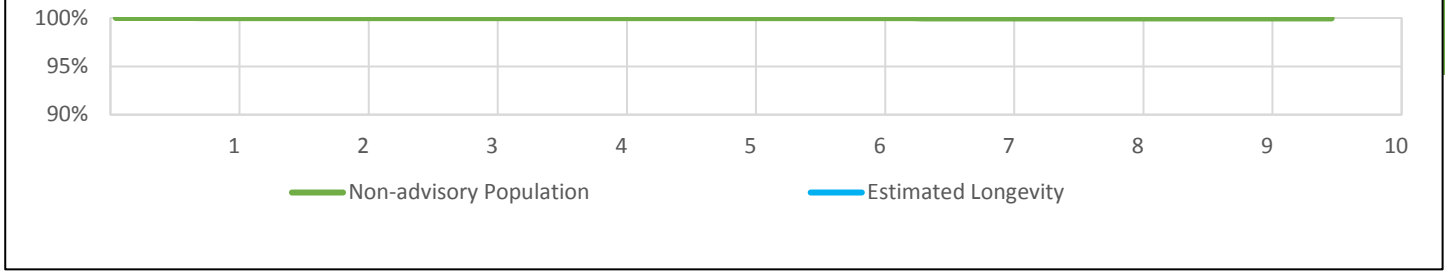
US Summary

US Registered Implants:	14,000	US Normal Battery Depletions:	2,915
US Approval Date:	April 2008	US Malfunctions:	4
US Estimated Active Implants:	5,000	Without Compromised Therapy:	4
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.7%	99.0%	97.1%	92.2%	79.1%	59.7%	41.7%	31.0%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
14,000	Effective Sample Size	12422	11125	9935	8841	7769	6585	4685	2134	595	212

@ 115 months

ALTRUA 40 DR (Downsize)

Models: S403

Worldwide Confirmed Malfunctions	**5**
Worldwide Distribution	**16,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Mechanical			
Seal plug (40)	0	1	1
Difficulty securing lead (41)	0	1	1
Other			
Battery status (49)	0	3	3
Grand Total	**0**	**5**	**5**

References cited in table above (link)

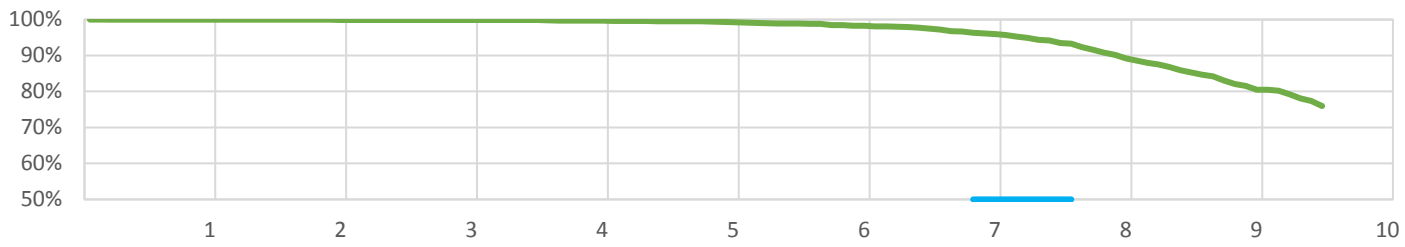
ALTRUA 40 SR

Model: S401

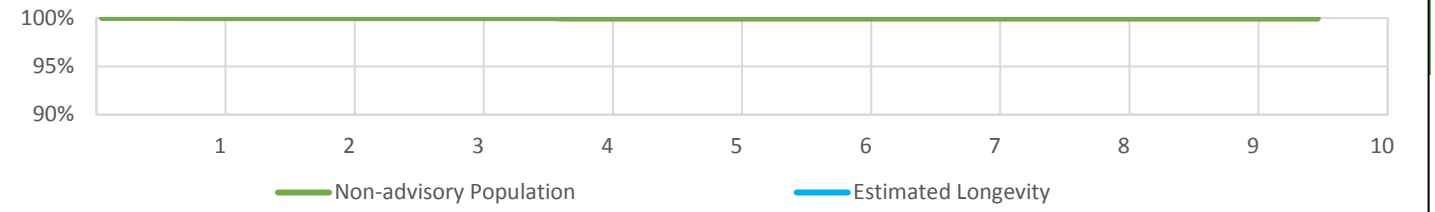
US Summary

US Registered Implants:	5,000	US Normal Battery Depletions:	259
US Approval Date:	April 2008	US Malfunctions:	2
US Estimated Active Implants:	2,000	Without Compromised Therapy:	2
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.9%	99.7%	99.3%	98.3%	96.2%	90.2%	81.5%	76.0%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%
5,000	Effective Sample Size	3883	3403	2974	2640	2335	2059	1659	985	419	211

@ 115 months

ALTRUA 40 SR

Models: S401

Worldwide Confirmed Malfunctions	**3**
Worldwide Distribution	**9,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	2	2
Integrated circuit (30)	1	0	1
Grand Total	**1**	**2**	**3**

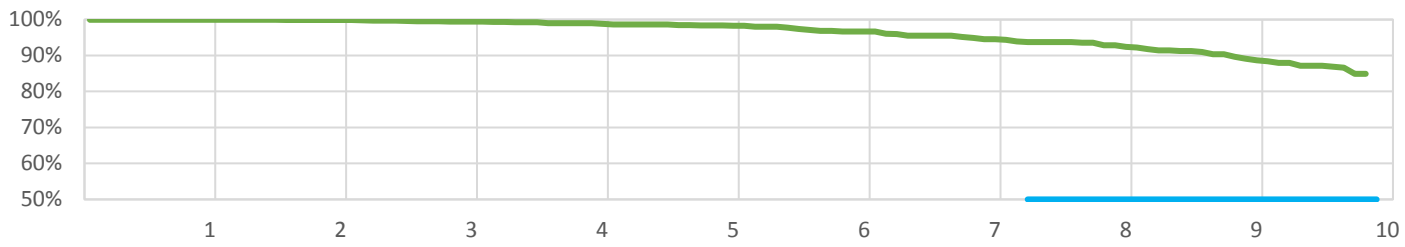
References cited in table above (link)

ALTRUA 20 DR

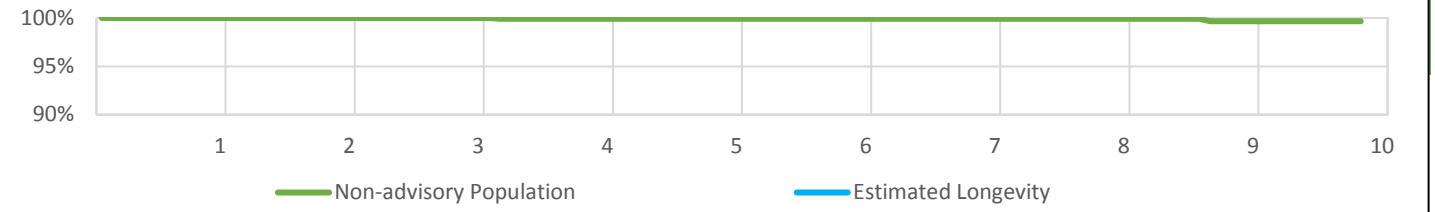
Model: S202/S205

US Summary			
US Registered Implants:	2,000	US Normal Battery Depletions:	89
US Approval Date:	April 2008	US Malfunctions:	2
US Estimated Active Implants:	1,000	Without Compromised Therapy:	1
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.5%	99.0%	98.4%	96.6%	94.6%	92.8%	89.2%	84.9%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%	99.9%	99.7%	99.7%
2,000	Effective Sample Size	1503	1326	1149	1004	862	724	602	489	380	212

ALTRUA 20 DR

Models: S202/S205

Worldwide Confirmed Malfunctions	**3**
Worldwide Distribution	**3,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Battery depletion (26)	1	0	1
Magnet rate (44)	0	1	1
Battery status (49)	0	1	1
Grand Total	**1**	**2**	**3**

References cited in table above (link)

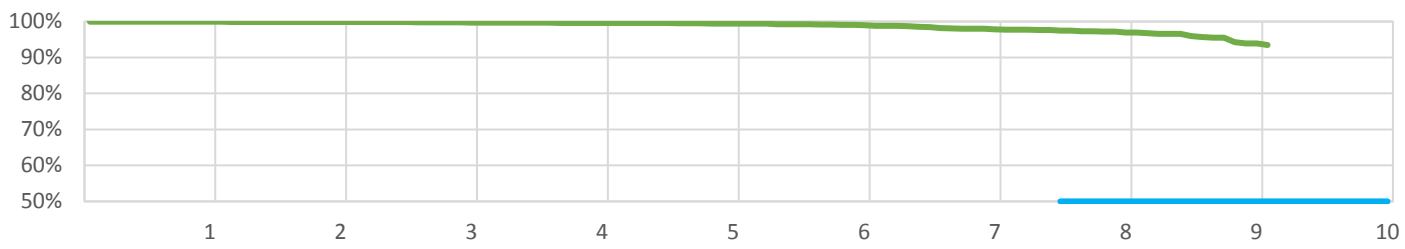
ALTRUA 20 DR EL

Model: S208

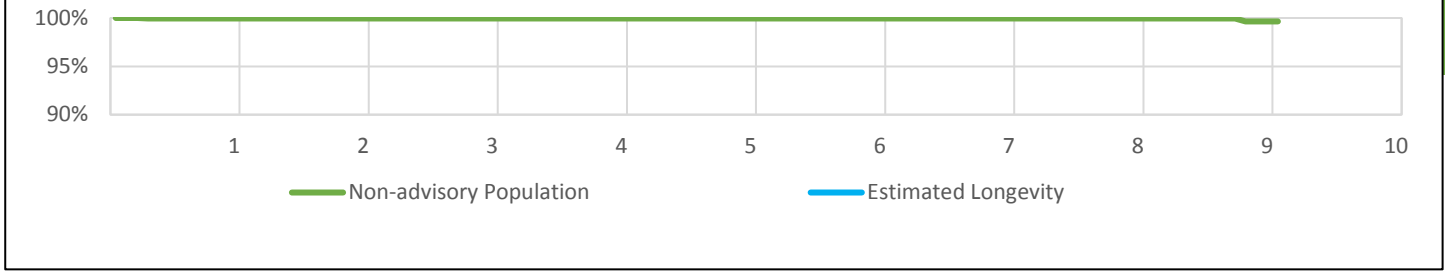
US Summary

US Registered Implants:	3,000	US Normal Battery Depletions:	56
US Approval Date:	April 2008	US Malfunctions:	2
US Estimated Active Implants:	2,000	Without Compromised Therapy:	1
		With Compromised Therapy:	1

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.9%	99.8%	99.6%	99.5%	99.0%	98.0%	97.2%	93.9%	93.5%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.6%	99.6%
3,000	Effective Sample Size	2761	2471	2198	1969	1748	1555	1243	720	272	215

@ 110 months

ALTRUA 20 DR EL

Models: S208

Worldwide Confirmed Malfunctions	**5**
Worldwide Distribution	**11,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	2	0	2
Other			
Non-patterned, other	1	1	2
Battery status (49)	0	1	1
Grand Total	**3**	**2**	**5**

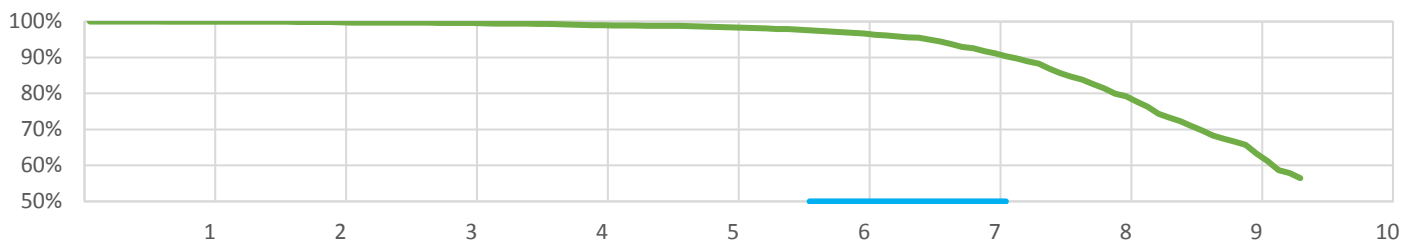
References cited in table above (link)

ALTRUA 20 DR (downsize)

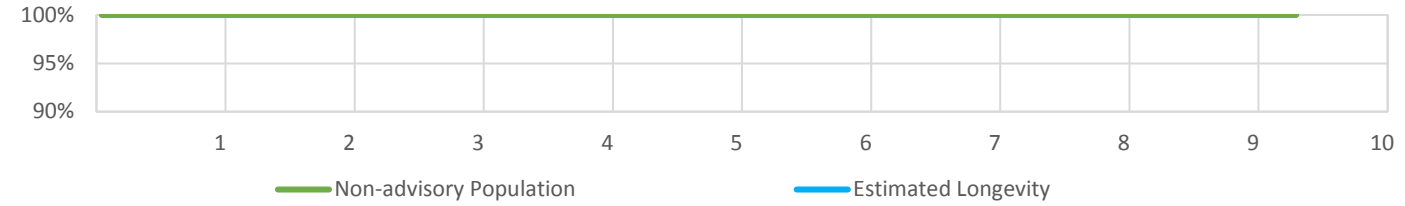
Model: S203

US Summary			
US Registered Implants:	5,000	US Normal Battery Depletions:	596
US Approval Date:	April 2008	US Malfunctions:	-
US Estimated Active Implants:	2,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.6%	99.0%	98.4%	96.9%	91.8%	80.0%	65.7%	56.5%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
5,000	Effective Sample Size	4310	3814	3394	3014	2681	2353	1865	1043	379	200

@ 113 months

ALTRUA 20 DR (downsize)

Models: S203

Worldwide Confirmed Malfunctions	**4**
Worldwide Distribution	**16,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	2	2
Other			
Battery depletion (26)	1	0	1
Battery status (49)	0	1	1
Grand Total	**1**	**3**	**4**

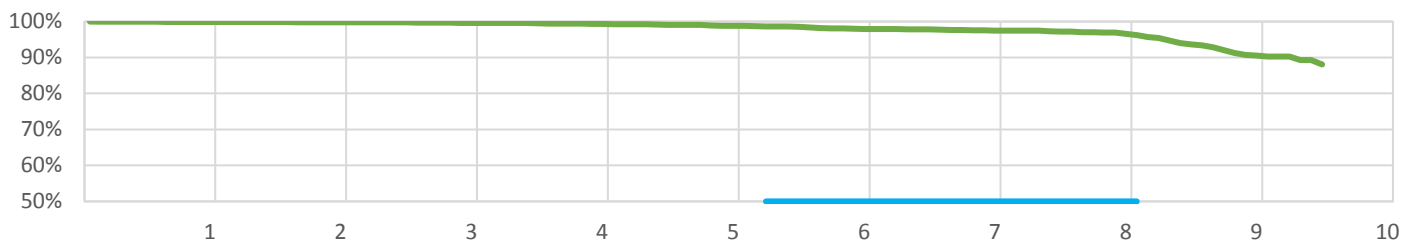
References cited in table above (link)

ALTRUA 20 SR

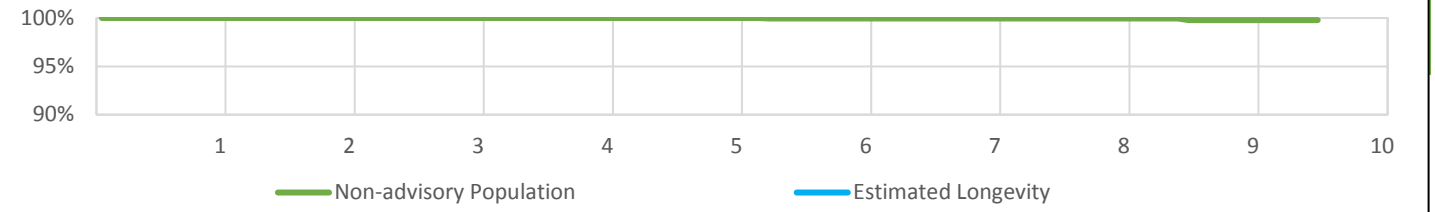
Model: S201/S204

US Summary			
US Registered Implants:	5,000	US Normal Battery Depletions:	108
US Approval Date:	April 2008	US Malfunctions:	2
US Estimated Active Implants:	2,000	Without Compromised Therapy:	2
		With Compromised Therapy:	-

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.7%	99.4%	98.8%	98.0%	97.6%	96.9%	90.8%	88.1%
Registered Implants:	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	99.8%	99.8%
5,000	Effective Sample Size	3568	3041	2605	2269	1973	1690	1364	849	405	223

@ 115 months

ALTRUA 20 SR

Models: S201/S204

Worldwide Confirmed Malfunctions	**4**
Worldwide Distribution	**24,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	0	1	1
Other			
Non-patterned, other	1	0	1
Battery status (49)	0	2	2
Grand Total	**1**	**3**	**4**

References cited in table above (link)

ALTRUA 20 SSI

Models: S206

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**8,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterend, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

ALTRUA 20 DDD

Models: S207

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**1,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

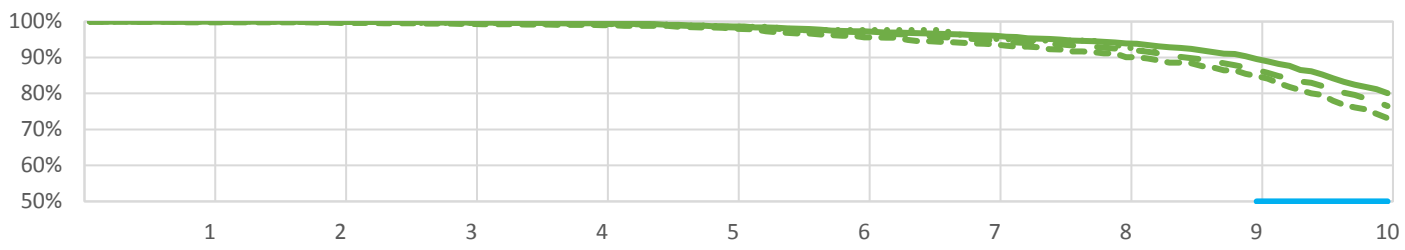
INSIGNIA Entra DR

Model: 1294/1295

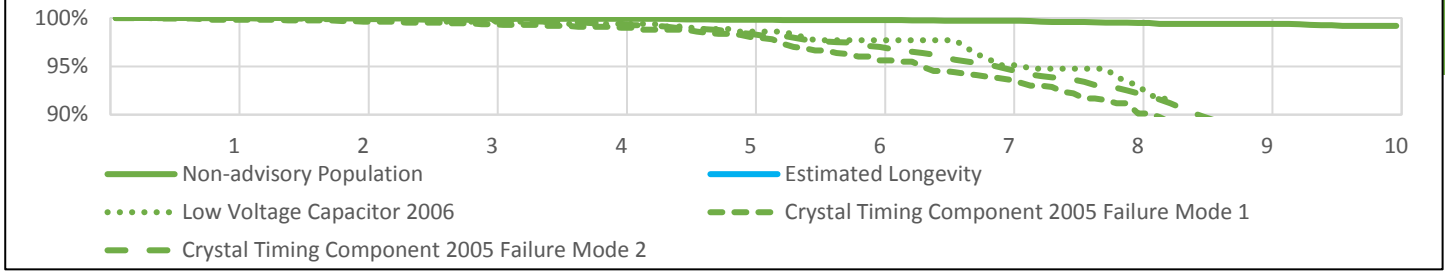
US Summary

US Registered Implants:	17,000	US Normal Battery Depletions:	2,399
US Approval Date:	March 2002	US Malfunctions:	74
US Estimated Active Implants:	2,000	Without Compromised Therapy:	64
		With Compromised Therapy:	10

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.5%	98.7%	97.3%	96.2%	94.2%	90.3%	81.2%
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.8%	99.8%	99.7%	99.5%	99.4%	99.2%
7000	Effective Sample Size	6106	5418	4802	4260	3723	3239	2841	2489	2123	1658

INSIGNIA Entra DR

Model: 1294/1295

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Low Voltage Capacitor 2006	Depletions and Malfunctions	100.0%	100.0%	99.6%	99.4%	98.9%	97.7%	97.0%	94.7%	91.7%	--
Registered Implants: 1000	Malfunctions Only	100.0%	100.0%	99.8%	99.6%	99.6%	99.6%	99.6%	99.6%	99.6%	--
	Effective Sample Size	651	565	493	421	363	311	272	229	201	--
Crystal Timing Component 2005 Failure Mode 1	Depletions and Malfunctions	99.8%	99.7%	99.4%	99.1%	98.3%	96.0%	93.8%	91.2%	85.4%	74.4%
Registered Implants: 2000	Malfunctions Only	99.8%	99.8%	99.8%	99.8%	99.8%	99.8%	99.7%	99.1%	99.1%	98.9%
	Effective Sample Size	1602	1392	1164	1021	888	745	625	518	420	305
Crystal Timing Component 2005 Failure Mode 2	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.4%	98.5%	97.1%	95.0%	92.5%	87.3%	77.8%
Registered Implants: 7000	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.8%	99.7%	99.5%	99.2%	99.0%	98.9%
	Effective Sample Size	6122	5425	4774	4205	3677	3169	2667	2264	1842	1398

@ 105 months

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

INSIGNIA Entra DR

Models: 1294/1295

Worldwide Confirmed Malfunctions	**91**
Worldwide Distribution	**37,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Integrated circuit (13)	1	0	1
Capacitor (15)	1	0	1
Integrated circuit (30)	1	0	1
Mechanical			
Seal plug (19)	0	3	3
Header (20)	2	0	2
Seal plug (33)	0	1	1
Crystal timing component Failure Mode 1 - September 22, 2005 Voluntary Physician Advisory (9)	5	0	5
Software			
Underestimation of battery status (34)	0	2	2
Other			
Non-patterned, other	7	3	10
Longevity labeling (11)	0	50	50
Battery status (49)	0	15	15
Grand Total	**17**	**74**	**91**

