Department of Health and Human Services
Food and Drug Administration
Center for Devices and Radiological Health
Office of Device Evaluation

DATE: November 22, 2011

TO: File

CC: [redacted]

Mitchell Shein (Branch Chief)

FROM: [redacted] (Lead Reviewer)

SUBJECT: P030054 / S173 PMA Supplement (180 Day) – **Summary Review**

St. Jude Medical – Promote Q Model CD3221-36, Promote Quadra Models CD 3245-40/40Q, and Unify Quadra CRT-D Models CD3249-40/40Q pulse generators, Quartet Model 1458Q LV Lead, and Model 3330 version 12.1.1 Programmer Software

OVERALL RECOMMENDATION

Based on my review of the submission text, discussions with supporting reviewers, interactions with the sponsor, **I recommend approval**.

Signature	*Date*	*Signature*	*Date*
[redacted]		Mitchell Shein	
Scientific Reviewer		Branch Chief	
(Lead Reviewer)		(Management Oversight)	

PURPOSE OF SUBMISSION

The purpose of the submission is to request approval of the company's quadripolar CRT-D systems including the Promote Q, Promote Quadra, and Unify Quadra cardiac resynchronization therapy defibrillators (CRT-D), the Quartet Model 1458Q left ventricular lead, and the associated programmer software. The company evaluated the Promote Q CRT-D pulse generator and the Quartet Model 1458Q LV Lead under IDE G090066. The submission includes the results of the clinical study as well as the supporting engineering data.

The Quartet Model 1458Q left ventricular heart lead with the Promote Q, Promote Quadra, or Unify Quadra CRT-D provides vector selection (referred to as Vect Select by the company) from four pacing electrodes on the left ventricular (LV) lead. The three CRT-D devices can provide quadripolar pacing, so

these devices and the Quartet Model 1458Q left ventricular heart lead are referred to as a Quadripolar CRT-D device system. Using these four pacing electrodes, up to ten different pacing configurations are available with the Merlin PCS programmer. These 10 pacing configurations include the 3 standard vectors currently available. The primary benefit is to have programmability and flexibility in optimizing capture thresholds.

CONSULTANT REVIEWERS

The following FDA staff also participated in the review of this file and provided written consult memos. The scope of their review is indicated in the following bulleted list.

DEVICE DESCRIPTION

Overview

The Promote devices (St. Jude Medical Promote Q (Model CD3221-36) or Promote Quadra (CD 3245-40/40Q) or Unify Quadra (CD3249-40/40Q) CRT-D) along with compatible, commercially available sense/pace and cardioversion/ defibrillation leads, and the St. Jude Medical Quartet Model 1458Q LV lead constitute the implantable portion of the CRT-D system. The St. Jude Medical Model 3650 Merlin atient Care System, the version 3330 v12.1.1 software, and a telemetry wand constitute the external portion of the CRT-D system.

The Quartet Model 1458Q left ventricular heart lead with any of the three the Promote devices provides pacing vector selection from four pacing electrodes on the left ventricular (LV) lead. Using these four pacing electrodes, up to ten different pacing configurations are available with the Merlin PCS programmer. The primary benefit is to have programmability and flexibility in optimizing capture thresholds.

The system under review includes the following:

- Devices with IS-4 compliant LV lead port – Promote Q, Promote Quadra and Unify Quadra CRT-D
- An IS-4 compliant left ventricle lead that has four independent pacing electrodes (i.e. two additional ring electrodes) – Quartet Model 1458Q LV Lead
- A Merlin PCS programmer with applicable software that allows up to ten different pacing configurations – Model 3330 v12.1.1 (or higher)

The Promote Q, Promote Quadra and Unify Quadra CRT-Ds are biventricular devices that are equipped with an IS-4 low voltage connector to facilitate implantation of an IS-4 left ventricular (LV) four electrode lead.