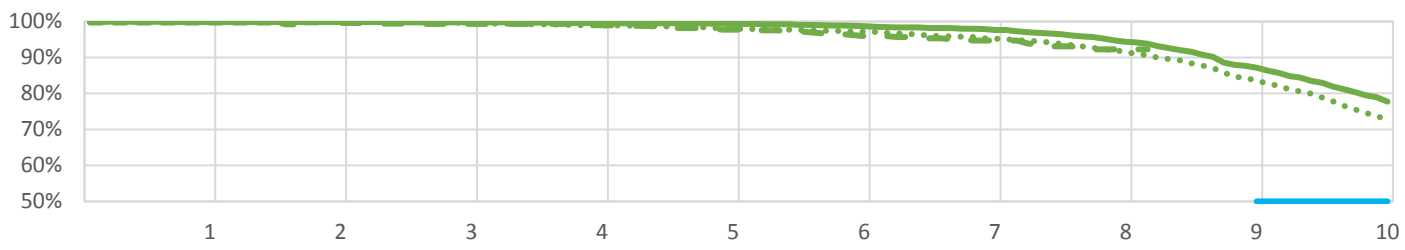
INSIGNIA Entra SR

Model: 1195/1198

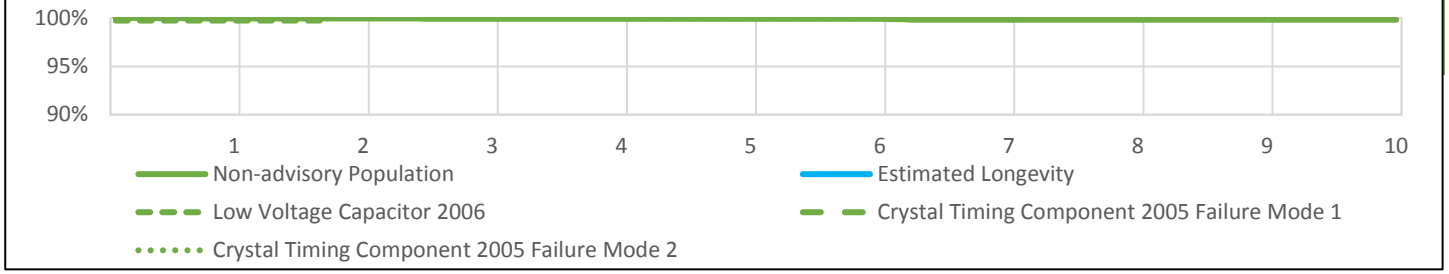
US Summary

US Registered Implants:	14,000	US Normal Battery Depletions:	1,158
US Approval Date:	March 2002	US Malfunctions:	8
US Estimated Active Implants:	1,000	Without Compromised Therapy:	6
		With Compromised Therapy:	2

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.8%	99.6%	99.4%	98.8%	97.9%	94.7%	87.7%	79.0%
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%	99.8%	99.8%	99.8%	99.8%
6000	Effective Sample Size	4619	3790	3172	2660	2239	1902	1642	1403	1141	893

INSIGNIA Entra SR

Model: 1294/1295

US Survival Probability (cont.)												
	Year	1	2	3	4	5	6	7	8	9	10	
Low Voltage Capacitor 2006	Depletions and Malfunctions	99.7%	99.2%	--	--	--	--	--	--	--	--	
Registered Implants: 500	Malfunctions Only	99.7%	99.7%	--	--	--	--	--	--	--	--	
	Effective Sample Size	254	200	--	--	--	--	--	--	--	--	@ 22 months
Crystal Timing Component 2005 Failure Mode 1	Depletions and Malfunctions	99.9%	99.8%	99.3%	99.0%	97.8%	96.3%	94.7%	92.3%	92.3%	--	
Registered Implants: 2000	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	--	
	Effective Sample Size	1105	894	704	564	454	355	263	210	201	--	@ 99 months
Crystal Timing Component 2005 Failure Mode 2	Depletions and Malfunctions	100.0%	99.9%	99.7%	99.0%	98.1%	97.2%	95.3%	92.1%	84.3%	73.7%	
Registered Implants: 6000	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	99.9%	99.9%	99.9%	99.9%	
	Effective Sample Size	4476	3731	3086	2546	2090	1737	1447	1209	947	713	

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

INSIGNIA Entra SR

Models: 1195/1198

Worldwide Confirmed Malfunctions	**28**
Worldwide Distribution	**52,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	2	2	4
	2	0	2
Low-voltage capacitor - June 23, 2006 Voluntary Physician Advisory (8)			
Mechanical			
Capacitor array (16)	2	0	2
Seal plug (19)	2	0	2
Seal plug (33)	1	0	1
Crystal timing component Failure Mode 1 - September 22, 2005 Voluntary Physician Advisory (9)	0	1	1
Crystal timing component Failure Mode 2 - September 22, 2005 Voluntary Physician Advisory (10)	1	0	1
Other			
Non-patterned, other	2	1	3
Longevity labeling (11)	0	6	6
Battery depletion (26)	1	0	1
Battery status (49)	0	5	5
Grand Total	**13**	**15**	**28**

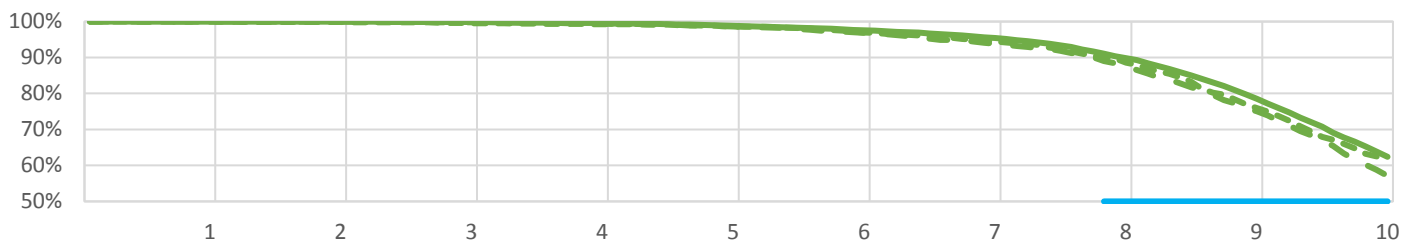
INSIGNIA Ultra DR

Model: 1291

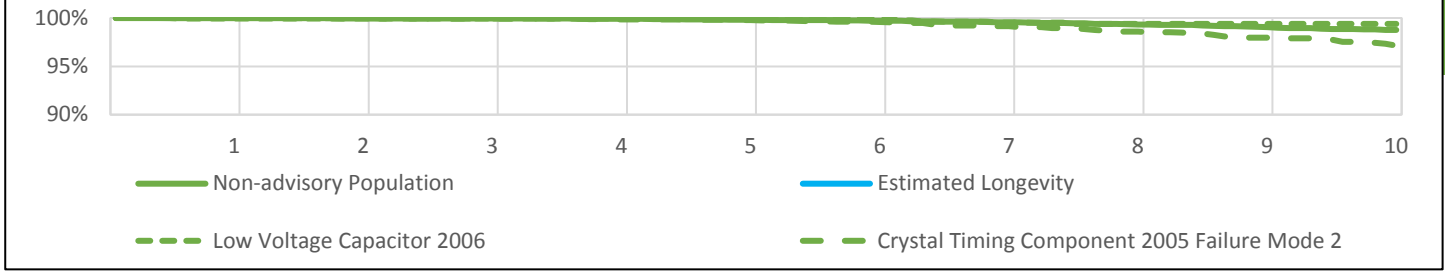
US Summary

US Registered Implants:	32,000	US Normal Battery Depletions:	6,853
US Approval Date:	November 2003	US Malfunctions:	203
US Estimated Active Implants:	7,000	Without Compromised Therapy:	188
		With Compromised Therapy:	15

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population Registered Implants: 24000	Depletions and Malfunctions	100.0%	100.0%	99.9%	99.6%	98.9%	97.7%	95.7%	90.4%	79.8%	63.9%
	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.8%	99.7%	99.6%	99.4%	99.1%	98.8%
	Effective Sample Size	20771	18541	16539	14704	13018	11453	9973	8362	6503	4539

INSIGNIA Ultra DR

Model: 1291

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Low Voltage Capacitor 2006	Depletions and Malfunctions	99.9%	99.9%	99.6%	99.3%	98.9%	97.5%	95.0%	90.2%	78.3%	63.2%
Registered Implants: 2000	Malfunctions Only	99.9%	99.9%	99.9%	99.9%	99.9%	99.9%	99.5%	99.4%	99.4%	99.4%
	Effective Sample Size	1861	1651	1460	1288	1136	990	854	708	541	372
Crystal Timing Component 2005 Failure Mode 2	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.4%	98.7%	97.1%	94.1%	88.4%	76.0%	58.8%
Registered Implants: 6000	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.8%	99.6%	99.1%	98.6%	98.0%	97.3%
	Effective Sample Size	5566	4948	4399	3894	3431	2976	2563	2110	1580	1030

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

INSIGNIA Ultra DR

Models: 1291

Worldwide Confirmed Malfunctions	**261**
Worldwide Distribution	**51,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (14)	0	1	1
Capacitor (15)	2	4	6
Integrated circuit (30)	1	2	3
Low-voltage capacitor - June 23, 2006 Voluntary Physician Advisory (8)	2	0	2
Mechanical			
Seal plug (19)	4	5	9
Header (20)	1	2	3
Software			
Underestimation of battery status (34)	0	3	3
Pacing rate limit (36)	0	1	1
Other			
Non-patterned, other	10	8	18
Longevity labeling (11)	0	83	83
Magnet response (21)	0	1	1
Battery depletion (26)	1	3	4
Battery status (49)	0	127	127
Grand Total	**21**	**240**	**261**

References cited in table above (link)

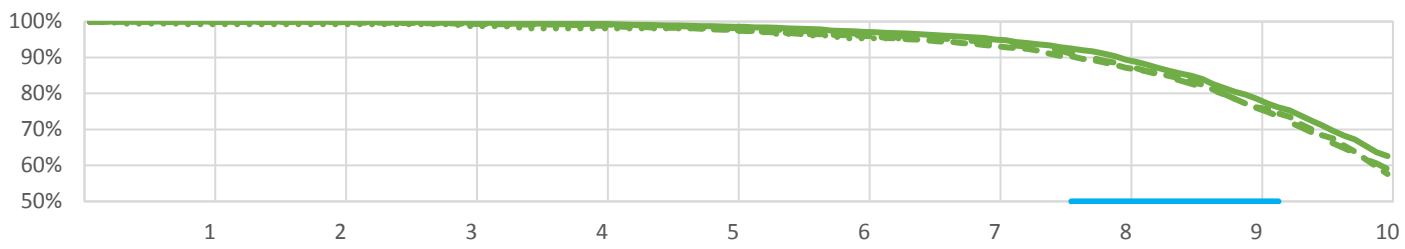
INSIGNIA Plus DR

Model: 1297

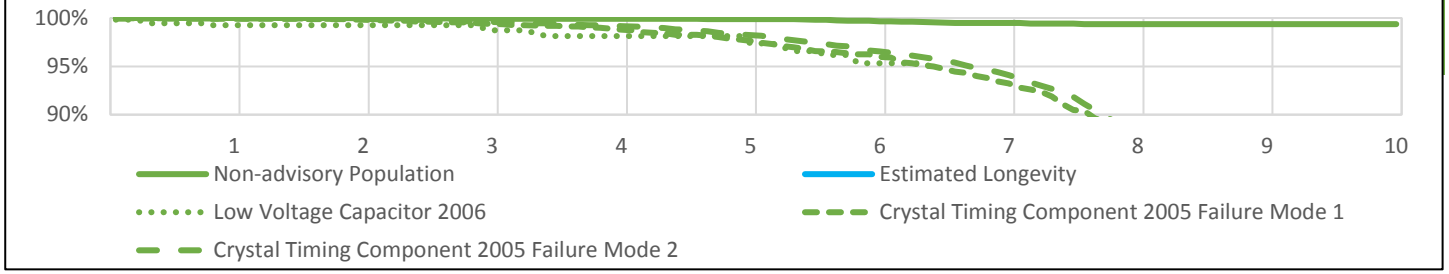
US Summary

US Registered Implants:	27,000	US Normal Battery Depletions:	6,136
US Approval Date:	March 2002	US Malfunctions:	138
US Estimated Active Implants:	3,000	Without Compromised Therapy:	127
		With Compromised Therapy:	11

Battery Depletions and Malfunctions



Malfunctions Only



US Survival Probability

	Year	1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	100.0%	99.9%	99.8%	99.3%	98.7%	97.3%	95.4%	90.3%	79.7%	63.7%
Registered Implants:	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.9%	99.7%	99.5%	99.4%	99.4%	99.4%
7000	Effective Sample Size	6420	5723	5084	4490	3966	3487	3041	2561	1988	1398

INSIGNIA Plus DR

Model: 1297

US Survival Probability (cont.)											
	Year	1	2	3	4	5	6	7	8	9	10
Low Voltage Capacitor 2006	Depletions and Malfunctions	99.3%	99.3%	99.0%	98.1%	98.1%	95.3%	94.8%	--	--	--
Registered Implants: 1000	Malfunctions Only	100.0%	100.0%	100.0%	100.0%	100.0%	99.6%	99.6%	--	--	--
	Effective Sample Size	497	422	367	306	260	220	202	--	--	--
Crystal Timing Component 2005 Failure Mode 1	Depletions and Malfunctions	99.9%	99.8%	99.4%	98.9%	97.8%	96.2%	93.4%	87.9%	77.2%	59.7%
Registered Implants: 4000	Malfunctions Only	100.0%	100.0%	99.9%	99.9%	99.8%	99.4%	99.4%	99.0%	98.5%	98.4%
	Effective Sample Size	3280	2875	2430	2137	1845	1596	1367	1130	858	541
Crystal Timing Component 2005 Failure Mode 2	Depletions and Malfunctions	100.0%	99.9%	99.6%	99.2%	98.3%	96.6%	94.4%	88.6%	77.2%	60.5%
Registered Implants: 14000	Malfunctions Only	100.0%	100.0%	100.0%	99.9%	99.9%	99.6%	99.4%	99.0%	98.8%	98.7%
	Effective Sample Size	12497	11080	9803	8668	7587	6597	5680	4684	3541	2335

*Devices subject to an advisory. Refer to the Advisories for more details. Devices may be part of more than one advisory.

INSIGNIA Plus DR

Models: 1297

Worldwide Confirmed Malfunctions	**180**
Worldwide Distribution	**47,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Electrical			
Capacitor (15)	1	2	3
Integrated circuit (30)	1	0	1
Low-voltage capacitor - June 23, 2006 Voluntary Physician Advisory (8)	1	1	2
Mechanical			
Solder bond (12)	0	1	1
Capacitor array (16)	0	1	1
Seal plug (19)	0	6	6
Header (20)	6	8	14
Crystal timing component Failure Mode 1 - September 22, 2005 Voluntary Physician Advisory (9)	2	1	3
Crystal timing component Failure Mode 2 - September 22, 2005 Voluntary Physician Advisory (10)	1	0	1
Software			
Underestimation of battery status (34)	0	4	4
Interrupted telemetry (35)	0	2	2
Pacing rate limit (36)	0	1	1
Other			
Non-patterned, other	9	5	14
Longevity labeling (11)	0	97	97
Battery depletion (26)	0	1	1
Battery status (49)	0	29	29
Grand Total	**21**	**159**	**180**

References cited in table above (link)

Confirmed Malfunction Details: Pulse Generator References

Descriptions listed below provide an overview of the clinical observations and/or analysis findings associated with each pulse generator confirmed malfunction pattern listed in this report.

All of the patterns listed are thoroughly investigated and analyzed. As part of Boston Scientific's process of continuous improvement, when possible, changes have been or will be implemented in response to identified malfunction patterns. "Improvements implemented" may include product design changes in existing or subsequent generations, manufacturing process modifications, software updates, educational communications, labeling changes, etc. Improvement implementation may vary by geography due to various factors, including regulatory review timing, and may not completely mitigate or eliminate the potential for additional malfunctions.

3. **Low Voltage Capacitor 2014**— *Aug 2013 and Sep 2014 Voluntary Physician Advisory.*Alert message during followup, beeping tones, premature battery depletion. Diminished low voltage capacitor performance. Improvement implemented.
4. **Unintended Fuse Activation 2013**— *March 1, 2013 Voluntary Physician Advisory*.Inability to interrogate, no magnet response, permanent loss of therapy without warning. Improvement implemented.
5. **High cathode condition**— *June 1, 2011 Voluntary Physician Advisory*.Premature battery depletion. Misaligned battery component. Improvement implemented.
6. **Subpectoral implant 2009**— *December 01, 2009 Voluntary Physician Advisory*.Noise, oversensing, inappropriate shocks, pacing inhibition, high impedance when implanted subpectorally. Weakened bond between header and titanium case. Improvement implemented.
7. **Respiratory Sensor Oversensing**— *March 23, 2009 Voluntary Physician Advisory.*Oversensing, noise, inappropriate shock, pacing inhibition. When Respiratory Sensor is ON, RV lead or system complications may cause oversensing or noise. Improvement implemented.
8. **Low-voltage capacitor**— *June 23, 2006 and August 24, 2006 Voluntary Physician Advisory*.Premature battery depletion, no output, no interrogation. Failed low-voltage capacitor. Improvement implemented.
9. **Crystal timing component Failure Mode 1**— *September 22, 2005 Voluntary Physician Advisory.*Intermittent or permanent loss of pacing output without warning, intermittent or permanent loss of telemetry, reversion to VVI mode or appearance of a reset warning message upon interrogation. Foreign material within a crystal timing component. Improvement implemented.
10. **Crystal timing component Failure Mode 2**— *September 22, 2005 Voluntary Physician Advisory.*At implant procedure or during pre-implant testing: Intermittent or permanent loss of pacing output without warning, intermittent or permanent loss of telemetry, reversion to VVI mode, or appearance of a reset warning message upon interrogation. Microscopic particle within a crystal timing component. Three failures have been reported following confirmation of successful implantation. No currently distributed devices are subject to this peri-implant failure mode. Improvement implemented.
11. **Longevity labeling**— Battery longevity inconsistent with longevity labeling. Device battery status indicators are accurate and no loss of therapy has been reported.
12. **Solder bond**— Loss of device output, loss of sensing. Separation of component solder from substrate. Improvement implemented.
13. **Integrated circuit**— Power on Reset state, loss of telemetry, safety mode operation or loss of output. Failed digital integrated circuit.
14. **Capacitor**— Premature battery depletion, inability to interrogate. Damage to low-voltage capacitor.
15. **Capacitor**— No telemetry, no pacing, premature battery depletion. Gradual, premature battery depletion most common; in rare instances, rapid depletion occurred with no therapy available. Failed low-voltage capacitor.
16. **Capacitor array**— Loss of device output, loss of capture, inability to accurately measure charge times causing elective replacement indicator declaration. Damage to capacitor array. Improvement implemented.
17. **Integrated circuit**— No telemetry, premature battery depletion. Integrated circuit issue within high-voltage transistor.
18. **Battery depletion**— Premature battery depletion and loss of capture.
19. **Seal plug**— Non-cardiac signals on electrograms leading to inhibition of pacing and/or inappropriate shock delivery. Damaged seal plug. Improvement implemented.
20. **Header**— High impedance, compromised header bonding identified during lead revision procedures. Insufficient medical adhesive bonding between header and case. Improvement implemented.
21. **Magnet response**— No magnet response. Particulate material in component. Improvement implemented.
22. **Battery depletion**— Premature battery depletion.
23. **Memory error**— Device resets (including pacing at reset parameters) and inability to interrogate. Errors in device memory.
24. **Transformer**— Charge time alert message and/or end of life (EOL) indicator displayed, loss of shock therapy. Damaged transformer. Improvement implemented.
25. **Setscrew block**— No pacing or pauses in pacing, intermittent or lack of setscrew contact with lead. Incorrect setscrew block. Improvement implemented.
26. **Battery depletion**— Loss of therapy, inability to interrogate, no magnet response, premature battery depletion.

27. **Solder bond**— Inability to interrogate, no magnet response, no pacing output. Broken solder bond between wire mounting surface and internal circuitry. Improvement implemented.
28. **Stored EGMs**— Inability to view stored EGMs. Incorrect EGM index location.
29. **Battery post**— Inability to interrogate, no pacing output. Bent battery post. Improvement implemented.
30. **Integrated circuit**— Premature battery depletion, loss of pacing output, inability to interrogate, loss of sensing, high-rate pacing, loss of shock therapy. Damage to integrated circuit. Improvement implemented.
31. **Alert messages**— During programmer interactions, alert messages appear which are able to be cleared. In one case, an alert message occurred with two memory errors after multiple device resets.
32. **Setscrew**— Inability to tighten or loosen setscrews during implant or replacement procedure due to process variability. Improvement implemented.
33. **Seal plug**— Lifted or missing seal plugs. Inadequate medical adhesive bond. Improvement implemented
34. **Underestimation of battery status**— Underestimation of remaining longevity due to invalid charge time measurement. Improvement implemented.
35. **Interrupted telemetry**— Early appearance of Elective Replacement Time (ERT) indicator, unexpected impedance measurements (>2500 ohms). Interruption in telemetry sequence during software upgrade. Improvement implemented.
36. **Pacing rate limit**— Inability to interrogate. Inappropriate pacing due to feature interaction. Improvement implemented.
37. **Solder joint**— Inappropriate shocks, beeping, fallback mode, errors or inability to interrogate or program. Cracked solder joint due to repetitive mechanical stress-induced component damage, only when implanted subpectorally with serial number facing the ribs.
38. **Transformer**— Inability to interrogate, loss of pacing and shock therapy. Failed transformer.
39. **Connector block**— Connector block can be moved out of alignment or displaced from header. Prolonged implant procedure, high impedance, no pacing, no sensing. Improvement implemented.
40. **Seal plug**— Non-cardiac signals on electrograms may result in loss of pacing or inappropriate shocks. Seal plug allows air in lead port to escape.
41. **Difficulty securing lead**— Noise, high impedance, inappropriate shocks or loss of therapy due to crossthreaded setscrews, intermittent or lack of contact between lead and header. Improvement implemented.
42. S**afety Core-electrocautery**— During electrocautery, device may enter Safety Core. Circuitry response to noise caused by electrocautery. Improvement implemented.
43. **High-voltage capacitor**— Alert message upon interrogation, extended charge time. Damaged high voltage capacitor.
44. **Magnet rate**— During interrogation, magnet rate remains after removal of magnet. Reed switch stuck in closed position. Improvement implemented.
45. **Header contacts**— Noise, oversensing, inappropriate shock, high pacing impedance, possible loss of pacing and sensing. Poor header connection with lead terminals due to contacts.
46. **Safety Core-programming**— Device enters Safety Core after three consecutive invalid programming attempts, due to firmware issue. Improvement implemented.
47. **Low-voltage capacitors**— Premature battery depletion, voltage alert during followup, device beeping. Capacitor failure.
48. **Alert messages not displayed post-EOL**— No alert message display after EOL declaration. Improvement implemented.
49. **Battery status**— Longevity remaining, battery status, gas gauge and/or magnet rate do not align or are inconsistent.
50. **Integrated circuit**— Loss of telemetry, premature battery depletion, alert message during followup. Integrated circuit issue. Improvement implemented.
51. **Memory errors**— Safety mode operation, inaccurately labeled pacing data. Errors in device memory
52. **High voltage circuit**— Alert message after implant, loss of shock therapy. Failed output module.
53. **Battery**— Beeping tones and alert message upon interrogation. Reduced battery voltage. Improvement implemented.
54. **Low-voltage capacitor**— Alert message during followup, beeping tones, premature battery depletion. Diminished low voltage capacitor performance. Improvement implemented.
55. **Shortened replacement time 2018** *November 2018 Voluntary Physician Advisory.* Premature, gradual depletion of battery; in rare instances, rapid depletion with no therapy available. Improvement implemented.
56. **Telemetry**— Inability to interrogate, premature battery depletion.
57. **Unintended Battery Depletion Alert**— Beeping tones, Battery Depletion alert during followup despite normal battery depletion. Alert may be cleared without impact to battery status or therapy availability. Improvement implemented.
58. **High voltage circuit**— Long charge time at implant, inability to interrogate, loss of pacing and shock therapy. Improvement implemented.
59. **Respiratory sensor**— Temporary increase or decrease in pacing rate as a result of respiratory sensor response to non-respiratory signals. No loss of pacing output.
60. **Titanium case material**— Noise, oversensing, abnormal pacing impedance, loss of capture, premature battery depletion. Titanium case material creating a higher than normal current drain condition. Improvement implemented.
61. **Charge Timeout Alert**— Beeping tones, programmer warning screen, abnormal shock impedance. Charge timeout alert.
62. **High voltage circuit component**— Charge time alert message and/or Elective Replacement indicator (ERI) displayed, beeping tones. High voltage circuit component. Improvement implemented.
63. **Integrated circuit**— Abnormal lead impedance, no telemetry, premature battery depletion. Integrated circuit issue within high-voltage transistor Improvement implemented

64. **Safety Core-unintended biventricular pacing**— *Dec 2017 Voluntary Physician Advisory.* Device enters Safety Core after detecting unintended asynchronous biventricular pacing due to software issue.
65. **Memory corruption** - *Jun 2017 Voluntary Physician Advisory.* Atypical energy delivery, error messages upon interrogation, loss of tachy therapy. Memory corruption. Improvement implemented.
67. **Capacitor**— Premature battery depletion. Diminished low voltage capacitor performance.
68. **Telemetry**— Alert message during followup, inability to interrogate, premature battery depletion, loss of pacing therapy. Telemetry component.
69. **Low-voltage capacitor** - Alert message during followup, beeping tones, premature battery depletion.
70. **Hydrogen induced premature depletion - September 2018 -** *September 2018 Voluntary Physician Advisory*. Premature battery depletion. Diminished low voltage capacitor performance.
71. **Battery –** Premature, gradual depletion of battery; in rare instances, rapid depletion with no therapy available. Improvement implemented.
72. **Capacitor -** Premature battery depletion. Diminished capacitor performance
73. **Misaligned markers -** Stored episode markers do not match recorded EGM.
74. **Header**— Noise, oversensing, inappropriate shocks, pacing inhibition, high impedance when implanted subcutaneously. Weakened bond between header and titanium case. Improvement Implemented.
75. **High voltage capacitor** - Charge time alert message, end of life (EOL) indicator displayed, beeping tones. Loss of tachy therapy without loss of brady therapy. Internal high-voltage capacitor issue. Improvement implemented.

Before/During Implant Procedure - Worldwide Malfunctions: Pulse Generators

This section of the report depicts the number of product malfunctions that occurred worldwide either before implant (prior to opening the sterile product packaging) or during implant (once the sterile product packaging has been opened). In all cases, the product in question must be returned to Boston Scientific CRM and confirmed through laboratory analysis to have operated or exhibited a problem outside the specified performance limits established by Boston Scientific. Damage incurred during shipping/transit or due to external factors warned against in labeling (e.g. radiation) is not reported as device malfunction here.
The Electrical category is comprised of confirmed malfunctions involving electrical components such as batteries and capacitors, and also includes fault codes encountered at implant. The majority of before/during implant pulse generator confirmed malfunctions in the Mechanical category are issues occurring within the connector block (e.g. stuck setscrews, seal plug/ring issues). The Software category consists primarily of confirmed malfunctions that result in telemetry issues. Confirmed malfunctions in the Labeling and Packaging categories include product labeling/identification issues and damage to sterile packaging, respectively. The Other category is comprised of non-patterned confirmed malfunctions.

CRT-D/Model	Worldwide Distribution	Electrical	Mechanical	Software	Other	Labeling	Packaging
RESONATE/MOMENTUM/CHARISMA/VIGILANT CRT-D G124/G125/G126/G128/G138/G224/G225/G228/G237/G247/ G248/G324/G325/G347/G348/G424/G425/G426/G428/G437/ G447/G448/G524/G525/G526/G528/G537/G547/G548	25,000	0	0	0	3	0	0
AUTOGEN CRT-D G160/G161/G164/G166/G168/G172/G173/G175/ G177/G179	24,000	3	0	0	3	0	0
DYNAGEN/INOGEN/ORIGEN CRT-D G150/G151/G154/G156/G158/G140/G141/ G146/G148/G050/G051/G056/G058	90,000	3	3	4	13	0	0

CRT-P/Model	Worldwide Distribution	Electrical	Mechanical	Software	Other	Labeling	Packaging
VISIONIST/VALITUDE U125/U128//U225/U226/U228	48,000	5	0	1	1	0	0
INTUA V272/V273/V282/V283/W272/W273	3,000	0	0	0	0	0	0
INVIVE V172/V173/V182/V183/W172/W173	18,000	0	0	1	3	0	0
CONTAK RENEWAL TR 2 H140/H145	31,000	1	7	0	5	0	0

ICD/Model	Worldwide Distribution	Electrical	Mechanical	Software	Other	Labeling	Packaging
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD DR D121/D221/D233/D321/D333/D421/D433/D521/D533	8,000	0	0	2	0	0	0
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD VR D120/D220/D232/D320/D332/D420/D432/D520/D532	7,000	0	0	1	0	0	0
AUTOGEN ICD EL VR D160/D161/D174/D175	16,000	1	0	0	0	0	0
AUTOGEN ICD EL DR D162/D163/D176/D177	15,000	1	0	1	0	0	0
DYNAGEN/INOGEN/ORIGEN ICD EL VR D020/D021/D010/D011/D000/D001	48,000	1	0	2	2	0	0
DYNAGEN/INOGEN/ORIGEN ICD EL DR D020/D021/D010/D011/D000/D001	49,000	0	2	2	1	0	0
DYNAGEN/INOGEN/ORIGEN ICD MINI VR D020/D021/D010/D011/D000/D001	22,000	1	0	1	0	0	0
DYNAGEN/INOGEN/ORIGEN ICD MINI DR D022/D023/D012/D013/D002/D003	21,000	2	0	0	2	0	0

S-ICD/Model	Worldwide Distribution	Electrical	Mechanical	Software	Other	Labeling	Packaging
EMBLEM S-ICD A209/A219	52,000	0	0	2	40	0	0
SQ-RX S-ICD 1010	11,000	10	0	21	27	0	0

Pacemaker/Model	Worldwide Distribution	Electrical	Mechanical	Software	Other	Labeling	Packaging
ACCOLADE/PROPONENT/ESSENTIO DR EL J064/K064/K067/K084	148,000	5	1	3	5	0	0
ACCOLADE/PROPONENT/ESSENTIO DR J064/K064/K067/K084	282,000	2	0	4	17	0	0
ACCOLADE/PROPONENT/ESSENTIO SR L100/L110/L200/L210/L300/L310	100,000	1	0	1	13	0	0
ADVANTIO/INGENIO/VITALIO EL DR J064/J067/K064/K067/K084/K087/ J174/J177/K174/K177/K184/K187/ J274/J277/K274/K277/K284/K287	75,000	1	1	0	4	0	0
ADVANTIO/INGENIO/VITALIO/FORMIO DR J064/J067/K064/K067/K084/K087/J174/J177/ K174/K177/K184/K187/J274/J277/K274/K277/ K284/K287/J278/J279/K278/K279/K288/K289	219,000	4	0	1	15	0	0
ADVANTIO/INGENIO/VITALIO SR J062/J065/K062/K065/K082/K085/ J172/J175/K172/K175/K182/K185/ J272/J275/K272/K275/K282/K285	86,000	0	0	1	5	0	0

U.S. Reason for Out of Service

As requested by the Heart Rhythm Society Task Force on Device Performance Policies and Guidelines, Boston Scientific provides reasons for device explant or out of service, if known. The reasons consist of normal battery depletion, unconfirmed premature battery depletion, device upgrade, device malfunction (which includes devices under advisory that have experienced a malfunction), complication related to another system component or clinical condition, (such as infection), or "other," a category consisting of patient death, prophylactic device explant, elective replacement, general product dissatisfaction, other observation/complication, unspecified, or unknown.

The counts for normal battery depletion, unconfirmed premature battery depletion, and device malfunction are reflected in the U.S. survival probability data. Reason for device explant or out of service may either be confirmed through laboratory analysis (as in the case of device malfunction) or it may be reported to Boston Scientific with no associated device return or laboratory analysis. Although a device may be indicated by the health care provider to have been taken out of service for more than one reason, the table below indicates only one reason per device in category counts.

CRT-D/Model	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
RESONATE/MOMENTUM/CHARISMA/VIGILANT CRT-D G124/G125/G126/G128/G138/G224/G225/G228/G237/G247/G248/G324/G325/G347/G348/G424/G425/G426/G428/G437/G447/G448/G524/G525/G526/G528/G537/G547/G548	11000	0	20	1	78	257
DYNAGEN/INOGEN/ORIGEN CRT-D G050/G051/G056/G058/G140/G141/G146/G148/G150/G151/G154/G156/G158	60000	39	169	37	822	4929
INCEPTA/ENERGEN/PUNCTUA CRT-D N050/N051/N052/N053/N140/N141/N142/N143/N160/N161/N162/N163/N164/N165/P052/P053/P142/P143/ P162/P163/P165	53000	966	249	638	1098	13996
COGNIS N118/N119/N120/P106/P107/P108	75000	6505	278	1999	1904	35809

CRT-P/Model	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
VISIONIST/VALITUDE U125/U128/U225/U226/U228	23000	14	370	16	176	1799
INTUA V272/V273/V282/V283/W272/W273	3000	25	54	2	29	498
INVIVE V172/V173/V182/V183/W172/W173	8000	137	107	4	71	2202
CONTAK RENEWAL TR H120/H125	19000	3745	205	67	268	10821

S-ICD/Model	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
EMBLEM S-ICD A209, A219	25000	7	122	35	529	1392
SQ-RX S-ICD 1010	8000	253	104	78	281	1392

ICD/Model	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD DR D121/D221/D233/D321/D333/D421/D433/D521/D533	4000	0	24	0	21	63
RESONATE/MOMENTUM/CHARISMA/VIGILANT ICD VR D120/D220/D232/D320/D332/D420/D432/D520/D532	3000	1	15	0	18	31
DYNAGEN/INOGEN/ORIGEN ICD EL DR D052/D053/D142/D143/D152/D153	35000	15	716	7	365	1832
DYNAGEN/INOGEN/ORIGEN ICD EL VR D050/D051/D140/D141/D150/D151	30000	8	640	11	291	1394
DYNAGEN/INOGEN/ORIGEN ICD MINI DR D002/D003/D012/D013/D022/D023	8000	19	168	10	98	858
DYNAGEN/INOGEN/ORIGEN ICD MINI VR D000/D001/D010/D011/D020/D021	8000	7	200	6	104	738
INCEPTA/ENERGEN/PUNCTUA ICD VR E050/E051/E140/E141/E160/E160/ F050/F051/F140/F141/F160/F161	39000	78	1295	517	604	7455
INCEPTA/ENERGEN/PUNCTUA ICD DR E052/E053/E142/E143/E162/E163/F052/F053/F142/F143/F162/F163	47000	86	1526	676	742	9351

ICD/Model, continued…	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
TELIGEN VR E102/E103/F102/F103	38000	172	1295	1881	726	14624
TELIGEN DR E110/E111/F110/F111	66000	1337	1992	2719	1274	26511

Pacemaker/Model	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
ACCOLADE/PROPONENT/ESSENTIO DR EL L121/L131/L221/L231/L321/L331	60000	11	965	39	292	2357
ACCOLADE/PROPONENT/ESSENTIO DR L101/L111/L201/L211/L301/L311	139000	82	1966	97	743	8934
ACCOLADE/PROPONENT/ESSENTIO SR L100/L110/L200/L210/L300/L310	28000	14	558	25	149	3167
ADVANTIO/INGENIO/VITALIO EL DR J064/J067/K064/K067/K084/K087/ J174/J177/K174/K177/K184/K187/ J274/J277/K274/K277/K284/K287	11000	6	282	8	62	1453
ADVANTIO/INGENIO/VITALIO/FORMIO DR J064/J067/K064/K067/K084/K087/J174/J177/ K174/K177/K184/K187/J274/J277/K274/K277/ K284/K287/J278/J279/K278/K279/K288/K289	121000	538	2331	60	802	24926
ADVANTIO/INGENIO/VITALIO SR J062/J065/K062/K065/K082/K085/ J172/J175/K172/K175/K182/K185/ J272/J275/K272/K275/K282/K285	27000	42	476	12	152	8450

Pacemaker/Model, continued…	U.S. Registered Implants	Normal Battery Depletion	Device Upgrade	Device Malfunction[1]	Complication related to another system component or clinical condition[2]	Other[3]
ALTRUA 60 SR S601	32000	1913	405	16	181	16726
ALTRUA 60 DR (Downsize) S603	90000	18443	1100	88	597	36255
ALTRUA 60 DR S602	22000	1934	375	32	209	8856
ALTRUA 60 DR EL S606	59000	1896	971	27	458	19890
ALTRUA 40 SR S401	5000	259	39	2	24	2704
ALTRUA 40 DR (downsize) S403	14000	2915	142	4	81	6051
ALTRUA 40 DR S402	2000	154	28	0	9	849
ALTRUA 40 DR EL S404	5000	172	63	3	45	2138
ALTRUA 20 SR S201/S204	5000	106	34	2	36	2774
ALTRUA 20 DR (downsize) S203	5000	595	37	0	39	2610
ALTRUA 20 DR S202/S205	2000	88	13	2	15	934
ALTRUA 20 DR EL S208	3000	56	37	2	12	1461
INSIGNIA Ultra SR 1190 [4]	24000	2990	230	47	147	17037
INSIGNIA Ultra DR 1291 [4]	32000	6847	467	203	322	17585
INSIGNIA Entra SR 1195/1198 [4]	14000	1152	102	8	75	10949
INSIGNIA Entra DR 1294/1295 [4]	17000	2396	166	74	187	11845
INSIGNIA Plus DR 1297 [4]	27000	6126	304	138	263	16475

[1] Device malfunction consists of all U.S. confirmed malfunctions for a product/product grouping. These include confirmed malfunctions for advisory populations, as well as any other type of malfunction in which a device was returned and confirmed by laboratory analysis to have malfunctioned.. U.S. confirmed malfunction counts are reflected in U.S. survival probability.

[2] System component and/or clinical condition complications may include, for example: infection, erosion, lead-to-PG interface.

[3] Other consists of: patient death, electrive replacement, general product dissatisfaction, other observation/complication, unspecifed, or unknown.

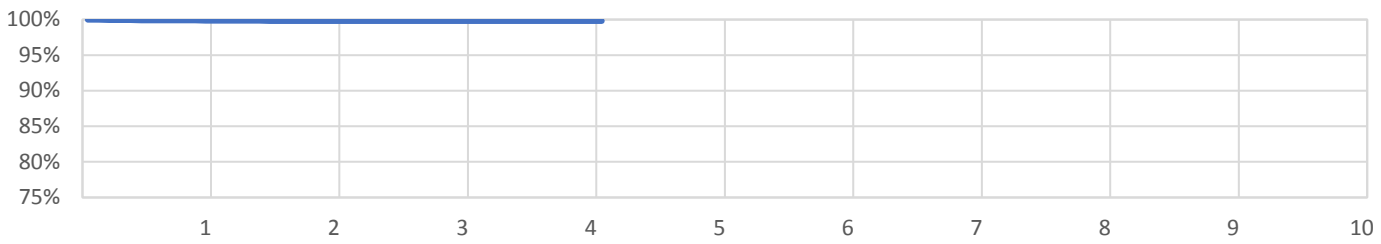
[4] Counts consist of Boston Scientific and Intermedics co-branded pacemaker data.

ACUITY X4 Spiral L

Models: 4677/4678

US Summary			
US Registered Implants:	10,000	US Chronic Complications	14
US Approval Date:	February 2016	US Malfunctions:	-
US Estimated Active Implants:	9,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.8%	99.8%	99.8%	--	--	--	--	--	
Registered Implants: 10000	Effective Sample Size	5985	3007	620	241	220	--	--	--	--	--	@ 49 months

ACUITY X4 Spiral L

Models: 4677/4678

Worldwide Confirmed Malfunctions	**1**
Worldwide Distribution	**24,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	1	1
Grand Total	**0**	**1**	**1**

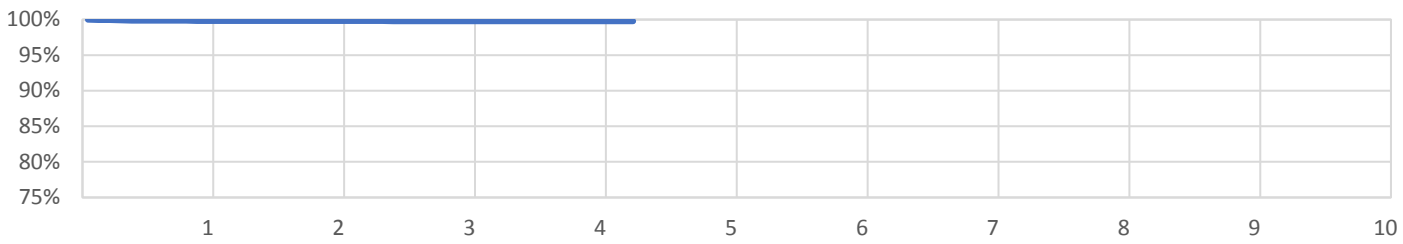
References cited in table above (link)

ACUITY X4 Spiral S

Models: 4674/4675

US Summary			
US Registered Implants:	26,000	US Chronic Complications	44
US Approval Date:	February 2016	US Malfunctions:	-
US Estimated Active Implants:	24,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.8%	99.8%	99.8%	99.8%	99.8%	--	--	--	--	--	
Registered Implants: 26000	Effective Sample Size	15388	7289	1074	317	215	--	--	--	--	--	@ 51 months

ACUITY X4 Spiral S

Models: 4674/4675

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**55,000**

	Without Compromised Therapy	With Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

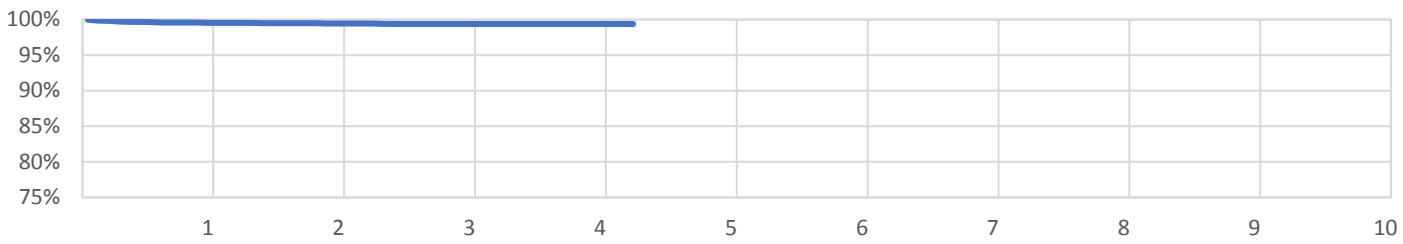
References cited in table above (link)

ACUITY X4 Straight

Models: 4671/4672

US Summary			
US Registered Implants:	19,000	US Chronic Complications	80
US Approval Date:	February 2016	US Malfunctions:	-
US Estimated Active Implants:	17,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.5%	99.4%	99.4%	99.4%	99.4%	--	--	--	--	--	
Registered Implants: 19000	Effective Sample Size	10739	4911	731	283	213	--	--	--	--	--	@ 51 months

ACUITY X4 Straight

Models: 4671/4672

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**45,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

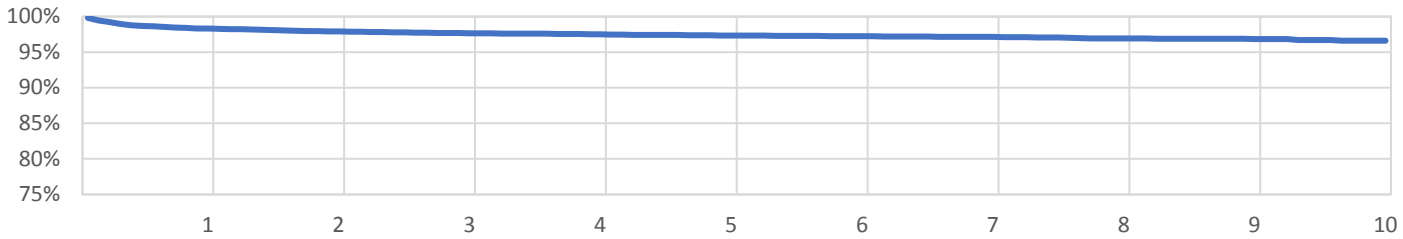
References cited in table above (link)

ACUITY Spiral

Models: 4591/4592/4593

US Summary			
US Registered Implants:	23,000	US Chronic Complications	546
US Approval Date:	May 2008	US Malfunctions:	7
US Estimated Active Implants:	14,000	Without Compromised Therapy:	3
		With Compromised Therapy:	4