The Quartet Model 1458Q left heart lead is a 4-pole over–the-wire design, enabling implantation using either a stylet or a guide wire. The lead has an open lumen with an opening at the lead tip to allow the use of the guide wire. The lead body has (b) (4) insulation and a maximum lead body diameter of 5.1 F. Like the QuickFlex Micro left heart lead family; the distal portion of the Quartet is pre-shaped in an "s-curve" configuration to provide stabilization of the distal tip in the coronary veins overlying the left ventricle. The outer lead body is covered with (b) (4) coating to increase lubricity during initial implant. The lead connector complies with the IS-4 connector standard.

Model 3650 Merlin™ Patient Care System (PCS) has been updated with Model 3330 version 12.1.1 software, which is based on Model 3330 version 10.1.1.2 and 11.1 software.

Quartet Model 1458Q LV lead

The Quartet Model 1458Q lead is a left ventricular, quadripolar lead which can be positioned in an appropriate left ventricular pacing site from within the coronary sinus anatomy using either the stylet / over-the-wire (OTW) approach or using a catheter based delivery system.

The maximum lead diameter is 5.1 French, and utilizes (b) (4) insulation. The lead tip and ring electrodes are made of (b) (4) and coated with (b) (4)

The distal section of the lead is shaped into an S-configuration (identical to QuickSite

1058T- Approved under P030054/S18 on February 15th 2006 / QuickFlex 1158T - Approved under P030054/S49 on July 25th 2007 / QuickFlex Micro 1258T- Approved under P030054/S130 on May 10th 2010) that provides stabilization for the distal tip when the lead tip is placed in veins on the left side of the heart within the coronary sinus anatomy.

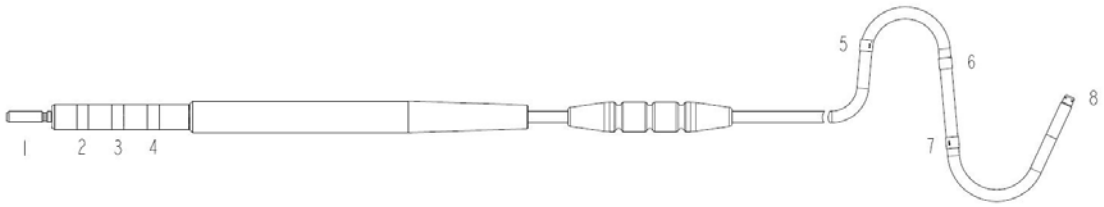
A total of four electrodes exist on the distal end, one tip electrode and three ring electrodes. The spacing between the tip and most distal ring electrode is 20 mm, between the tip and second most distal ring electrode is 30 mm, and between the tip and most proximal ring electrode is 47 mm.

The tip electrode contains a molded (b) (4) plug identical to QuickFlex 1156T lead, 1158T lead and the QuickFlex Micro 1258T lead. Lead conduction is achieved by joining the connector rings to the ring electrodes using cable components and connecting the tip electrode to the connector pin using a coil component.

The lead utilizes a (b) (4) coating on the outer tubing to provide a lubricious external lead surface which is identical to all predecessor SJM CRT lead models.

The Promote Q Model 1458Q lead is very similar to the 1158T and 1258T leads in terms of identical MCRD steroid plug designs and the (b) (4) coating process. In addition the insulation material, distal tip design, conductor material and design for the 1458Q lead is identical to the 1258T lead.

Picture of the Quartet left heart lead



Legend	Component
1	Distal Tip 1 (D1) – Connector Pin
2	Mid 2 (M2) – Connector Ring
3	Mid 3 (M3) – Connector Ring
4	Proximal 4 (P4) – Connector Ring
5	Proximal 4 (P4) – Pacing Electrode
6	Mid 3 (M3) – Pacing Electrode
7	Mid 2 (M2) – Pacing Electrode
8	Distal Tip 1 – Pacing Electrode

The lead provides pace/sense capability from 4 electrodes (tip and 3 rings):

- Distal Tip 1 (D1) = LV tip
- Mid 2 (M2) = LV Ring 1
- Mid 3 (M3) = LV Ring 2
- Proximal 4 (P4) = LV ring 3