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	98.3%	97.9%	97.7%	97.5%	97.3%	97.2%	97.1%	96.9%	96.8%	96.6%
Registered Implants: 23000	Effective Sample Size	19488	17166	15092	12718	10111	7560	5390	3492	1956	742

ACUITY Spiral

Models: 4591/4592/4593

Worldwide Confirmed Malfunctions	**7**
Worldwide Distribution	**45,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	4	3	7
Grand Total	**4**	**3**	**7**

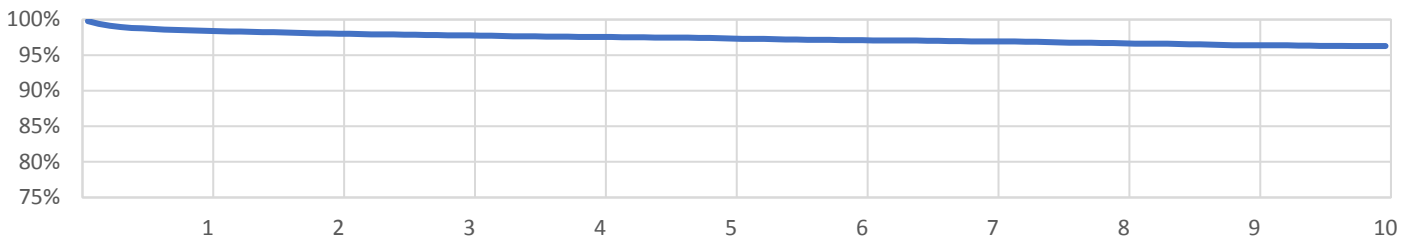
References cited in table above (link)

ACUITY Steerable

Models: 4554/4555/4556

US Summary			
US Registered Implants:	29,000	US Chronic Complications	706
US Approval Date:	May 2008	US Malfunctions:	33
US Estimated Active Implants:	15,000	Without Compromised Therapy:	12
		With Compromised Therapy:	21

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	98.4%	98.0%	97.8%	97.5%	97.3%	97.1%	96.9%	96.6%	96.4%	96.3%
Registered Implants: 29000	Effective Sample Size	24536	21905	19542	17014	14140	11179	8704	6550	4520	2683

ACUITY Steerable

Models: 4554/4555/4556

Worldwide Confirmed Malfunctions	**57**
Worldwide Distribution	**65,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Extracardiac fracture (34)	28	8	36
Other			
Non-patterned, other	10	11	21
Grand Total	**38**	**19**	**57**

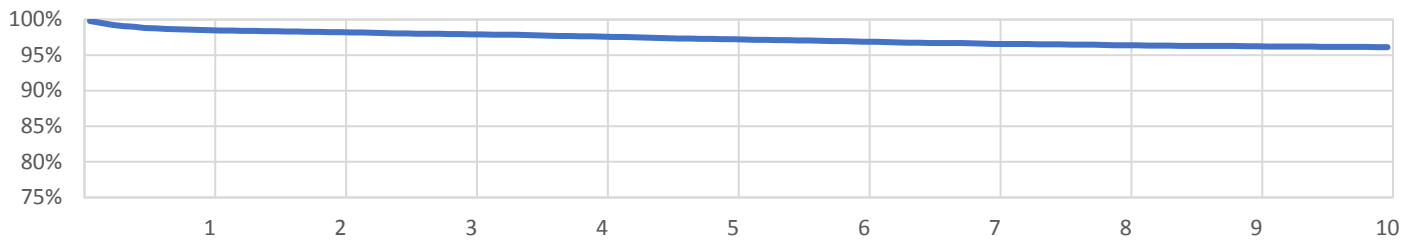
References cited in table above (link)

EASYTRAK 3

Models: 4522/4524/4525/4527/4548/4549/4550

US Summary			
US Registered Implants:	22,000	US Chronic Complications	545
US Approval Date:	August 2004	US Malfunctions:	32
US Estimated Active Implants:	9,000	Without Compromised Therapy:	9
		With Compromised Therapy:	23

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	98.5%	98.2%	97.9%	97.6%	97.2%	96.9%	96.6%	96.4%	96.2%	96.1%
Registered Implants: 22000	Effective Sample Size	18245	16288	14528	12703	10733	8748	7099	5770	4626	3590

EASYTRAK 3

Models: 4522/4524/4525/4527/4548/4549/4550

Worldwide Confirmed Malfunctions	**52**
Worldwide Distribution	**43,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Extracardiac fracture (34)	28	6	34
Other			
Non-patterned, other	7	11	18
Grand Total	**35**	**17**	**52**

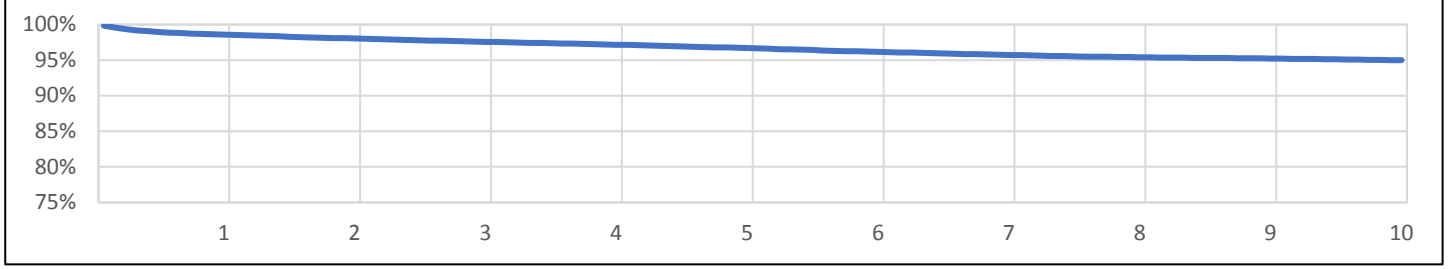
References cited in table above (link)

EASYTRAK 2

Models: 4515/4517/4518/4520/4542/4543/4544

US Summary			
US Registered Implants:	97,000	US Chronic Complications	2,805
US Approval Date:	August 2004	US Malfunctions:	388
US Estimated Active Implants:	38,000	Without Compromised Therapy:	129
		With Compromised Therapy:	259

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	98.6%	98.0%	97.6%	97.2%	96.7%	96.1%	95.7%	95.4%	95.2%	95.0%
Registered Implants: 97000	Effective Sample Size	82352	73269	65112	56698	48009	39576	32418	26140	20361	15249

EASYTRAK 2

Models: 4515/4517/4518/4520/4542/4543/4544

Worldwide Confirmed Malfunctions	**531**
Worldwide Distribution	**179,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (25)	329	134	463
Other			
Non-patterned, other	39	29	68
Grand Total	**368**	**163**	**531**

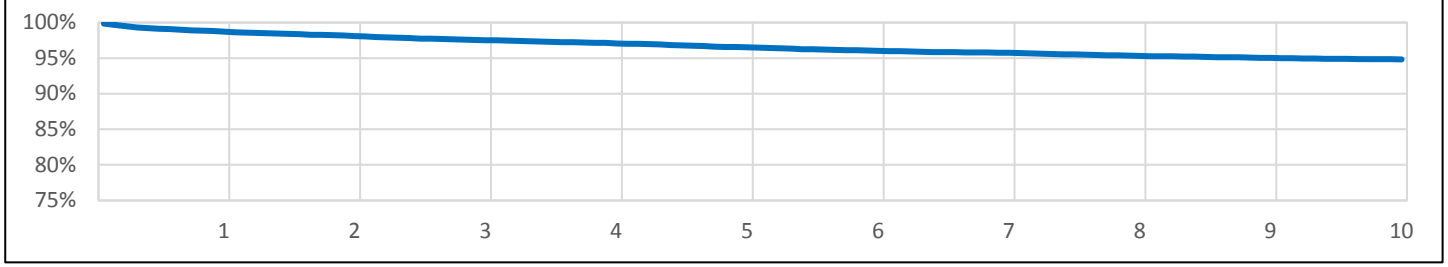
References cited in table above (link)

EASYTRAK

Models: 4510/4511/4512/4513/4535/4536/4537/4538

US Summary			
US Registered Implants:	38,000	US Chronic Complications	1,120
US Approval Date:	May 2002	US Malfunctions:	94
US Estimated Active Implants:	6,000	Without Compromised Therapy:	9
		With Compromised Therapy:	85

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	98.7%	98.1%	97.5%	97.1%	96.5%	96.0%	95.7%	95.3%	95.0%	94.8%
Registered Implants: 38000	Effective Sample Size	30371	26131	22441	19310	16506	14137	12144	10594	9379	8362

EASYTRAK

Models: 4510/4511/4512/4513/4535/4536/4537/4538

Worldwide Confirmed Malfunctions	**106**
Worldwide Distribution	**53,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	96	10	106
Grand Total	**96**	**10**	**106**

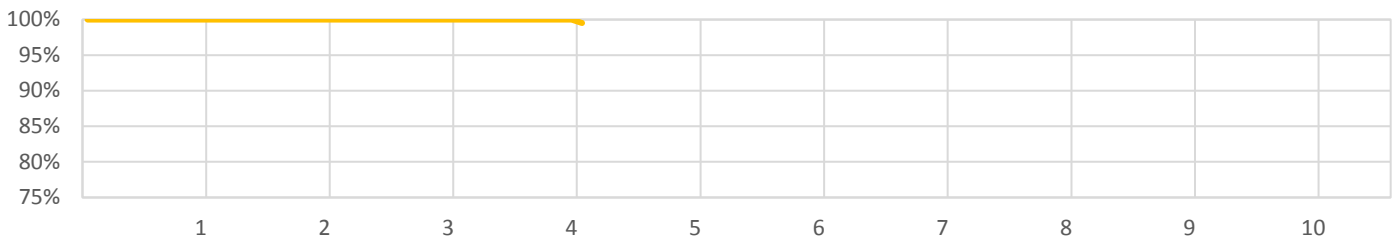
References cited in table above (link)

ENDOTAK RELIANCE 4-FRONT Dual Coil Active Fixation

Models: 0658/0695/0696

US Summary			
US Registered Implants:	1,000	US Chronic Complications	1
US Approval Date:	May 2018	US Malfunctions:	-
US Estimated Active Implants:	1,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	100.0%	100.0%	99.5%	--	--	--	--	--	
Registered Implants: 1000	Effective Sample Size	555	502	473	229	206	--	--	--	--	--	@ 49 months

ENDOTAK RELIANCE 4-FRONT Dual Coil Active Fixation

Models: 0658/0695/0696

Worldwide Confirmed Malfunctions	**3**
Worldwide Distribution	**14,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	3	0	3
Grand Total	**3**	**0**	**3**

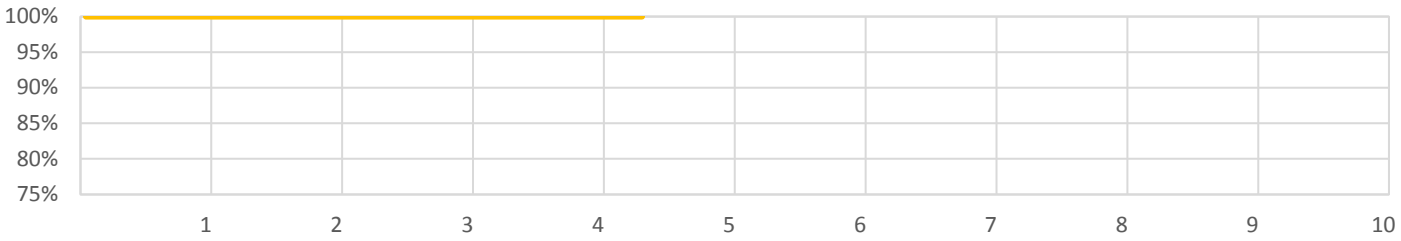
References cited in table above (link)

ENDOTAK RELIANCE 4-FRONT Single Coil Active Fixation

Models: 0657/0692/0693

US Summary			
US Registered Implants:	1,000	US Chronic Complications	-
US Approval Date:	May 2018	US Malfunctions:	-
US Estimated Active Implants:	1,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	100.0%	100.0%	100.0%	100.0%	100.0%	--	--	--	--	--	
	Effective Sample Size	1260	1129	1012	453	226	--	--	--	--	--	@ 52 months
Registered Implants: 1000												

ENDOTAK RELIANCE 4-FRONT Single Coil Active Fixation

Models: 0657/0692/0693

Worldwide Confirmed Malfunctions	**34**
Worldwide Distribution	**67,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor cable fracture (38)	15	0	15
Other			
Non-patterned, other	17	2	19
Grand Total	**32**	**2**	**34**

References cited in table above (link)

ENDOTAK RELIANCE 4-FRONT Dual Coil Passive Fixation

Models: 0655/0685/0686

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**1,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

References cited in table above (link)

ENDOTAK RELIANCE 4-FRONT Single Coil Passive Fixation

Models: 0654/0682/0683

Worldwide Confirmed Malfunctions	**1**
Worldwide Distribution	**4,000**

	Without Compromised Therapy	With Compromised Therapy	Total
Conductor			
Conductor cable fracture (38)	1	0	1
Grand Total	**1**	**0**	**1**

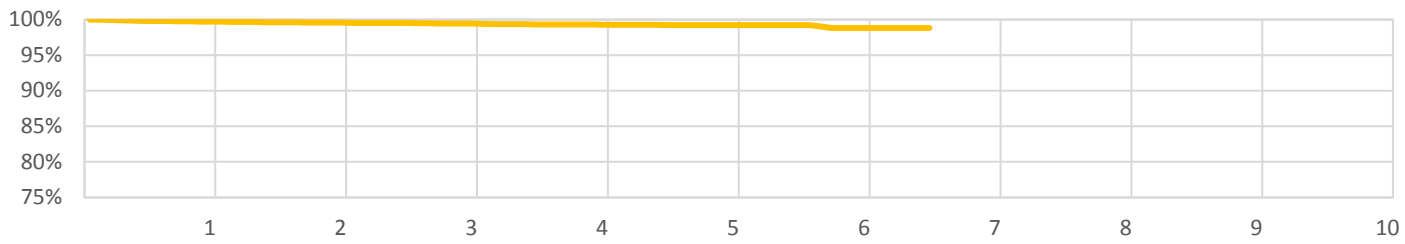
References cited in table above (link)

EMBLEM/Q-TRAK S-ICD Electrode

Models: 3010/3401/3501

US Summary			
US Registered Implants:	32,000	US Chronic Complications	120
US Approval Date:	September 2012	US Malfunctions:	11
US Estimated Active Implants:	28,000	Without Compromised Therapy:	1
		With Compromised Therapy:	10

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.4%	99.3%	99.2%	98.8%	98.8%	--	--	--	
Registered Implants: 32000	Effective Sample Size	21880	14287	8318	3718	1098	471	328	--	--	--	@ 78 months

EMBLEM/Q-TRAK S-ICD Electrode

Models: 3010/3401/3501

Worldwide Confirmed Malfunctions	**24**
Worldwide Distribution	**61,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Crimp/Weld/Bond			
Weld fracture (37)	3	0	3
Other			
Non-patterned, other	19	2	21
Grand Total	**22**	**2**	**24**

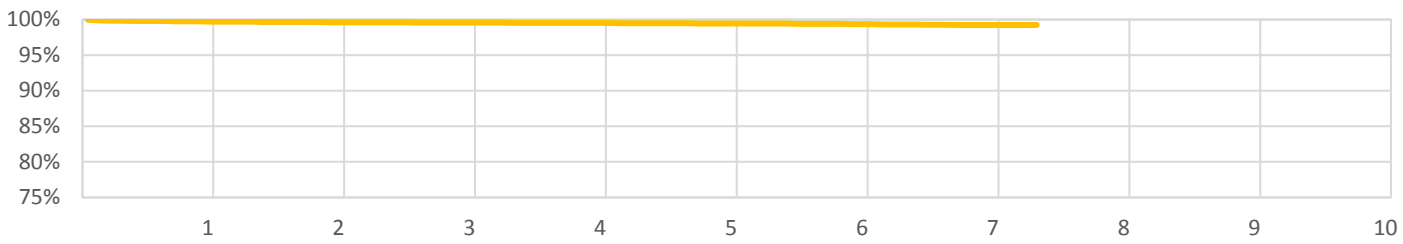
References cited in table above (link)

ENDOTAK RELIANCE 4-Site Dual Coil, Active Fixation

Models: 0275/0276/0295/0296

US Summary			
US Registered Implants:	73,000	US Chronic Complications	284
US Approval Date:	November 2010	US Malfunctions:	24
US Estimated Active Implants:	60,000	Without Compromised Therapy:	2
		With Compromised Therapy:	22

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.6%	99.5%	99.5%	99.4%	99.2%	99.2%	--	--	
Registered Implants: 73000	Effective Sample Size	59091	47691	37206	27502	18047	9007	1122	231	--	--	@ 94 months

ENDOTAK RELIANCE 4-Site Dual Coil, Active Fixation

Models: 0275/0276/0295/0296

Worldwide Confirmed Malfunctions	**56**
Worldwide Distribution	**115,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	1	0	1
Other			
Non-patterned, other	46	9	55
Grand Total	**47**	**9**	**56**

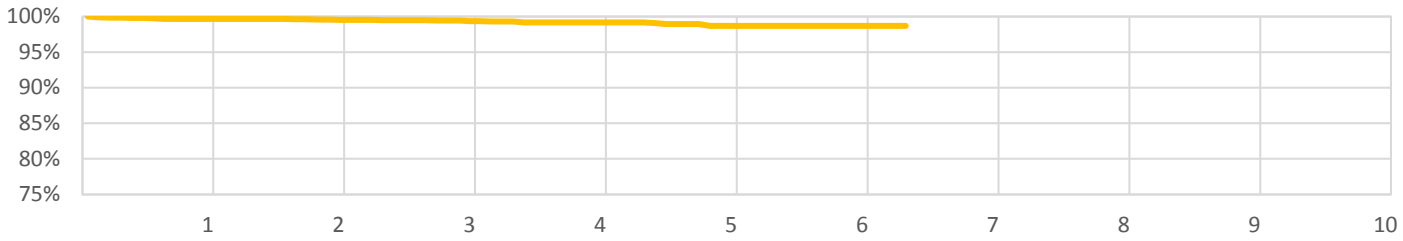
References cited in table above (link)

ENDOTAK RELIANCE 4-Site Dual Coil, Passive Fixation

Models: 0265/0266/0285/0286

US Summary			
US Registered Implants:	3,000	US Chronic Complications	22
US Approval Date:	November 2010	US Malfunctions:	-
US Estimated Active Implants:	3,000	Without Compromised Therapy:	-
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.5%	99.4%	99.2%	98.7%	98.7%	98.7%	--	--	--	
Registered Implants: 3000	Effective Sample Size	2543	2050	1594	1157	668	308	202	--	--	--	@ 76 months

ENDOTAK RELIANCE 4-Site Dual Coil, Passive Fixation

Models: 0265/0266/0285/0286

Worldwide Confirmed Malfunctions	**0**
Worldwide Distribution	**10,000**

	With Compromised Therapy	With Compromised Therapy	Total
Other			
Non-patterned, other	0	0	0
Grand Total	**0**	**0**	**0**

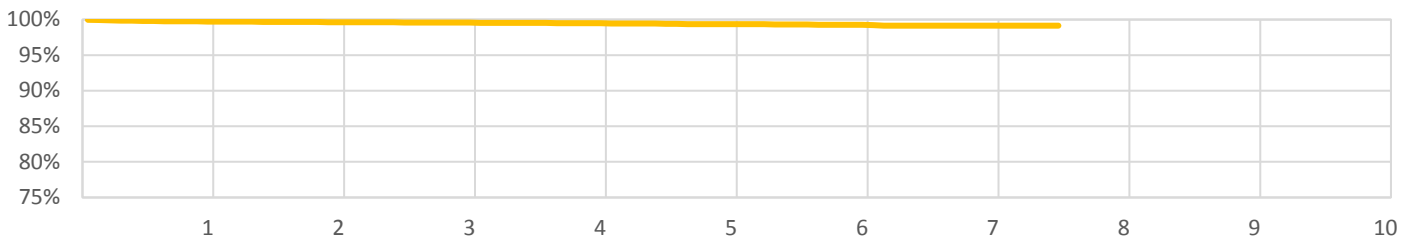
References cited in table above (link)

ENDOTAK RELIANCE 4-Site Single Coil, Active Fixation

Models: 0292/0293

US Summary			
US Registered Implants:	114,000	US Chronic Complications	408
US Approval Date:	November 2010	US Malfunctions:	23
US Estimated Active Implants:	102,000	Without Compromised Therapy:	1
		With Compromised Therapy:	22

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.6%	99.5%	99.4%	99.2%	99.1%	99.1%	--	--	
Registered Implants: 114000	Effective Sample Size	82722	57059	37912	22879	11702	4527	694	354	--	--	@ 92 months

ENDOTAK RELIANCE 4-Site Single Coil, Active Fixation

Models: 0292/0293

Worldwide Confirmed Malfunctions	**52**
Worldwide Distribution	**173,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	4	0	4
Other			
Non-patterned, other	45	3	48
Grand Total	**49**	**3**	**52**

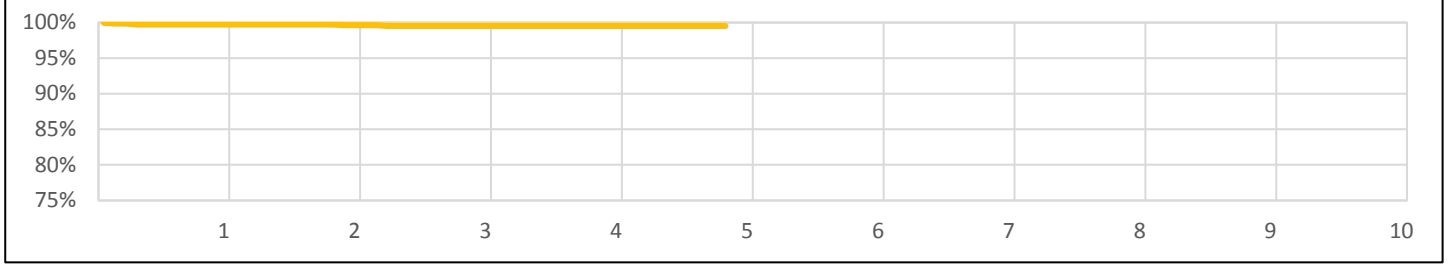
References cited in table above (link)

ENDOTAK RELIANCE 4-Site Single Coil, Passive Fixation

Models: 0282/0283

US Summary			
US Registered Implants:	2,000	US Chronic Complications	7
US Approval Date:	November 2010	US Malfunctions:	1
US Estimated Active Implants:	2,000	Without Compromised Therapy:	-
		With Compromised Therapy:	1

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.5%	99.5%	99.5%	--	--	--	--	--	
Registered Implants: 2000	Effective Sample Size	1612	1070	677	359	202	--	--	--	--	--	@ 58 months

ENDOTAK RELIANCE 4-Site Single Coil, Passive Fixation

Models: 0282/0283

Worldwide Confirmed Malfunctions	**3**
Worldwide Distribution	**5,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Other			
Non-patterned, other	2	1	3
Grand Total	**2**	**1**	**3**

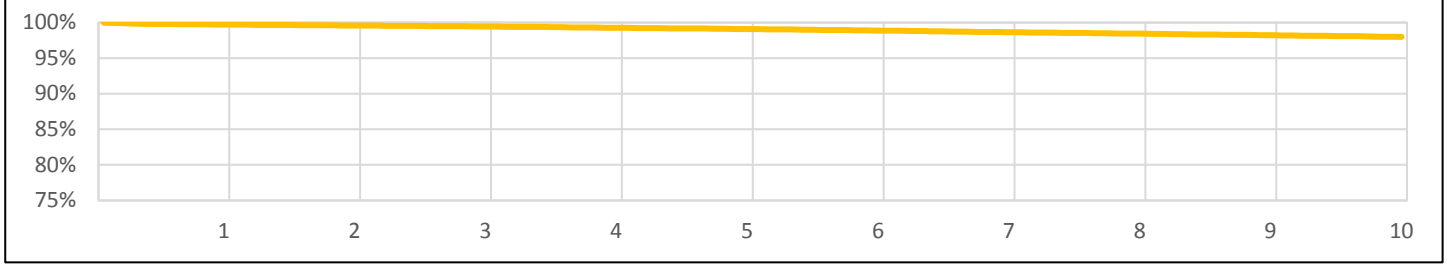
References cited in table above (link)

ENDOTAK RELIANCE Dual Coil, Active Fixation

Models: 0157/0158/0159/0164/0165/0166/0167/0184/0185/0186/0187

US Summary			
US Registered Implants:	287,000	US Chronic Complications	3,198
US Approval Date:	July 2002	US Malfunctions:	362
US Estimated Active Implants:	122,000	Without Compromised Therapy:	117
		With Compromised Therapy:	245

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.4%	99.3%	99.1%	98.9%	98.6%	98.4%	98.2%	98.0%
Registered Implants: 287000	Effective Sample Size	251442	225494	202249	180927	161381	143018	125608	102338	80439	60156

ENDOTAK RELIANCE Dual Coil, Active Fixation

Models: 0157/0158/0159/0164/0165/0166/0167/0184/0185/0186/0187

Worldwide Confirmed Malfunctions	**556**
Worldwide Distribution	**379,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	103	0	103
Crimp/Weld/Bond			
Seal rings (5)	2	2	4
Other			
Non-patterned, other	255	194	449
Grand Total	**360**	**196**	**556**

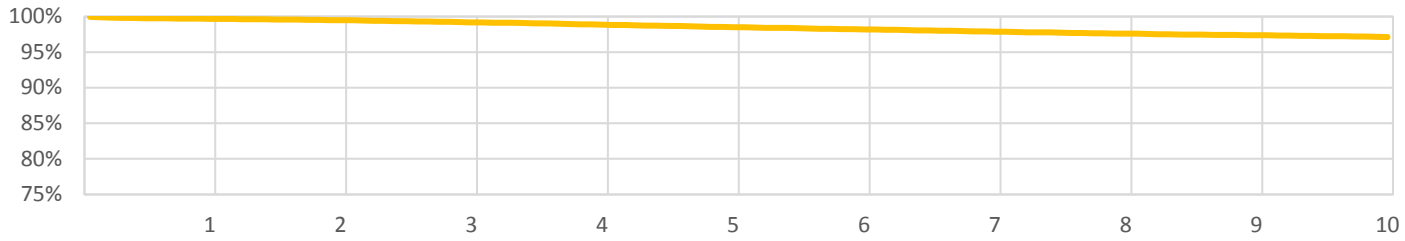
References cited in table above (link)

ENDOTAK RELIANCE Dual Coil, Passive Fixation

Models: 0147/0148/0149/0174/0175/0176/0177

US Summary			
US Registered Implants:	47,000	US Chronic Complications	843
US Approval Date:	October 2000	US Malfunctions:	44
US Estimated Active Implants:	16,000	Without Compromised Therapy:	11
		With Compromised Therapy:	28

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.5%	99.2%	98.9%	98.5%	98.2%	97.9%	97.6%	97.4%	97.1%
Registered Implants: 47000	Effective Sample Size	40161	36013	32265	28813	25681	22784	20043	17315	14781	12482

ENDOTAK RELIANCE Dual Coil, Passive Fixation

Models: 0147/0148/0149/0174/0175/0176/0177

Worldwide Confirmed Malfunctions	**159**
Worldwide Distribution	**110,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	18	0	18
Crimp/Weld/Bond			
Conductor connection (36)	3	0	3
Other			
Non-patterned, other	84	53	137
Manufacturing material (6)	1	0	1
Grand Total	**106**	**53**	**159**

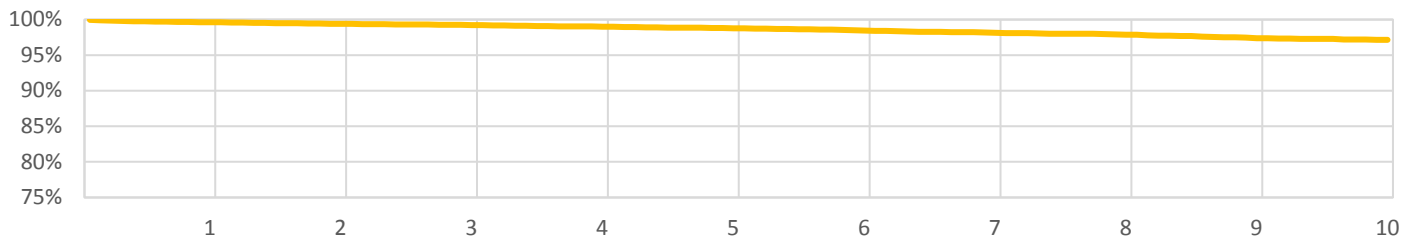
References cited in table above (link)

ENDOTAK RELIANCE Single Coil, Active Fixation

Models: 0137/0138/0160/0161/0162/0180/0181/0182

US Summary			
US Registered Implants:	33,000	US Chronic Complications	362
US Approval Date:	October 2000	US Malfunctions:	78
US Estimated Active Implants:	22,000	Without Compromised Therapy:	22
		With Compromised Therapy:	56

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.6%	99.4%	99.2%	99.0%	98.8%	98.5%	98.1%	97.9%	97.4%	97.2%
Registered Implants: 33000	Effective Sample Size	28342	24970	21859	18599	15415	12449	9863	6148	3690	2052

ENDOTAK RELIANCE Single Coil, Active Fixation

Models: 0137/0138/0160/0161/0162/0180/0181/0182

Worldwide Confirmed Malfunctions	**189**
Worldwide Distribution	**72,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	60	0	60
Other			
Non-patterned, other	76	53	129
Grand Total	**136**	**53**	**189**

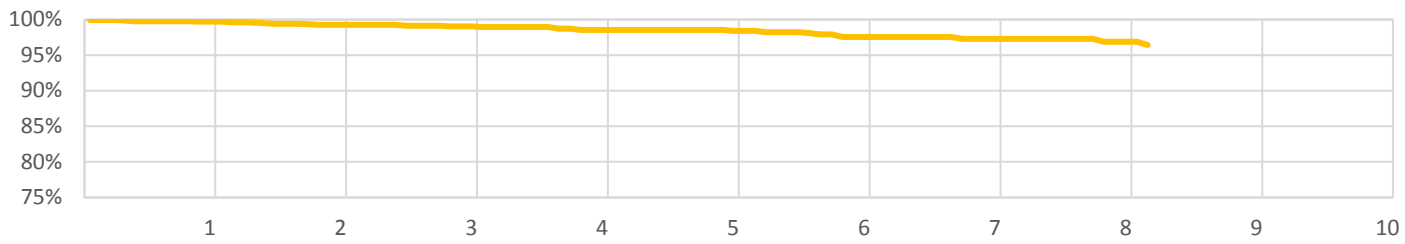
References cited in table above (link)

ENDOTAK RELIANCE Single Coil, Passive Fixation

Models: 0127/0128/0170/0171/0172/0173

US Summary			
US Registered Implants:	2,000	US Chronic Complications	32
US Approval Date:	October 2000	US Malfunctions:	4
US Estimated Active Implants:	1,000	Without Compromised Therapy:	1
		With Compromised Therapy:	3

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.3%	99.0%	98.5%	98.4%	97.6%	97.3%	96.9%	96.4%	--	
Registered Implants: 2000	Effective Sample Size	1521	1333	1130	907	711	508	342	226	209	--	@ 98 months

ENDOTAK RELIANCE Single Coil, Passive Fixation

Models: 0127/0128/0170/0171/0172/0173

Worldwide Confirmed Malfunctions	**20**
Worldwide Distribution	**8,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Conductor fracture (24)	3	0	3
Other			
Non-patterned, other	9	8	17
Grand Total	**12**	**8**	**20**

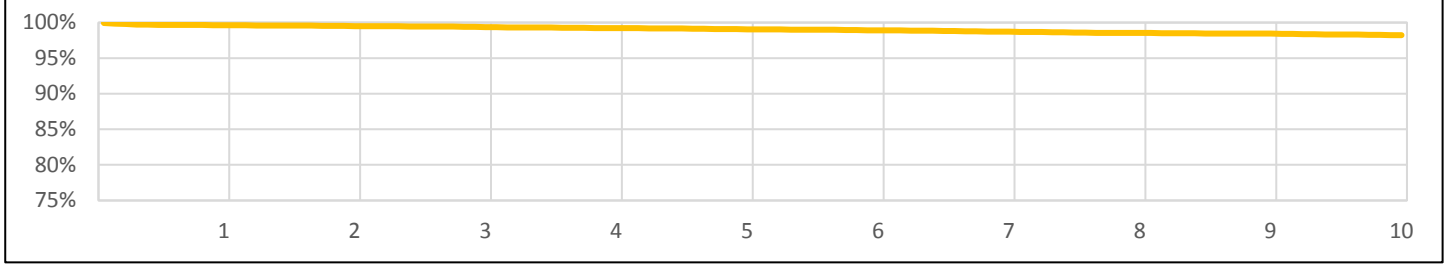
References cited in table above (link)

ENDOTAK ENDURANCE EZ Active Fixation

Models: 0154/0155/0156

US Summary			
US Registered Implants:	29,000	US Chronic Complications	368
US Approval Date:	June 1999	US Malfunctions:	25
US Estimated Active Implants:	6,000	Without Compromised Therapy:	10
		With Compromised Therapy:	15

Complications and Malfunctions



US Survival Probability

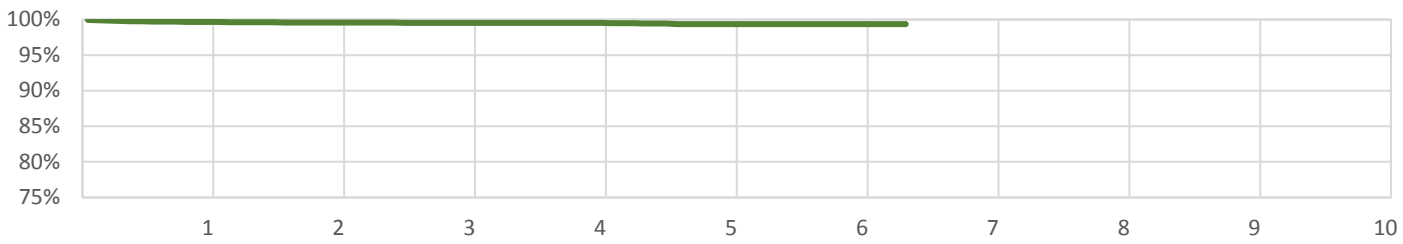
Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.6%	99.5%	99.4%	99.2%	99.1%	98.9%	98.7%	98.5%	98.4%	98.2%
Registered Implants: 29000	Effective Sample Size	23896	21387	19140	17115	15291	13627	12143	10852	9678	8616

INGEVITY Positive Fixation

Models: 7640/7641/7642/7740/7741/7742

US Summary			
US Registered Implants:	268,000	US Chronic Complications	783
US Approval Date:	April 2016	US Malfunctions:	83
US Estimated Active Implants:	251,000	Without Compromised Therapy:	36
		With Compromised Therapy:	47

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.6%	99.6%	99.4%	99.4%	99.4%	--	--	--	
Registered Implants: 268000	Effective Sample Size	154716	63646	1638	1571	1314	918	912	--	--	--	@ 77 months

INGEVITY Positive Fixation

Models: 7640/7641/7642/7740/7741/7742

Worldwide Confirmed Malfunctions	**139**
Worldwide Distribution	**649,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Inner conductor break (39)	4	7	11
Extracardiac fracture (41)	46	34	80
Other			
Non-patterned, other	27	21	48
Grand Total	**77**	**62**	**139**

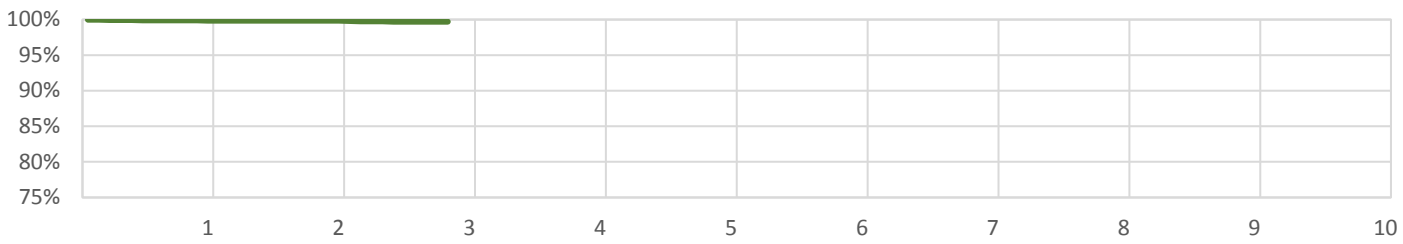
References cited in table above (link)

INGEVITY Passive Fixation

Models: 7631/7632/7731/7732

US Summary			
US Registered Implants:	14,000	US Chronic Complications	16
US Approval Date:	April 2016	US Malfunctions:	4
US Estimated Active Implants:	13,000	Without Compromised Therapy:	-
		With Compromised Therapy:	4

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.9%	99.8%	99.7%	--	--	--	--	--	--	--	
Registered Implants: 14000	Effective Sample Size	7987	3416	219	--	--	--	--	--	--	--	@ 34 months

INGEVITY Passive Fixation

Models: 7631/7632/7731/7732

Worldwide Confirmed Malfunctions	**7**
Worldwide Distribution	**71,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Extracardiac fracture (41)	5	0	5
Other			
Non-patterned, other	2	0	2
Grand Total	**7**	**0**	**7**

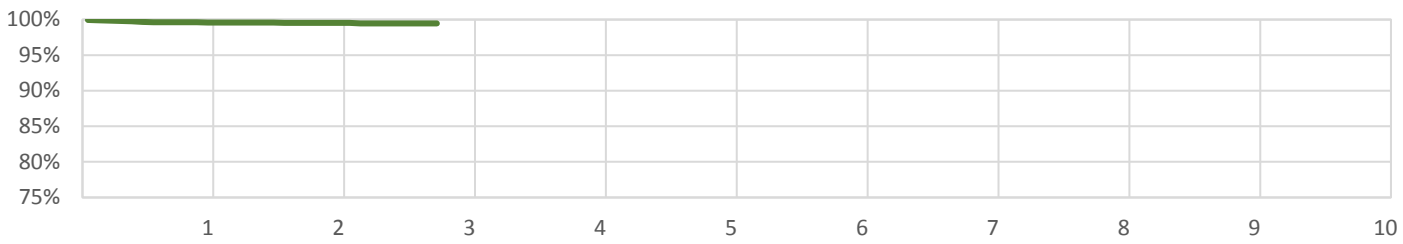
References cited in table above (link)

INGEVITY Atrial J Passive Fixation

Models: 7635/7636/7735/7736

US Summary			
US Registered Implants:	8,000	US Chronic Complications	27
US Approval Date:	April 2016	US Malfunctions:	2
US Estimated Active Implants:	7,000	Without Compromised Therapy:	2
		With Compromised Therapy:	-

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10	
Non-Advisory Population	Depletions and Malfunctions	99.6%	99.5%	99.5%	--	--	--	--	--	--	--	
Registered Implants: 8000	Effective Sample Size	4417	1786	240	--	--	--	--	--	--	--	@ 33 months

INGEVITY Atrial J Passive Fixation

Models: 7635/7636/7735/7736

Worldwide Confirmed Malfunctions	**5**
Worldwide Distribution	**59,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Extracardiac fracture (41)	0	3	3
Crimp/Weld/Bond			
Weld (40)	0	1	1
Other			
Non-patterned, other	0	1	1
Grand Total	**0**	**5**	**5**

References cited in table above (link)

FLEXTEND 2 Active Fixation

Models: 4095/4096/4097

Worldwide Confirmed Malfunctions	**120**
Worldwide Distribution	**185,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	17	4	21
Electrical			
Inner insulation abrasion (2)	1	5	6
Other			
Non-patterned, other	2	9	11
Conductor damage (32)	22	60	82
Grand Total	**42**	**78**	**120**

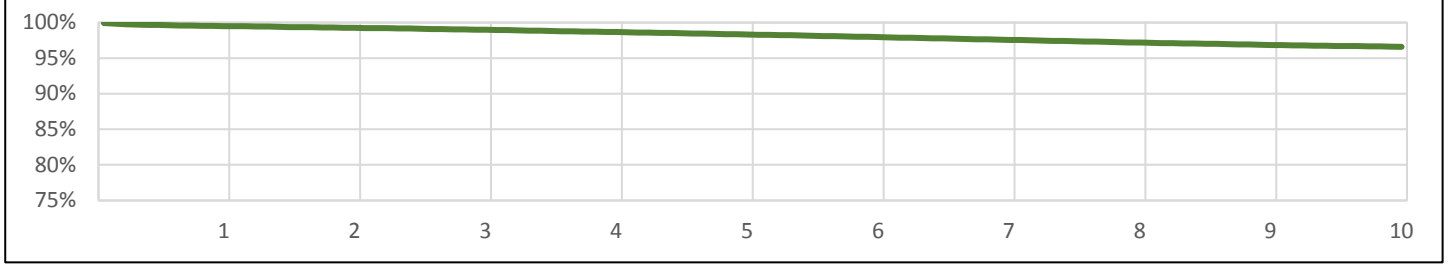
References cited in table above (link)

FLEXTEND Active Fixation

Models: 4086/4087/4088

US Summary			
US Registered Implants:	235,000	US Chronic Complications	4,529
US Approval Date:	February 2002	US Malfunctions:	358
US Estimated Active Implants:	87,000	Without Compromised Therapy:	141
		With Compromised Therapy:	217

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.5%	99.3%	99.0%	98.7%	98.3%	98.0%	97.6%	97.2%	96.8%	96.6%
Registered Implants: 235000	Effective Sample Size	200127	178986	159460	139426	121307	104645	89549	75815	62969	51603

FLEXTEND Active Fixation

Models: 4086/4087/4088

Worldwide Confirmed Malfunctions	**385**
Worldwide Distribution	**291,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	86	15	101
Electrical			
Inner insulation abrasion (2)	15	20	35
Other			
Non-patterned, other	11	17	28
Conductor damage (32)	122	99	221
Grand Total	**234**	**151**	**385**

References cited in table above (link)

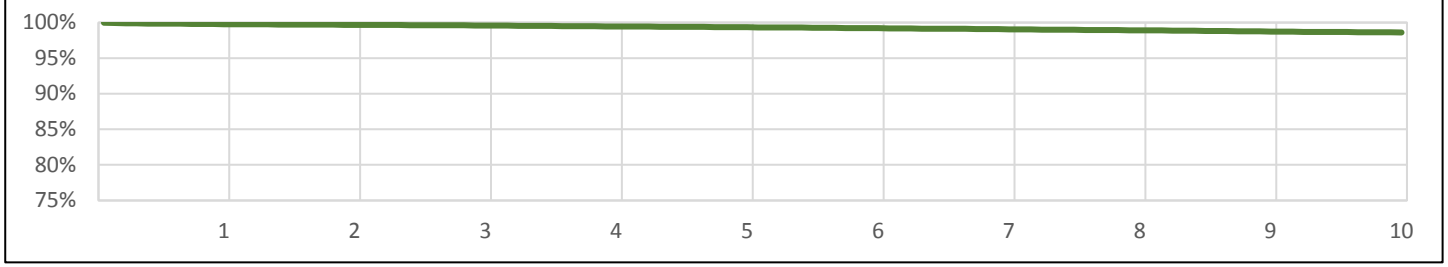
FINELINE II EZ/FINELINE II Sterox EZ Positive Fixation (Polyurethane)

Models: 4463/4464/4465/4469/4470/4471

US Summary

US Registered Implants:	479,000	US Chronic Complications	3,416
US Approval Date:	January 2000	US Malfunctions:	152
US Estimated Active Implants:	255,000	Without Compromised Therapy:	37
		With Compromised Therapy:	115

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.8%	99.7%	99.6%	99.5%	99.3%	99.2%	99.0%	98.9%	98.7%	98.6%
Registered Implants: 479000	Effective Sample Size	408334	357005	311557	264133	221358	183146	149487	119657	93090	69495

FINELINE II EZ/FINELINE II Sterox EZ Positive Fixation (Polyurethane)

Models: 4463/4464/4465/4469/4470/4471

Worldwide Confirmed Malfunctions	**182**
Worldwide Distribution	**746,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	64	11	75
Crimp/Weld/Bond			
Terminal weld (23)	1	0	1
Other			
Non-patterned, other	7	6	13
Lead body (4)	68	25	93
Grand Total	**140**	**42**	**182**