The Quartet Model 1458Q LV lead can be programmed in the following ten pacing vectors using the Merlin PCS programmer:

- D1- M2
- D1- P4

- D1- RV Coil
- M2- P4
- M2 – RV Coil
- M3 – M2
- M3-P4
- M3- RV Coil
- P4- M2
- P4- RV Coil

Although the Quartet lead offers electronic repositioning by switching to a different electrode rather than mechanically repositioning the lead itself, the lead can only be programmed to two electrodes at a time (similar to existing bipolar CRT leads).

The Quartet Model 1458Q lead included in this PMA supplement is identical to the Quartet Model 1458Q lead that was implanted under the IDE (G090066, approved on October 28th 2009) except for a few minor modifications. These modifications were previously submitted and reviewed by FDA as part of an IDE supplement (b) (4) This supplement was disapproved because the company completed enrollment and did not request to initiate a continued access study. Each of these changes are described in further detail within the submission.

The following table compares the company's unipolar, bipolar, and quadripolar LV leads.

Lead name and model number	Quick Flex 1158T (Approved under P030054/S49 on July 25th 2007)	Quick Flex Micro 1258T (Approved under P030054/S130 on May 10th 2010)	Quartet lead 1458Q
Polarity	Bipolar	Bipolar	Quadripolar
Lead Body Diameter	5.6 Fr (1.9 mm)	4.3Fr (1.42 mm)	4.7 Fr (1.55 mm)
Tip Electrode (Cathode)	(b) (4), One Groove, Blunt Tip, Steroid Eluting Through Groove	(b) (4), One Groove, Blunt Tip, Steroid Eluting Through Groove	(b) (4), One Groove, Blunt Tip, Steroid Eluting Through Groove
Tip Electrode Diameter	4.0 Fr (1.3 mm)	4.0 Fr (1.3 mm)	4.0 Fr (1.3 mm)
Tip Electrode Surface Area	5.0 sq. mm	5.0 sq. mm	5.0 sq. mm
Tip Electrode Steroid	(b) (4) In Internal (b) (4) Rubber Ring	(b) (4) In Internal (b) (4) Rubber Ring	(b) (4) In Internal (b) (4) Rubber Ring
Steroid volume	0.34 mm^3	0.34 mm^3	0.34 mm^3
Tip Electrode Rigid Length	2.44 mm	2.64 mm	2.64 mm
Ring Electrode (Anode)	(b) (4) Coated	(b) (4) Coated	(b) (4) Coated
Ring Diameter	1.8 mm	1.55 mm	1.7 mm
Ring Length	1.3 mm	1.52 mm	1.39 mm
Ring Electrode Surface Area	7.35 sq. mm	7.4 sq. mm	7.4 sq. mm
Electrode Spacing Tip to Ring 1/ Tip to Ring 2/ Tip to Ring 3	20 mm/ N/A/ N/A	20 mm/ N/A/ N/A	20 mm/ 30 mm/ 47 mm
Tip to Ring Electrode Configuration	"S" curve	"S" curve	"S" curve
Lead Body Insulation	Tri-lumen Proximal: (b) (4) Distal 7 cm: (b) (4) Rubber	Bi-lumen (b) (4) Entire Length	Quad-lumen (b) (4) Entire Length
Lead Body Coating	(b) (4)	(b) (4)	(b) (4)
Tip Electrode Conductor(s)	Proximal & Distal Lead Sections: MP35N LT Quadrifilar / 0.004 inch Diam. Wire Coil	Proximal & Distal Lead Sections: MP35N LT Quadrifilar / 0.0025 X .005 inch Diam. Wire Flat Coil	Proximal & Distal Lead Sections: MP35N LT Quadrifilar / 0.0025 X .005 inch Diam. Wire Flat Coil
Ring Electrode Conductor(s)	Two (b) (4) Insulated MP35N LT Cables (1 x 19 .0012 inch Strand Diameter)	One (b) (4) Insulated MP-35N LT Cable (1 x 19 .0012 inch Strand Diameter)	One (b) (4) Insulated MP-35N LT Cable (1 x 19 .0012 inch Strand Diameter)
Length of Distal Silicone Section	7 cm	N/A	N/A
Minimum Amplitude of "S" Hump	16 mm	16 mm	16 mm
Connector	(b) (4)	(b) (4)	(b) (4)