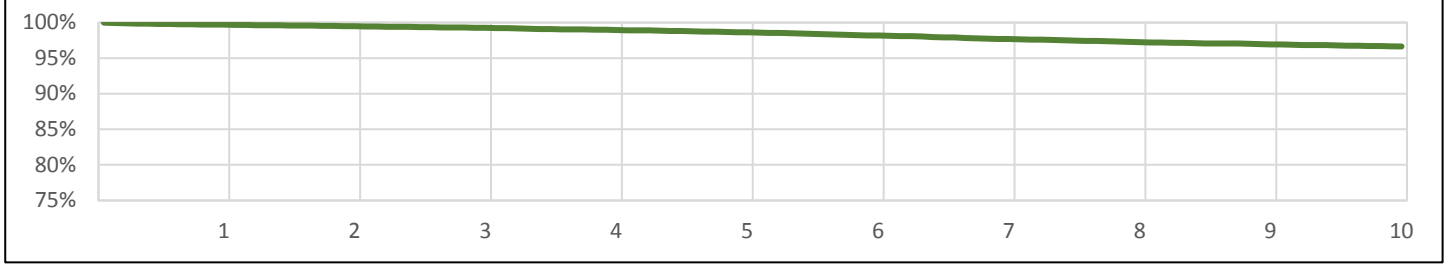
References cited in table above (link)

FINELINE II EZ/FINELINE II Sterox EZ Positive Fixation (Silicone)

Models: 4466/4467/4468/4472/4473/4474

US Summary			
US Registered Implants:	52,000	US Chronic Complications	863
US Approval Date:	January 2000	US Malfunctions:	141
US Estimated Active Implants:	23,000	Without Compromised Therapy:	28
		With Compromised Therapy:	113

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.5%	99.2%	98.9%	98.6%	98.2%	97.7%	97.3%	96.9%	96.6%
Registered Implants: 52000	Effective Sample Size	45713	40754	36153	31354	26917	22790	19090	15845	12790	10224

FINELINE II EZ/FINELINE II Sterox EZ Positive Fixation (Silicone)

Models: 4466/4467/4468/4472/4473/4474

Worldwide Confirmed Malfunctions	**179**
Worldwide Distribution	**142,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	89	7	96
Other			
Non-patterned, other	3	7	10
Conductor damage (32)	53	19	72
Lead body (4)	0	1	1
Grand Total	**145**	**34**	**179**

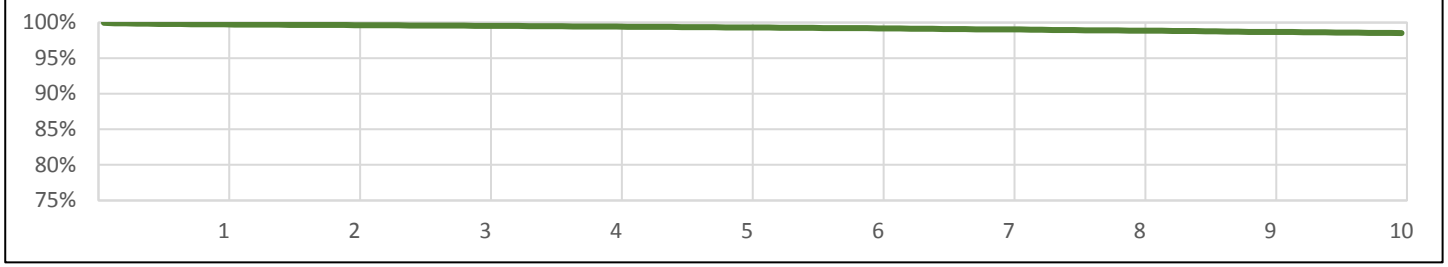
References cited in table above (link)

FINELINE II/FINELINE II Sterox Passive Fixation (Polyurethane)

Models: 4452/4453/4456/4457

US Summary			
US Registered Implants:	192,000	US Chronic Complications	1,536
US Approval Date:	January 2000	US Malfunctions:	45
US Estimated Active Implants:	82,000	Without Compromised Therapy:	3
		With Compromised Therapy:	42

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.7%	99.6%	99.5%	99.4%	99.3%	99.2%	99.0%	98.9%	98.7%	98.5%
Registered Implants: 192000	Effective Sample Size	165165	146549	129302	110908	93971	78774	65401	53660	43132	33703

FINELINE II/FINELINE II Sterox Passive Fixation (Polyurethane)

Models: 4452/4453/4456/4457

Worldwide Confirmed Malfunctions	**68**
Worldwide Distribution	**539,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	17	0	17
Other			
Lead body (4)	41	3	44
Non-patterned, other	6	1	7
Grand Total	**64**	**4**	**68**

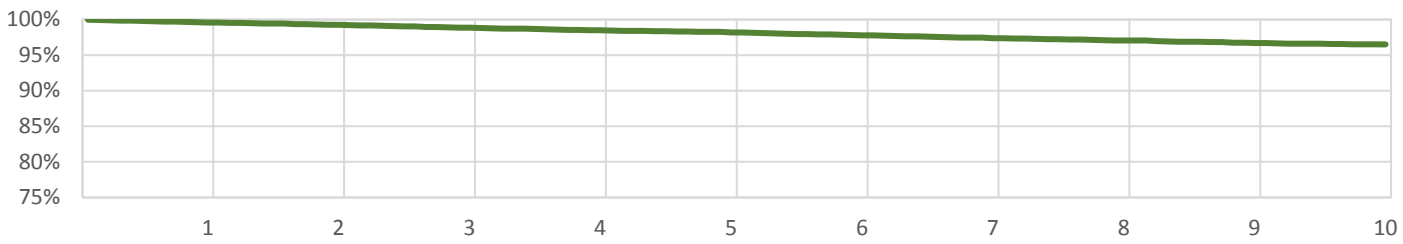
References cited in table above (link)

FINELINE II EZ/FINELINE II Sterox EZ Passive Fixation (Silicone)

Models: 4454/4455/4458/4459

US Summary			
US Registered Implants:	14,000	US Chronic Complications	295
US Approval Date:	January 2000	US Malfunctions:	23
US Estimated Active Implants:	4,000	Without Compromised Therapy:	-
		With Compromised Therapy:	23

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.6%	99.3%	98.8%	98.5%	98.2%	97.8%	97.4%	97.0%	96.7%	96.5%
Registered Implants: 14000	Effective Sample Size	12244	10936	9712	8475	7376	6355	5431	4581	3824	3196

FINELINE II/FINELINE II Sterox Passive Fixation (Silicone)

Models: 4454/4455/4458/4459

Worldwide Confirmed Malfunctions	**58**
Worldwide Distribution	**104,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	19	0	19
Other			
Conductor damage (32)	35	2	37
Non-patterned, other	2	0	2
Grand Total	**56**	**2**	**58**

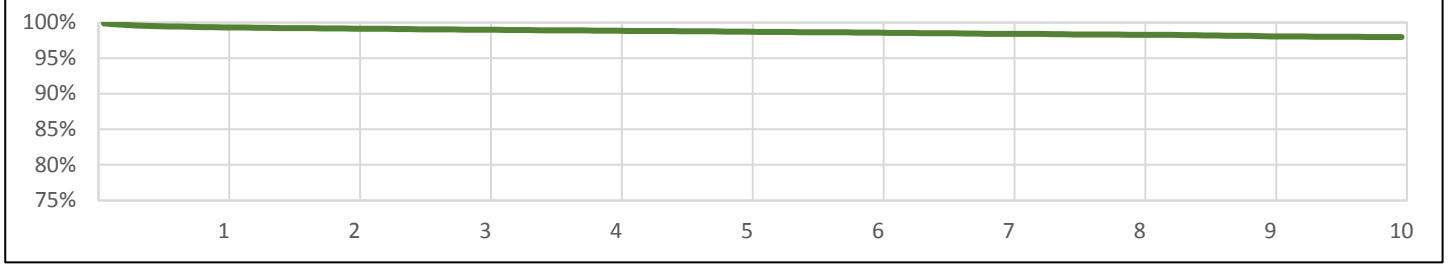
References cited in table above (link)

FINELINE II/FINELINE II Sterox Atrial J (Polyurethane)

Models: 4477/4478/4479/4480

US Summary			
US Registered Implants:	62,000	US Chronic Complications	800
US Approval Date:	January 2000	US Malfunctions:	38
US Estimated Active Implants:	29,000	Without Compromised Therapy:	19
		With Compromised Therapy:	19

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.3%	99.1%	99.0%	98.8%	98.7%	98.6%	98.4%	98.3%	98.0%	98.0%
Registered Implants: 62000	Effective Sample Size	54075	48073	42503	36376	30810	25745	21260	17354	13819	10719

FINELINE II/FINELINE II Sterox Atrial J (Polyurethane)

Models: 4477/4478/4479/4480

Worldwide Confirmed Malfunctions	**78**
Worldwide Distribution	**310,000**

	With Compromised Therapy	Without Compromised Therapy	Total
Conductor			
Lead conductor (7)	5	1	6
Other			
Non-patterned, other	3	2	5
J-shape (22)	26	30	56
Lead body (4)	8	3	11
Grand Total	**42**	**36**	**78**

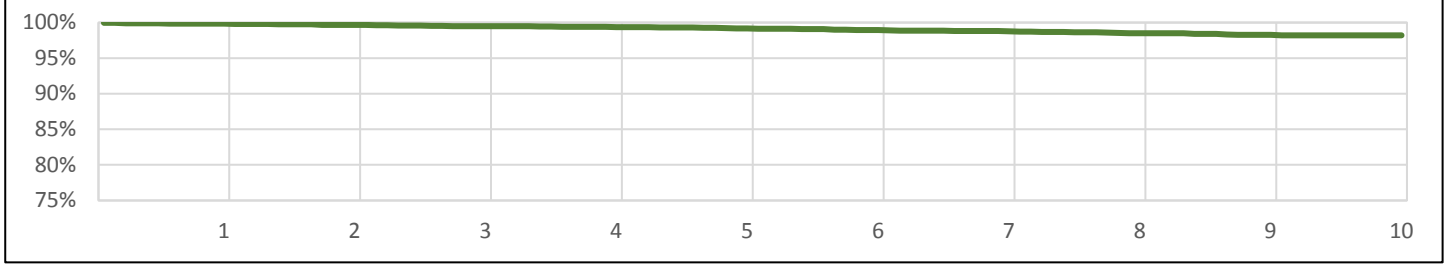
References cited in table above (link)

FINELINE EZ Positive Fixation

Models: 4460/4461/4462

US Summary			
US Registered Implants:	6,000	US Chronic Complications	63
US Approval Date:	July 1999	US Malfunctions:	4
US Estimated Active Implants:	1,000	Without Compromised Therapy:	1
		With Compromised Therapy:	3

Complications and Malfunctions



US Survival Probability

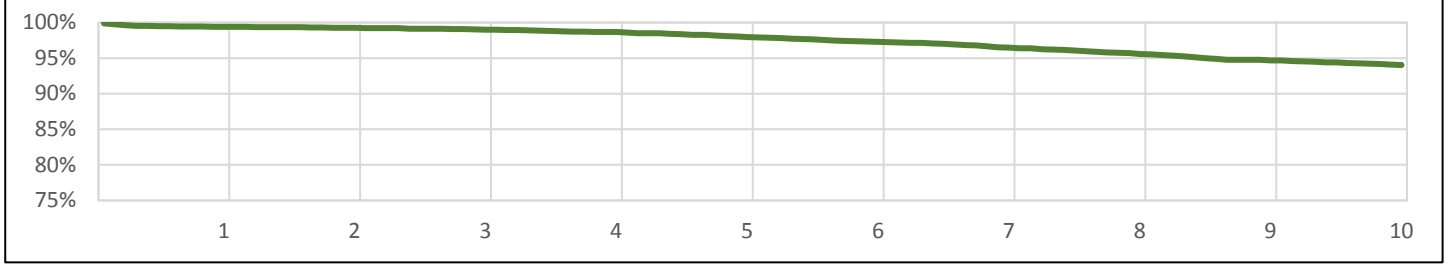
Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.8%	99.7%	99.5%	99.4%	99.2%	99.0%	98.8%	98.5%	98.3%	98.2%
Registered Implants: 6000	Effective Sample Size	4892	4334	3833	3384	3003	2590	2262	1952	1670	1424

SELUTE PICOTIP Atrial J

Models: 4040/4041/4042/4043/4044/4045/4063/4064

US Summary			
US Registered Implants:	10,000	US Chronic Complications	372
US Approval Date:	May 2000	US Malfunctions:	25
US Estimated Active Implants:	2,000	Without Compromised Therapy:	16
		With Compromised Therapy:	9

Complications and Malfunctions



US Survival Probability

Year		1	2	3	4	5	6	7	8	9	10
Non-Advisory Population	Depletions and Malfunctions	99.4%	99.3%	99.0%	98.7%	98.0%	97.3%	96.5%	95.6%	94.7%	94.0%
Registered Implants: 10000	Effective Sample Size	8521	7650	6854	6128	5464	4854	4244	3711	3240	2863

Confirmed Malfunction Details: Leads References

Descriptions listed below provide an overview of the clinical observations and/or analysis findings associated with each confirmed lead malfunction pattern listed in this report. All of the patterns listed are thoroughly investigated and analyzed. As part of Boston Scientific's process of continuous improvement, when possible, changes have been or will be implemented in response to identified malfunction patterns. "Improvements implemented" may include product design changes in existing or subsequent generations, manufacturing process modifications, educational communications, labeling changes, etc. Improvement implementation may vary by geography due to various factors, including regulatory review timing, and may not completely mitigate or eliminate the potential for additional malfunctions.

1. **IS-1 terminal pin**— Compromised insulation and/or conductor integrity if lead is bent sharply away from the header block when placed in implant pocket or if pulse generator migrates from implant site. Improvement implemented.
2. **Inner insulation abrasion**— Loss of capture, decreasing impedance, increased pacing thresholds, noisy signals, oversensing. Abrasion of inner insulation.
3. **Terminal leg insulation**— Loss of sensing, loss of pacing, loss of defibrillation therapy. Abraded insulation on terminal leg portion of lead due to lead-on-lead or lead-on-can contact. Improvement implemented.
4. **Lead body**— Insulation abrasion due to lead-on-lead or lead-on-can contact combined with damage attributed to application of compressive or torsional loads which may be due to clavicle-first rib entrapment. Damage to lead body may expose conductor.
5. **Seal rings**— Insertion difficulty at implant, difficulty removing lead from header post-implant. Proximal silicone seal rings not fully adhered to lead terminal. Improvement implemented.
6. **Manufacturing material**— Loss of sensing, loss of pacing, noisy signals. Manufacturing material embedded in lead body.
7. **Lead conductor**— Loss of capture, inability to deliver therapy. Fatigue of lead conductor due to repeated flexing.
8. **Lead body**— Lead fracture, inappropriate shocks, oversensing. Insulation damage resulting from implant stresses or manufacturing variability.
9. **Lead conductor**— Loss of sensing, loss of pacing. Physical damage to lead body due to repeated flexing.
10. **Lead connector**— Insulation damage resulting from bending or tension at the terminal connector. May lead to inappropriate shocks, oversensing.
11. **Lead conductor**— Physical damage to lead conductor, inappropriate shocks, oversensing. Displacement of yoke component may lead to fatigue of high-voltage lead conductor. Improvement implemented.
12. **Conductor connection**— Loss of sensing, loss of pacing, loss of defibrillation output. Improper conductor wire connection. Improvement implemented.
13. **Serial number label**— Loss of sensing, loss of pacing. Sharp edge in serial number label resulting in breach in outer lead insulation. Improvement implemented.
14. **Terminal component**— Loss of sensing, loss of pacing, terminal pin separation from terminal ring during implant or ICD replacement. Improvement implemented.
15. **Electrode tip**— Separation between electrode tip and lead body.
16. **Lead body**— Physical damage to lead body, inappropriate shocks. Abraded insulation due to contact with patient anatomy.
17. **DF-1 terminal pin**— Loss of sensing, loss of pacing, loss of defibrillation output. Compromised insulation and/or conductor integrity from sharp or excessive bending. Improvement implemented.
18. **Yoke component**— Noise, impedance anomalies, threshold variation. Use of multiple or pre-formed stylets may cause component within lead yoke to dislodge. Improvement implemented.
19. **Lead conductor**— Muscle stimulation, inappropriate shocks, oversensing, high pacing impedance, inability to deliver therapy. Repeated flexing leading to fatigue of lead conductor.
20. **Serial number label**— Loss of sensing, loss of pacing. Broken serial number label due to either sharp bend away from header at implant or repetitive movement during implant.
21. **IS-1 terminal pin**— Compromised insulation and/or conductor integrity if lead is bent sharply away from the header block when placed in implant pocket or if pulse generator migrates from implant site. Improvement implemented.
22. **J-shape**— Placement difficulty, dislodgement. Elevated temperatures resulting in a relaxation of pre-formed J-shape. Improvement implemented.
23. **Terminal weld**— Impedance rise, loss of pacing. Loss of connection on terminal weld. Improvement implemented.
24. **Conductor fracture**— High impedance, loss of capture, loss of pacing, inappropriate shocks. Flex fatigue leading to discontinuity of pace/sense conductor.
25. **Conductor fracture**— High impedance, loss of LV capture, loss of LV pacing. Flex fatigue leading to discontinuity of conductor.
26. **Non-patterned, Other**— Confirmed malfunction for which the root cause does not fit within other categories and is not associated with other malfunctions, or has not yet been identified.
32. **Conductor damage**— Noise, oversensing, inappropriate shocks, possible loss of therapy. Conductor damage attributed to application of compressive or torsional loads which may be due to clavicle-first rib entrapment.
33. **Insulation damage**— Low pacing impedance, noise, possible loss of therapy. Insulation abrasion due to lead-onlead or lead-on-can contact, or due to application of compressive or torsional loads which may be due to clavicle first rib entrapment. Damage to lead body may expose conductor.

34. **Extracardiac fracture**— High impedance, loss of LV capture, loss of LV pacing. Flex fatigue near suture sleeve, not including clavicle-first rib damage, leading to discontinuity of conductor.
35. **Lead conductor**— High impedance, loss of sensing, loss of pacing. Variability in wire conductor material. Improvement implemented.
36. **Conductor connection**— Loss of sensing, loss of pacing, loss of defibrillation output. Improper conductor wire connection. Improvement implemented.
37. **Weld fracture**— Noise, loss of sensing. Fractured weld.
38. **Conductor cable fracture**— High impedance, potential loss of pacing and defibrillation therapy. Fractured high voltage cable. Improvement implemented.
39. **Inner conductor break**— High impedance, loss of capture, loss of sensing. Inner conductor break. Commonly associated with helix extension/retraction difficulties at implant.
40. **Weld -** Out of range impedance measurements, noise, oversensing. Incomplete weld.
41. **Extracardiac fracture**— High impedance, noise, oversensing, loss of capture, loss of pacing. Flex fatigue leading to discontinuity of outer conductor.

U.S. Chronic Lead Complications (Occurring After the First Month of Service)

Boston Scientific strives to provide meaningful detail in describing the performance of our products. U.S. Chronic Lead Complications are reported in compliance with ISO 5841-2: 2014 (E), Reporting of Clinical Performance of Populations of Pulse Generators or Leads. To be included in the Chronic Lead Complications table, a lead must be successfully implanted, with clinical observations (as listed in the table) occurring after the first month of implant, and have been removed from service surgically or electronically. The lead either was not returned for analysis, or was returned but had no confirmation of a malfunction.

While multiple complications are possible for any given lead, only one complication is reported per lead. The complication reported is determined by an observation hierarchy, indicated by the order of the categories from left to right in the table. The number of U.S. Registered Implants is also provided as context for the data. Chronic Lead Complications are included in the calculation of survival probability.

Pacing Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
INGEVITY Positive Fixation 7640/7641/7642/7740/7741/7742	267,000	60	243	305	88	19	13	23	14	0	16
INGEVITY Atrial J Passive Fixation 7635/7636/7735/7736	8,000	0	6	16	3	0	1	1	0	0	0
INGEVITY Passive Fixation 7631/7632/7731/7732	13,000	0	3	6	3	1	1	0	2	0	0
FLEXTEND Active Fixation 4086/4087/4088	235,000	81	1024	1007	975	510	128	219	530	0	53
FINELINE II ; Passive Fixation (poly) 4452/4453/4456/4457	192,000	5	454	238	277	59	34	208	240	0	19
FINELINE II EZ ; Positive Fixation (poly) 4463/4464/4465/4469/4470/4471	479,000	21	745	825	468	151	135	579	462	0	28
FINELINE II Atrial J (poly) 4477/4478/4479/4480	62,000	1	121	358	136	23	32	76	46	0	7
FINELINE II/THINLINE II ; Passive Fixation (silicone) 4454/4455/4458/4459	14,000	2	124	19	64	27	4	23	32	0	1
FINELINE II/THINLINE II EZ ; Positive Fixation (silicone) 4466/4467/4468/4472/5573/4474	52,000	0	293	95	110	102	23	100	137	0	2

CRT Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ACUITY X4 Spiral L 4677/4678	10,000	0	0	9	2	1	0	0	0	0	2
ACUITY X4 Spiral S 4674/4675	26,000	1	0	34	2	1	0	0	0	0	6

CRT Leads/Model (cont.)	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ACUITY X4 Straight 4671/4672	19,000	0	0	50	6	0	0	1	4	0	18
ACUITY Steerable 4554/4555/4556	29,000	3	37	453	62	5	2	16	33	0	94
ACUITY Spiral 4591/4592/4593	23,000	0	22	331	47	0	1	5	10	0	130
EASYTRAK 3 4522/4524/4525/4527/4548/4549/4550	22,000	2	38	311	58	5	2	16	21	0	94
EASYTRAK 2 4515/4517/4518/4520/4542/4543/4544	97,000	1	393	1353	342	9	8	115	141	0	440
EASYTRAK 4510/4511/4512/4513/4535/4536/ 4537/4538	38,000	2	89	487	147	4	1	75	52	0	266

Defibrillation Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ENDOTAK RELIANCE 4-FRONT Single Coil Active Fixation 0657/0692/0693	1,000	0	0	0	0	0	0	0	0	0	0
ENDOTAK RELIANCE 4-FRONT Dual Coil Active Fixation 0675/0676/0658/0695/0696	1,000	0	0	0	0	0	0	0	0	0	0
ENDOTAK RELIANCE 4-Site ; Dual Coil, Active Fixation 0275/0276/0295/0296	73,000	18	40	108	27	37	11	12	15	11	5
ENDOTAK RELIANCE 4-Site ; Dual Coil, Passive Fixation 0285/0286	3,000	0	1	8	1	4	0	0	8	0	0
ENDOTAK RELIANCE 4-Site ; Single Coil, Active Fixation 0292/0293	114,000	24	49	168	46	52	16	8	16	20	7
ENDOTAK RELIANCE 4-Site ; Single Coil, Passive Fixation 0282/0283	2,000	1	0	1	2	1	0	0	2	0	0
ENDOTAK RELIANCE ; Dual Coil, Active Fixation 0157/0158/0159/0164/0165/0167/ 0184/0185/0186/0187	287,000	32	703	424	208	793	97	160	391	362	29
ENDOTAK RELIANCE ; Dual Coil, Passive Fixation 0147/0148/0149/0174/0175/0176/0177	47,000	4	152	75	80	145	12	48	253	67	6
ENDOTAK RELIANCE ; Single Coil, Active Fixation 0137/0138/0160/0161/0162/0180/0181/0182	33,000	12	85	58	30	68	2	9	40	54	4
ENDOTAK RELIANCE ; Single Coil, Passive Fixation 0127/0128/0170/0171/0172/0173	2,000	0	5	5	3	7	0	1	9	3	0

S-ICD Electrodes/Model	U.S. Registered Implants	Perforation	Conductor fracture	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal defibrillation impedance	Extracardiac stimulation
EMBLEM/Q-TRAK S-ICD Electrode 3010, 3401, 3501	32,000	0	3	13	0	86	6	4	0	8

U.S. Acute Lead Observations

Boston Scientific strives to provide meaningful detail reflective of real-world product experience. In the first weeks following lead implantation, physiologic responses and lead performance can vary until chronic lead stability is attained. Acute lead performance may be subject to a number of factors, including patient-specific anatomy, clinical conditions and/or varying implant conditions/techniques.

Because acute implant time contributes to overall clinical experience. Boston Scientific provides specific information regarding acute lead performance. To be included in the Acute Lead Observations table, a lead must first be successfully implanted, with clinical observations occurring within the first month of implant. These reports may or may not have resulted in clinical action and/or product return to Boston Scientific. The categories are consistent with the AdvaMed guidance for *Uniform Reporting of Clinical Performance of Cardiac Rhythm Management Pulse Generators and Leads*. Although multiple observations are possible for any given lead, only one observation is reported per lead. The observation reported is determined by an observation hierarchy, indicated by the order of the categories from left to right in the table. The number of U.S. Registered Implants is also provided as context for the data. Acute Lead Observations are not included in calculation of lead survival probability.

Pacing Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
INGEVITY Positive Fixation 7640/7641/7642/7740/7741/7742	267000	272	306	724	181	64	44	5	40	0	26
INGEVITY Atrial J Passive Fixation 7635/7636/7735/7736	8000	0	0	18	2	1	0	0	0	0	0
INGEVITY Passive Fixation 7631/7632/7731/7732	13000	0	0	21	5	0	2	0	0	0	0
FLEXTEND Active Fixation 4086/4087/4088	235000	170	265	1012	292	46	55	25	92	0	30
FINELINE II ; Passive Fixation (poly) 4452/4453/4456/4457	192000	9	10	391	100	7	12	16	15	0	10
FINELINE II Atrial J (poly) 4463/4464/4465/4469/4470/4471	62000	0	10	396	47	2	16	5	7	0	5
FINELINE II EZ ; Positive Fixation (poly) 4477/4478/4479/4480	479000	54	49	618	142	84	62	28	76	0	26
FINELINE II/THINLINE II ; Passive Fixation (silicone) 4454/4455/4458/4459	14000	0	1	28	9	0	0	3	4	0	0
FINELINE II/THINLINE II EZ ; Positive Fixation (silicone) 4466/4467/4468/4472/4473/4474	52000	2	13	89	13	3	8	6	3	0	3

CRT Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ACUITY X4 Spiral L 4677/4678	10000	0	0	18	17	7	0	0	3	0	15
ACUITY X4 Spiral S 4674/4675	26000	0	1	35	12	4	0	0	15	0	33

CRT Leads/Model (cont.)	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ACUITY X4 Straight 4671/4672	19000	1	0	65	9	3	0	0	7	0	32
ACUITY Steerable 4554/4555/4556	29000	1	1	291	22	13	1	1	21	0	162
ACUITY Spiral 4591/4592/4593	23000	1	2	172	28	5	0	3	9	0	168
EASYTRAK 3 4522/4524/4525/4527/4548/4549/4550	22000	0	1	240	23	8	1	3	17	0	128
EASYTRAK 2 4515/4517/4518/4520/4542/4543/4544	97000	7	4	805	84	30	4	14	63	0	513
EASYTRAK 4510/4511/4512/4513/4535/4536/ 4537/4538	38000	4	4	168	23	11	1	10	20	0	141

Defibrillation Leads/Model	U.S. Registered Implants	Cardiac Perforation	Conductor fracture/ helix damage	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal pacing impedance	Abnormal defibrillation impedance	Extracardiac stimulation
ENDOTAK RELIANCE 4-FRONT Single Coil Active Fixation 0657/0692/0693	1000	0	0	0	0	0	0	0	0	1	0
ENDOTAK RELIANCE 4-FRONT Dual Coil Active Fixation 0675/0676/0658/0695/0696	1000	0	0	0	0	0	0	0	0	0	0
ENDOTAK RELIANCE 4-Site ; Dual Coil, Active Fixation 0275/0276/0295/0296	73000	52	18	238	40	25	3	1	25	5	6
ENDOTAK RELIANCE 4-Site ; Dual Coil, Passive Fixation 0285/0286	3000	2	0	9	1	0	0	0	5	0	0
ENDOTAK RELIANCE 4-Site ; Single Coil, Active Fixation 0292/0293	114000	79	19	325	63	42	13	5	29	13	17
ENDOTAK RELIANCE 4-Site ; Single Coil, Passive Fixation 0282/0283	2000	2	1	5	0	1	1	0	6	0	0
ENDOTAK RELIANCE ; Dual Coil, Active Fixation 0157/0158/0159/0164/0165/0167/ 0184/0185/0186/0187	287000	82	137	510	130	223	12	17	179	108	44
ENDOTAK RELIANCE ; Dual Coil, Passive Fixation 0147/0148/0149/0174/0175/0176/0177	47000	5	4	92	36	41	4	3	47	5	0
ENDOTAK RELIANCE ; Single Coil, Active Fixation	33000	29	7	64	14	19	3	2	18	21	9

0137/0138/0160/0161/0162/0180/0181/0182											
ENDOTAK RELIANCE ; Single Coil, Passive Fixation 0127/0128/0170/0171/0172/0173	2000	0	0	3	1	2	0	0	1	0	0

S-ICD Electrodes/Model	U.S. Registered Implants	Perforation	Conductor fracture	Lead dislodgement	Failure to capture	Oversensing	Failure to sense	Insulation breach	Abnormal defibrillation impedance	Extracardiac stimulation
EMBLEM/Q-TRAK S-ICD Electrode 3010/3401/3501	32000	1	0	26	0	271	7	1	0	16

Before/During Implant Procedure - Worldwide Malfunctions: Leads

This section of the report depicts the number of product malfunctions that occurred worldwide either before implant (prior to opening the sterile product packaging) or during implant (once the sterile product packaging has been opened). In all cases, the product in question must be returned to Boston Scientific CRM and confirmed through laboratory analysis to have operated or exhibited a problem outside the specified performance limits established by Boston Scientific. Damage incurred during shipping/transit or due to external factors warned against in labeling is not reported as device malfunction here.
The Conductor category includes any conductor break or damage with complete or intermittent loss of continuity that could interrupt current flow, including clavicle fatigue or crush damage. The Insulation category includes any lead insulation breach, such as damage due to lead-on-lead or lead-on-anatomy contact, or clavicle fatigue or crush. The Crimp/Weld/Bond category includes any interruption in the conductor or lead body associated with a point of connection. The Other category includes malfunctions for which the root cause does not fit within other categories or has not yet been determined. The Labeling and Packaging categories include product identification issues and damage to sterile packaging, respectively. The Implant Accessory category includes lead malfunctions due to catheter, guidewire or sheath issues.

CRT Leads/Model	Worldwide Distribution	Conductor	Insulation	Crimp/Weld/Bond	Other	Labeling	Packaging	Implant Accessory
ACUITY X4 Spiral L 4677/4678	24,000	0	0	0	1	0	0	0
ACUITY X4 Spiral S 4674/4675	55,000	0	0	0	3	0	0	0
ACUITY X4 Straight 4671/4672	45,000	0	0	0	0	0	0	0
ACUITY Steerable 4554/4555/4556	65,000	0	0	0	5	0	2	0
ACUITY Spiral 4591/4592/4593	45,000	0	0	0	2	1	0	0

Defibrillation Leads/Model	Worldwide Distribution	Conductor	Insulation	Crimp/Weld/Bond	Other	Labeling	Packaging	Implant Accessory
ENDOTAK RELIANCE 4-FRONT Dual Coil Active Fixation 0658/0695/0696	14,000	0	0	0	1	0	0	0
ENDOTAK RELIANCE 4-FRONT Single Coil Active Fixation 0657/0692/0693	67,000	3	1	0	2	0	0	0
ENDOTAK RELIANCE 4-FRONT Dual Coil Passive Fixation 0655/0685/0686	1,000	0	0	0	0	0	0	0
ENDOTAK RELIANCE 4-FRONT Single Coil Passive Fixation 0654/0682/0683	4,000	0	1	0	0	0	0	0
ENDOTAK RELIANCE 4-Site ; Dual Coil, Active Fixation 0275/0276/0295/0296	115,000	0	0	0	74	0	1	0
ENDOTAK RELIANCE 4-Site ; Dual Coil, Passive Fixation 0265/0266/0285/0286	10,000	0	0	0	5	15	1	0
ENDOTAK RELIANCE 4-Site ; Single Coil, Active Fixation 0292/0293	173,000	0	0	0	30	0	1	0
ENDOTAK RELIANCE 4-Site ; Single Coil, Passive Fixation 0282/0283	5,000	0	0	0	0	0	0	0
ENDOTAK RELIANCE ; Dual Coil, Active Fixation 0157/0158/0159/0164/0165/0167/ 0184/0185/0186/0187	379,000	0	0	92	569	1	3	10
ENDOTAK RELIANCE ; Dual Coil, Passive Fixation 0147/0148/0149/0174/0175/0176/0177	110,000	0	0	20	109	0	3	0
ENDOTAK RELIANCE ; Single Coil, Active Fixation 0137/0138/0160/0161/0162/0180/0181/0182	72,000	0	0	15	72	0	1	1
ENDOTAK RELIANCE ; Single Coil, Passive Fixation 0127/0128/0170/0171/0172/0173	8,000	0	0	1	6	0	0	0

S-ICD Electrodes/Model	Worldwide Distribution	Conductor	Insulation	Crimp/Weld/Bond	Other	Labeling	Packaging	Implant Accessory
EMBLEM/Q-TRAK S-ICD Electrode 3010, 3401, 3501	61,000	0	0	1	0	0	0	0

Pacing Leads/Model	Worldwide Distribution	Conductor	Insulation	Crimp/Weld/Bond	Other	Labeling	Packaging	Implant Accessory
INGEVITY Positive Fixation 7640/7641/7642/7740/7741/7742	649,000	1719	0	0	3036	0	0	0
INGEVITY Atrial J Passive Fixation 7635/7636/7735/7736	59,000	0	0	0	0	0	0	0
INGEVITY Passive Fixation 7631/7632/7731/7732	71,000	1	0	0	1	0	0	0
FLEXTEND 2 Active Fixation 4095/4096/4097	185,000	0	0	11	136	1	0	0
FLEXTEND Active Fixation 4086/4087/4088	291,000	0	0	66	636	1	1	4
FINELINE II ; Passive Fixation (poly) 4452/4453/4456/4457*	539,000	1	0	3	8	6	26	0
FINELINE II EZ ; Positive Fixation (poly) 4463/4464/4465/4469/4470/4471*	746,000	0	0	6	725	1	52	3
FINELINE II Atrial J (poly) 4477/4478/4479/4480*	310,000	0	0	1	144	6	18	0
FINELINE II/THINLINE II ; Passive Fixation (silicone) 4454/4455/4458/4459*	104,000	0	0	2	2	1	1	0
FINELINE II/THINLINE II EZ ; Positive Fixation (silicone) 4466/4467/4468/4472/5573/4474*	142,000	0	0	0	233	4	6	0

*Counts consist of Boston Scientific and Intermedics co-branded pacing leads data.

Product Advisories

A Product Advisory is a voluntary letter issued to inform physicians of an anomalous device behavior identified by Boston Scientific's Quality System. A Product Advisory is issued when there is a material elevation in risk to patient safety with potential for compromised lifesaving therapy, or when Boston Scientific can provide meaningful guidance to improve patient outcomes or device performance. Boston Scientific considers many perspectives in the decision to issue a Product Advisory, including internal expertise and guidance from an independent Patient Safety Advisory Board (PSAB).

This report section includes summaries of Product Advisories for which significant, active U.S. device populations exist. In general, this includes advisories for which the estimated active U.S. advisory population is at least 200. Physician and patient letters, as well as Advisory Updates, are available at www.bostonscientific.com. With respect to the number of reported events listed in the summaries below, Boston Scientific recognizes that the actual number of clinical malfunctions may be greater than the number reported. Additionally, rate projections are provided with the acknowledgment that predictive modeling is inherently uncertain due to its dependence on the device age distribution of reported events and resultant statistical approximations and assumptions. Advisory notifications may vary by geography, based upon local regulatory requirements. Please contact the local Boston Scientific office for more information. Not all products may be approved for use in all geographies, as product approval is geography specific.

PRODUCT	ORIGINAL COMMUNICATION **November 2018 — SQ-RX 1010 Shortened Replacement Time**
Identifiable by serial number. Not all serial numbers are affected. A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **S-ICD** Model 1010 SQ-RX 1010 Shortened Replacement Time, Physician Letter, November 2018 SQ-RX 1010 Shortened Replacement Time, Patient Letter, November 2018	Voluntary Physician Advisory FDA Classification: Unclassified This advisory discusses the potential for a shortened replacement interval after a Charge Time (CT) / Battery Depletion (BD) alert has occurred or after the battery status reaches Elective Replacement Indicator (ERI) in the first-generation Subcutaneous Implantable Cardioverter Defibrillator (S-ICD) system's SQ-RX™ Model 1010 Pulse Generator (PG). The SQ-RX Model 1010 PG provides an Elective Replacement Indicator (ERI) as the PG approaches the end of its expected battery service life. When the battery reaches ERI through normal use, there is sufficient capacity to support up to 90 days of continued operation, including up to 6 maximum energy charges/shocks before fully depleting. However, if the PG experiences a latent battery malfunction resulting in accelerated battery depletion, the reserve battery capacity available beyond ERI may not be sufficient to support the full 90-day interval or additional shock therapy before depleting. The rate of depletion for a latent battery malfunctions varies. The SQ-RX model 1010 PGs include separate monitors for charging and battery performance. The Charge Time (CT) alert is designed to detect unsuccessful charging of the high voltage capacitors within 44 seconds. The Battery Depletion (BD) alert is designed to detect higher rates of accelerated battery depletion. When an alert condition occurs, the patient is notified through beeping tones and the clinician user is notified through programmer messages. Most battery malfunctions exhibit a sufficient rate of accelerated depletion to be detected by one of these alerts. Some battery malfunctions exhibit a slower rate of accelerated depletion, which is not detected as an alert condition. Based on an analysis of accelerated battery depletion events where only ERI presented (no alert condition), at least one maximum energy shock has been determined to be available for at least 20 days after ERI. *Estimated Rate of Occurrence* The projected occurrence rate for latent battery malfunctions for SQ-RX Model 1010 PGs is up to 2% at 5 years. There have been no reports of injuries or deaths associated with this behavior. Laboratory analysis of returned PGs with latent battery malfunctions has shown some depletions to a level at which therapy would not have been available if not replaced in accordance with the recommendations above. Based on a 3-month follow-up interval, the potential for life threatening harm for this behavior is 0.006% (1 in 16,667) at 5 years. However, the potential for life-threatening harm is greater for secondary prevention patients or those who have received appropriate therapy previously, patients with longer follow-up intervals, and/or patients who are unable to hear beeping tones. For these patients, the benefit associated with prophylactically replacing the PG may outweigh the risks associated with a shortened replacement interval due to latent battery malfunction. Standard Warranty program available, please contact your local representative for terms and conditions.
	CURRENT STATUS **09-Apr-19**
	Estimated Rate of Occurrence The projected occurrence rate for latent battery malfunctions for SQ-RX Model 1010 PGs is up to 2% at 5 years. There have been no reports of injuries or deaths associated with this behavior.
	CURRENT RECOMMENDATION **09-Apr-19**
	• Follow-Up. Consistent with the SQ-RX Model 1010 PG User Manual: - Perform in-clinic checks every 3 months as the PG is not capable of remote patient management; - If it has been more than 3 months since a patient's last in-clinic follow-up, schedule a follow-up within the next month and every 3 months thereafter; - During the next follow-up visit, demonstrate the beeper by applying a magnet over the PG to elicit beeping tones; and - Remind patients to promptly contact their physician if beeping tones are heard from their PG as this may be an indication of a CT / BD alert or ERI. - Append the patient's medical record with this letter to maintain awareness of this topic for the remaining service life of their PG • Evaluate Risk. The potential for life-threatening harm is greater for patients who have experienced life-threatening ventricular arrhythmias, patients not followed every 3 months, and/or patients who are unable to hear beeping tones. For these patients, the benefit associated with prophylactically replacing the PG may outweigh the risks associated with a shortened replacement interval due to latent battery malfunction • CT / BD Alerts. Promptly investigate any beeping tones, CT alerts, or BD alerts and report them to Boston Scientific Technical Services. Using saved PG data, Technical Services can determine if an accelerated battery depletion exists and provide guidance for replacement. • ERI. To mitigate the rare potential for undetected accelerated battery depletion, replace SQ-RX Model 1010 PGs within 20 days of ERI. If a longer replacement interval is desired, save PG data and contact Technical Service to determine a recommended replacement interval. Note: CT / BD Alerts appearing before or after ERI should always be reported to Technical Services for evaluation

PRODUCT	ORIGINAL COMMUNICATION **September 2018 — Hydrogen Induced Premature Depletion**
Identifiable by serial number. Not all serial numbers are affected. A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **VALITUDE CRT-P** Models U125, U128 **VISIONIST CRT-P** Models U225, U226, U228 **ACCOLADE Pacemaker** Models L300, L301, L310, L311, L321, L331 **PROPONENT Pacemaker** Models L200, L201, L209, L210, L211, L221, L231 **ESSENTIO Pacemaker** Models L100, L101, L110, L111, L121, L131 Hydrogen Induced Premature Depletion, Physician Letter, Septemeber 2018 Hydrogen Induced Premature Depletion, Patient Letter, September 2018	Voluntary Physician Advisory FDA Classification: Unclassified This advisory discusses a subset of 2900 pacemakers and cardiac resynchronization therapy pacemakers (CRT-Ps) with an elevated potential for early pacemaker replacement due to hydrogen-induced accelerated battery depletion. The pacemaker manual describes how increases in pacing requirements or changes in programmed parameters may result in an expected longevity reduction and are considered normal battery depletion. However, hydrogen exposure within the pacemaker's circuitry may compromise the electrical performance of low voltage capacitors causing current leakage and a moderate acceleration in the rate of battery depletion. Because this accelerated depletion does not occur rapidly, a follow-up interval of no more than six months is recommended. Boston Scientific has determined a liner component to be the source of hydrogen and identified a subset of 2900 previously distributed pacemakers that have an elevated potential for exhibiting this behavior. Boston Scientific pacemakers include automated diagnostic tools, including battery status assessment and estimated longevity predictions, that dynamically adjust based on power consumption. It is important to emphasize that the accuracy of battery status and longevity estimates are not affected by this behavior. *Estimated Rate of Occurrence* The observed malfunction rate for hydrogen induced accelerated depletion within this advisory subset is 1.4% at 2.5 years which is 233 times higher than the non-advisory population. Because this behavior is highly detectable through regular pacemaker follow-up care, the projected potential for life-threatening harm is 0.0003% (1 in 333,333) at 5 years. There are no devices within this advisory subset that are still available for implant. Standard Warranty program available, please contact your local representative for terms and conditions.
	CURRENT STATUS **09-Apr-19**
	Estimated Rate of Occurrence The observed malfunction rate for hydrogen induced accelerated depletion within this advisory subset is 3.6% at 3 years, which is approximately 90 times higher than the rate of 0.04% in the non-advisory population. Because this behavior is highly detectable through regular pacemaker follow-up care, the projected potential for life-threatening harm is 0.0003% (1 in 333,333) at 5 years. There are no devices within this advisory subset that are still available for implant.
	CURRENT RECOMMENDATION **09-Apr-19**
	• Boston Scientific recommends following patients implanted with any affected pacemaker from the advisory subset at intervals no greater than every six (6) months either in-clinic or via LATITUDE in accordance with the best practices outlined in international societal guidelines • Promptly investigate any suspected indication of accelerated depletion. Before surgical intervention, contact Boston Scientific Technical Services for verification of accelerated depletion and to determine an appropriate timeframe for pacemaker replacement. Please note, if accelerated depletion is identified, the Save to Disk feature or LATITUDE is necessary to perform an engineering assessment. • Prophylactic replacement is NOT recommended for pacemakers with normal battery consumption as the risk of surgical replacement outweighs the risk of accelerated depletion.

PRODUCT

A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool

VALITUDE CRT-P
Models U125, U128

VISIONIST CRT-P
Models U225, U226, U228

ACCOLADE Pacemaker
Models L300, L301, L310, L311, L321, L331

PROPONENT Pacemaker
Models L200, L201, L209, L210, L211, L221, L231

ESSENTIO Pacemaker
Models L100, L101, L110, L111, L121, L131

ALTRUA 2 Pacemaker
Models S701, S702, S722

Minute Ventialtion Signal Oversensing, Physician Letter,

Minute Ventialtion Signal Oversensing, Patient Letter, December 2017

Minute Ventialtion Signal Oversensing, Update letter, January 2019

ORIGINAL COMMUNICATION **December 2017 — Minute Ventilation Signal Oversensing**

Voluntary Physician Advisory

This advisory discusses intermittent oversensing of the Minute Ventilation (MV) sensor signal with certain Boston Scientific pacemaker and cardiac resynchronization therapy pacemaker systems (pacemakers). MV sensor signal oversensing may cause pre-syncope or syncope due to periods of pacing inhibition. This MV behavior may occur with any manufacturer's pacing lead system, but Boston Scientific has determined it to be more likely for affected Boston Scientific pacemakers using Medtronic or Abbott/St. Jude (Abbott) leads implanted in either the right atrium (RA) or right ventricle (RV).

The MV sensor in Boston Scientific pacemakers can be used for RightRate™ (rate adaptive pacing), Respiratory Rate Trend, or AP Scan. When the RA/RV pacing leads and lead terminal connections are operating as intended, the MV sensor signal is appropriately filtered and therefore is not detected by the pacemaker or displayed on electrograms (EGMs). However, intermittency related to the lead or pacemaker-lead connection has the potential to create a transient high impedance condition. A high impedance condition may subsequently alter the MV sensor signal such that it becomes visible on EGMs and potentially subject to oversensing on the RA or RV channels. For a technical description of the Boston Scientific's MV sensor, please refer to Appendix A in the December 2017 physician letter.

Engineering analysis and testing, as well as evaluation of post-market surveillance data, demonstrates an elevated potential for oversensing of the MV sensor signal in certain pacemaker systems connected to Medtronic or Abbott pacing leads. Although all leads evaluated in simulated testing environments comply with appropriate connector standards, we have discovered subtle differences amongst lead manufacturers in the surface finish of the lead terminal ring and amount of axial and radial terminal ring motion within the pacemaker header. These factors may result in intermittent increases in impedance leading to oversensing of the MV sensor signal or changes in daily impedance test measurements.

Estimated Rate of Occurrence

Boston Scientific investigation has shown that the probability of harm associated with MV sensor signal oversensing behavior is significantly greater when affected pacemakers are connected to Medtronic or Abbott pacing leads.

Affected pacemaker systems connected to the following RA/RV pacing leads[4]:	Probability of Injury at 5 years	Probability of Life Threatening Harm at 5 years
Medtronic or Abbott pacing leads	0.0005 (1 in 2,000)	0.00001 (1 in 100,000)
Boston Scientific pacing leads (including DEXTRUS)	0.00003 (1 in 33,333)	0.0000008 (1 in 1,250,000)
All pacing leads combined[5]	0.00008 (1 in 12,500)	0.000002 (1 in 500,000)

CURRENT STATUS **09-Apr-19**

Estimated Rate of Occurrence

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Boston Scientific pacing leads (including DEXTRUS)	0.00003 (1 in 33,333)	0.0000008 (1 in 1,250,000)
All pacing leads combined[5]	0.00008 (1 in 12,500)	0.000002 (1 in 500,000)

CURRENT RECOMMENDATION **09-Apr-19**

Boston Scientific has now received approval for Model 2869 v2.06 software. Once this software upgrade is complete, the MV sensor may be enabled for those patients who are likely to benefit clinically from RightRate™, Respiratory Rate Trend, or AP Scan™ . Please refer to the Minute Ventialtion Signal Oversensing, Update letter, January 2019 for instructions.

PRODUCT	ORIGINAL COMMUNICATION **December 2017 — CRT Positive LV Offset and TPP Interaction**
Identifiable by serial number. Not all serial numbers are affected. A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **VALITUDE CRT-P** Models U125, U128 **VISIONIST CRT-P** Models U225, U226, U228 **RESONATE CRT-D** Models G424, G425, G426, G428, G437, G447, G448, G524, G525, G526, G528, G537, G547, G548 **VIGILANT CRT-D** Models G224, G225, G228, G237, G247, G248 **MOMENTUM CRT-D** Models G124, G125, G126, G128, G138 **CHARISMA CRT-D** Models G324, G325, G328, G337, G347, G348 **AUTOGEN CRT-D** Models G172, G173, G175, G177, G179 **DYNAGEN CRT-D** Models G150, G151, G156, G158 **INOGEN CRT-D** Models G140, G141, G146, G148 **ORIGEN CRT-D** Models G050, G051, G056, G058 CRT Positive LV Offset and TPP Interaction, Physician Letter, Dec 2017 CRT Positive LV Offset and TPP Interaction, Patient Letter, December 2017 CRT Positive LV Offset and TPP Interaction, Update Letter, January 2019	Voluntary Physician Advisory FDA Classification: Unclassified This advisory discusses unintended asynchronous biventricular (BiV) pacing behavior when tracking elevated atrial intrinsic rhythms in certain Boston Scientific Cardiac Resynchronization Therapy (CRT) pacemakers (CRT-Ps) and defibrillators (CRT-Ds). Repeated detection of this unintended asynchronous BiV pacing behavior may result in the implanted device reverting to a permanent Safety Mode (Safety Core™) status thus requiring early replacement. The unintended asynchronous BiV pacing behavior can only occur when an infrequent combination of parameters are programmed, specifically: • Left Ventricular (LV) Offset programmed to a positive value which exceeds the Atrial Blank after Ventricular Pace (A-Blank after V-Pace) interval; and • Tracking Preference = ON (nominal). *Observed Rate* Of the 60,500 CRT devices distributed worldwide, Boston Scientific estimates approximately 300 CRT devices are programmed with the combination of parameters which may lead to this device behavior. There have been two confirmed instances of early device replacement due to this device behavior (0.7%). Of the two cases, a single patient death occurred due to complications related to the replacement procedure. CURRENT STATUS **09-Apr-19** *Confirmed Malfunctions (worldwide)* There have been four confirmed instances of early device replacement due to this device behavior. CURRENT RECOMMENDATION **09-Apr-19** Boston Scientific has received approval of Model 2868 v4.07 for CRT-Ds and Model 2869 v2.06 software for CRT-Ps to resolve this behavior. Please refer to the CRT Positive LV Offset and TPP Interaction, Update Letter, January 2019 for instructions. Standard Warranty program available, please contact your local representative for terms and conditions.

PRODUCT	ORIGINAL COMMUNICATION **Aug 2013 and Sep 2014 — Low Voltage Capacitor**
A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **COGNIS** Models N106/N107/N108/N118/ N119/N120/P106/P107/P108 **TELIGEN VR** Models E102/E103/F102/F103 **TELIGEN DR** Models E110/E111/F110/F111	Voluntary Physician Advisory FDA Classification August 2013: Class II FDA Classification September 2014: Class II In August 2013, a physician communication discussed a subset of COGNIS CRT-Ds and TELIGEN ICDs that had experienced an increased rate of premature battery depletion due to compromised performance of a low voltage (LV) capacitor. It also informed physicians how to identify and respond to a Safety Architecture low voltage alert. In September 2014, a second subset of devices was identified that may exhibit compromised LV capacitor performance at a rate that is similar to the August 2013 advisory subset. The second communication also discussed improvements to Safety Architecture's low voltage alert, which were released through a programmer software update. The performance of an LV capacitor may be compromised in some devices after two or more years of implant time, which will increase battery use and may eventually initiate one or more Safety Architecture alerts and patient-audible beeping. The most common alert is a yellow programmer screen that states, "Voltage is too low for projected remaining capacity. Contact Technical Services with Code 1003". LATITUDE issues a corresponding yellow alert (nominally configured "On"). In other instances, diminished LV capacitor performance can result in an early "Explant" battery status indicator (ERI) and a replacement window that may be less than 3 months. Devices that experience a low voltage alert require replacement. If not replaced, increased current drain could deplete the battery and impact therapy delivery and telemetry. Advisory population Approximately 22,800 devices identified in the August 2013 communication remain in service. In September 2014, Boston Scientific identified an additional 27,300 active devices that may exhibit diminished LV capacitor performance at a rate that is similar to the August 2013 advisory population. The projected cumulative rate of occurrence for LV capacitor malfunction within the total advisory population is approximately 2.9% at 60 months. Due to Safety Architecture alerts and timely physician response, the potential for life-threatening harm from loss of therapy is estimated to be less than 1 in 125,000 (0.0008%) at 60 months.
Low Voltage Capacitor 2014 Physician Letter, Sep 17, 2014 Low Voltage Capacitor 2014 Patient Letter, Sep 17, 2014 Low Voltage Capacitor 2013 Physician Letter, Aug 29, 2013	CURRENT STATUS **25-Apr-19** Advisory devices have not been available for implant for more than seven years. *Confirmed Malfunctions (worldwide)* 5,750 malfunctions have been confirmed from the advisory population. Approximately 32,000 devices from the advisory populations remain in service. There have been two reported patient deaths due to complications with the replacement of an advisory device. *Projected Rate of Occurrence* • COGNIS CRT-D and TELIGEN ICD advisory population - The rate of occurrence is 2.9% at 60 months, 6.0% at 72 months, 8.9% at 84 months and 11.2% at 96 months. The potential for life-threatening harm from loss of therapy is approximately 1 in 200,000 (0.0005%) at 60 months. • COGNIS CRT-D and TELIGEN ICD populations (advisory and non-advisory) - The overall rate of occurrence is approximately 1.1% at 60 months, 2.5% at 72 months and 3.7% at 84 months. The projected rate of occurrence is 5.0% at 96 months. Since notifying customers of this behavior in September 2014 and improving the Safety Architecture voltage alert, the portion of malfunctions with compromised therapy has decreased to approximately 1.6%. The potential for life-threatening harm from loss of therapy is approximately 1 in 500,000 (0.0002%) at 60 months. • INCEPTA, ENERGEN and PUNCTUA CRT-Ds and ICDs - The rate of occurrence is 1% at 60 months. The projected rate of occurrence is 1.8% at 72 months. The portion of malfunctions with compromised therapy is approximately 0.3%. The potential for life-threatening harm from loss of therapy is approximately 1 in 5,000,000 (0.00002%) at 60 months.
	CURRENT RECOMMENDATION **25-Apr-19** Updated Software In 2014 BSC released software that enhances the effectiveness of the Safety Architecture tools later in device life. When the software was introduced, BSC recommended an in-clinic follow-up with an updated programmer at first opportunity, but within 3 months for patients within the advisory population. In-clinic interrogation with a current programmer automatically downloads Safety Architecture software upgrades from the programmer into individual patient devices, enhancing detection of a compromised LV capacitor before therapy delivery is impacted. LATITUDE Patient Management System Boston Scientific recommends that advisory patients utilize the LATITUDE Patient Management System (remote monitoring), which offers additional/supplemental device checks between office visits. Use of LATITUDE may accelerate detection of Safety Architecture alerts, and can notify if/when scheduled checkups have not occurred. Verify that the yellow alert "Voltage was too low for projected remaining capacity" is configured "On". Additional Recommendations - After a device has been upgraded with new software, Boston Scientific recommends normal device monitoring as described in device labeling. - Device replacement is not recommended for advisory devices displaying normal behavior. - Promptly investigate alerts, device beeping, and unanticipated replacement indicator messages. - Following a Safety Architecture alert, contact Boston Scientific Technical Services as directed on programmer screens. Technical Services can facilitate an evaluation of device information downloaded from a recent in-clinic or remote LATITUDE interrogation, which may help to clarify available replacement time.
	Standard Warranty program available, please contact your local representative for terms and conditions.

PRODUCT

A serialized search tool to determine if a specific device is affected by this product advisory is available here:
Device Lookup Tool

This advisory is limited to those models listed below implanted subpectorally.

COGNIS
Models
N106/N107/N108/N118/N119
P106/P107/P108

TELIGEN VR
Models E102/F102

TELIGEN DR
Models E110/E111/F110/F111

Subpectoral Implant 2009 Physician Letter, Dec 01, 2009

Subpectoral Implant 2009 Patient Letter, Dec 01, 2009

ORIGINAL COMMUNICATION **01-Dec-09 — Subpectoral Implant**

Voluntary Physician Advisory
FDA Classification: Class II

This advisory is limited to devices identified in the product model list that were implanted subpectorally. Devices implanted subcutaneously are not included in this advisory.

Boston Scientific has determined that the bond between the header and case could be weakened by significant forces associated with a subpectoral implant procedure or when a device in a subpectoral position is pushed against a rib during contraction of the pectoralis muscle. A weakened header bond may alter lead impedance and introduce noise that may inhibit pacing therapy or initiate inappropriate tachy therapy. Additional mechanical stress applied to a weakened bond may eventually cause header connection wires to fracture, resulting in loss of therapy.

A weakened header bond can result in one or more of the following device behaviors:
– Significant changes in measured lead impedance
– Noise on real-time or stored electrograms
– Intermittent inhibition of pacing
– Inappropriate anti-tachy pacing or shock therapy
– Loss of pacing therapy
– Loss of anti-tachy pacing and shock therapy

No patient deaths related to this behavior have been reported. Patients have required early device replacement due to inappropriate shocks and/or noise induced by pocket manipulation or arm movement.

Rate of Occurrence
The implant orientation of devices is not reported to Boston Scientific, making it difficult to provide rate of occurrence and prediction information. Two (2) reports have been received worldwide of subpectoral implants with weakened header bonds. An estimated 5% of approximately 77,000 COGNIS and TELIGEN devices worldwide have been implanted in a subpectoral location.

The following factors may also impact the risk of failure if implanted in a subpectoral location:
– Exact location of the patient's ribs relative to the device
– Body size and/or muscle mass of the patient (risk may increase for larger/muscular patients)
– Activity level and/or occupation of the patient (risk may increase for more active patients)

CURRENT STATUS **09-Apr-19**

Reported events (worldwide)

101 reports have been received worldwide of subpectoral implants with weakened header bonds. An estimated 10% of approximately 104,000 COGNIS and TELIGEN devices worldwide have been implanted in a subpectoral location.

There have been no reported patient deaths associated with this advisory.

Rate of Occurrence

An estimated 10% of COGNIS and TELIGEN devices worldwide have been implanted in a subpectoral position. The rate of occurrence for subpectoral implants of COGNIS advisory devices is 1.95% at 60 months. The rate of occurrence for subpectoral implants of TELIGEN advisory devices is 0.53% at 60 months.

CURRENT RECOMMENDATION **09-Apr-19**

If a patient's device was implanted subcutaneously, it is excluded from this advisory and no change to current patient management is recommended.

For affected devices implanted in a subpectoral location:
– Follow patient at least once every three months as recommended in device instructions for use.
– Consider advising patients to contact their physician or clinic if they receive shocks, in order to ensure timely review of associated electrograms and other device data via in-clinic or remote interrogation.
– Where available, consider using the LATITUDE® Patient Management System to facilitate remote device checks between in-clinic follow-ups.

Standard Warranty program available, please contact your local representative for terms and conditions.

PRODUCT	ORIGINAL COMMUNICATION **23-Jun-06 and 24-Aug-06— Low Voltage Capacitor**
A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **INSIGNIA Ultra SR** Models 1190/1390 **INSIGNIA Ultra DR and Ultra DR Downsize** Models 1291/1491/1290/1490 **INSIGNIA Entra SR** Models 1195/1198/1395/1398 **INSIGNIA Entra DR (downsize)** Models 1296/1466 **INSIGNIA Entra DR** Models 1294/1295/1494/1495 **INSIGNIA Entra SSI** Models 0484/0485/1325/1326 **INSIGNIA Entra DDD** Models 0985/0986/1426 **INSIGNIA Plus SR** Models 1194/1394 **INSIGNIA Plus DR and Plus DR Downsize** Models 1297/1467/1298/1468 **INSIGNIA AVT** Models 0482/0882/0982 1192/12921392/1428/1432/1492 **CONTAK RENEWAL TR / TR2** Models H120/H125/H140/H145 **VITALITY 2 EL VR/DR** Models T177/T167 **VITALITY 2 VR/DR** Models T175/T165 **VITALITY DR HE** Model T180 **VITALITY DS VR/DR** Models T135/T125 **VITALITY VR/DR and EL** Models 1870/1871/T127 **VENTAK PRIZM 2 VR/DR** Models 1860/1861 Low Voltage Capacitor, Physician Low Voltage Capacitor, Patient Letter, Low Voltage Capacitor, Physician Letter, Jun 23, 2006	Voluntary Physician Advisory FDA Classification: Class II Devices within a well-defined subset manufactured using low-voltage capacitors from a single component supplier may perform in a manner that leads to device malfunction, including intermittent or permanent loss of output or telemetry, or premature battery depletion. At the time of the original June 23, 2006 communication, approximately 49,800 devices had been distributed, and approximately 27,200 devices had been implanted worldwide. Boston Scientific initiated retrieval of all non-implanted devices within this subset from hospital and sales force inventory. An Advisory Update was issued on August 24, 2006, with a revised estimation of the implanted population to be approximately 31,000. All product currently being shipped and available for implant is not susceptible to this issue. *Reported Events (worldwide)* At the time of the original June 23, 2006 communication, a total of five (5) devices had been confirmed to have malfunctioned. As reported in the August 24, 2006 Advisory Update, five (5) additional malfunctions were confirmed since the original June 23, 2006 communication. A total of 10 confirmed malfunctions represented 0.032% of the implanted population of approximately 31,000 devices. Seven (7) of 10 malfunctions were identified while implanted, and three were identified prior to the implant procedure. There were no reports of patient death associated with this issue. There were a total of three (3) reports of patients experiencing syncope associated with loss of pacing. *Projected Rate of Occurrence* While a statistically significant projection of expected failures for implanted devices was not possible, testing suggested that the frequency of new malfunctions would continue to decrease in the future. CURRENT STATUS **09-Apr-19** *Confirmed Malfunctions (worldwide)* 46 malfunctions have been confirmed from the advisory population. 35 of these were identified while implanted. There were an estimated 32,000 advisory devices implanted. 11 malfunctions were identified prior to implantation. There have been no reported patient deaths associated with this advisory. No devices currently being distributed are susceptible to this malfunction mode. *Projected Rate of Occurrence* The rate of occurrence is projected to range between 0.10% and 0.22%. CURRENT RECOMMENDATION **09-Apr-19** Patient management recommendations from the August 24, 2006 Advisory Update remain unchanged. – Normal follow-up. – Physicians should consider the low and declining failure rate in addition to the unique needs of individual patients when making medical decisions regarding patient management. As always, advise patients to seek attention immediately if they experience syncope or lightheadedness. – Should the device exhibit symptoms described below, please contact your local sales representative or Technical Services for assistance with device evaluation. **Device Behavior** **Pacemakers: INSIGNIA** – Intermittent or permanent loss of pacing output – Inability to interrogate – Erased values in Daily Measurements – ERT or EOL indicator message displayed earlier than expected – A gas gauge less than BOL within six months of implant Standard Warranty program available, please contact your local representative for terms and conditions.

PRODUCT	ORIGINAL COMMUNICATION **22-Sep-05 — Crystal Timing Component**
Identifiable by serial number. Not all serial numbers are affected. A serialized search tool to determine if a specific device is affected by this product advisory is available here: Device Lookup Tool **INSIGNIA Ultra SR** Models 1190/1390 **INSIGNIA Ultra DR and Ultra DR Downsize** Models 1291/1491/1290/1490 **INSIGNIA Entra SR** Models 1195/1198/1395/1398 **INSIGNIA Entra DR (downsize)** Models 1296/1466 **INSIGNIA Entra DR** Models 1294/1295/1494/1495 **INSIGNIA Entra SSI** Models 0484/0485/1325/1326 **INSIGNIA Entra DDD** Models 0985/0986/1426 **INSIGNIA Plus SR** Models 1194/1394 **INSIGNIA Plus DR and Plus DR Downsize** Models 1297/1467/1298/1468 **INSIGNIA AVT** Models 0482/0882/0982 1192/12921392/1428/1432/1492 Crystal Timing Component, Physician Letter, Dec 12, 2005 Crystal Timing Component, Patient Letter, Oct 03, 2005 Crystal Timing Component, Physician Letter, Sep 22, 2005	Voluntary Physician Advisory FDA Classification: Class II Two separate failure modes were identified that may result in intermittent or permanent loss of pacing output without warning, intermittent or permanent loss of telemetry, and/or reversion to VVI mode or appearance of a Reset warning message upon interrogation. The root cause of the first failure mode is foreign material within a crystal timing component. As of the December 12, 2005 Advisory Update, root cause had been identified as a microscopic particle within the crystal timing component. *Reported Events* Failure Mode 1—As of September 6, 2005, 36 malfunctions have been confirmed out of 49,500 devices distributed worldwide (0.073%). The majority of malfunctions occurred early in life, with a mean implant time of seven (7) months. There were no reported patient deaths. The supplier of the crystal timing component used in this subset of devices has eliminated foreign material within the crystal chamber, and no malfunctions were observed in any devices shipped after March 12, 2004. Failure Mode 2—As of September 6, 2005, 16 malfunctions were confirmed out of 341,000 devices distributed worldwide (0.0047%). All 16 devices exhibited a no-output condition at the implant procedure or during pre-implant testing. There were no reported patient deaths. *Rate Projection* Failure Mode 1—As of the September 22, 2005 communication, Modeling, based on field experience and statistical analysis, predicted the malfunction rate for the active device population of 41,000 to be between 0.017% to 0.037% over the remaining device lifetime.
	CURRENT STATUS **09-Apr-19**
	Confirmed Malfunctions (worldwide) Failure Mode 1— 62 malfunctions out of approximately 49,500 advisory population devices have been confirmed. There have been no reported patient deaths associated with this advisory. Failure Mode 2— 26 malfunctions out of approximately 257,000 (0.010%) devices distributed have been confirmed. Twenty-two (22) malfunctions were identified before or during the implant procedure and four (4) were identified after implant. There have been no reported patient deaths associated with this advisory. *Projected Rate of Occurrence* Failure Mode 1— The rate of occurrence for the estimated worldwide active advisory device population of 3,000 is projected to range between 0.027% and 0.038%.
	CURRENT RECOMMENDATION **09-Apr-19**
	Failure Mode 1— Patient management recommendations from the September 22, 2005 physician communication remain unchanged. Failure Mode 2— Patient management recommendations supersede those originally communicated on September 22, 2005. – Normal follow-up for both Failure Mode 1 and Failure Mode 2 devices. – Specific to Failure Mode 1, physicians should consider the projected low and declining malfunction rate in addition to the unique needs of individual patients in their medical decisions regarding patient management. As always, advise patients to seek attention immediately if they experience syncope or lightheadedness. Standard Warranty program available, please contact your local representative for terms and conditions.

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Rhythm Management
300 Boston Scientific Way
Marlborough, MA 01752-1234
www.bostonscientific.com

Medical Professionals:
1.800.CARDIAC (227.3422)
Patients and Families:
1.866.484.3268

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