Promote Q: CRT-D Pulse Generator

SJM is requesting market approval for the Promote Q device Model CD3221-36 which is identical to the Promote Q device (Model CD3221-36) version that was originally approved under the IDE G090066, (approved on October 28th 2009). No changes have been made to the Promote Q Model CD3221-36 device since the IDE study started.

The Promote Q CRT-D (Model CD3221-36) is based on the previously approved Promote™ RF (Model 3207-36) device (Approved under P030054/S50 on September 11th 2007), with two additional pacing cathodes and one additional anode wired in the hardware to support the two additional left ventricular ring electrodes.

The Promote Q header is intended for use in connecting 2 DF-1 leads, 2 IS-1 leads and 1 IS-4 – LLLL lead to the device. This 5 port header is designed with (b) (4) The header is also designed to provide electrical isolation of the device's inputs and outputs to prevent shorting or signal distortion that may affect therapy delivery. Modifications were made (b) (4) to allow for the two additional ring Feedthrus/IS-4 bore.

The IS-4 – LLLL Four-Pole bore design used in the Promote Q CRT-D is identical to the market approved SJ4 – LLHH Four-Pole RV bore used in the Promote Model 3207-36Q (approved under P030054/S117 and P910023/S201) with the exception of the tip block. The tip block modification is required to conform to the IS-4 standard for low voltage connectors.

The Promote RF Model 3207-36 CRT-D was modified in order to create the Promote Q Model CD3221-36 CRT-D. The main hardware design differences between the Promote RF Model 3207-36 CRT-D and the Promote Q Model CD3221-36 CRT-D are described in the following table.

(b) (4)

* The predicate (b) (4) accelerometer is replaced by the (b) (4) accelerometer from an alternate vendor. The (b) (4) accelerometer component is used in the Accent/Anthem (approved under P080086/S174 and P030035/S53 on July 15th 2009) and Unify/Fortify devices (approved under P910023/S226 and P030054/S141 on May 7th 2010).

Modifications were made to the hybrid to accommodate two additional LV Ring channels. The Promote Q uses two output Feedthrus instead of one – (b) (4) – to support the two additional LV ring electrodes. These Feedthrus are identical to the Feedthrus used on previously approved product.

The (b) (4) case of the Promote Q device is larger than the market approved Promote devices to provide space for the additional Feedthru. (b) (4) schedules were modified to accommodate this shape change.

The external RF antenna is made of (b) (4) wire and is laid along the contour of the header and welded to anchors on either end of the can. Modifications were made to the substrate to incorporate the two additional ring electrode outputs for the Quartet LV lead.

In addition, the (b) (4) accelerometer sensor has replaced the existing (b) (4) accelerometer sensor to provide for a second source alternate vendor.

The Promote Q CRT-D provides additional Left Ventricular (LV) pace configurations through use of the IS-4-LLLL connector bore designed to the IS-4 standard.

The company also provided a brief summary of the software (firmware) used in the implanted device.

Promote Quadra: CRT-D Pulse Generators

SJM is requesting market approval for the Promote Quadra device Model 3245-40/40Q. This device is based on modifications to the Promote Q device to allow for manufacturing consistency, reduction in manufacturing cost and availability of similar feature sets across SJM CRT-Ds.

The information provided in this section of the submission, regarding the Promote Quadra devices (Model CD3245-40/40Q) is identical to the information provided as part of the IDE Supplement G090066/S5 for the Promote Quadra devices (Model CD3245-40/40Q), submitted on May 27th 2010. (Other than a few additional software documents have been provided as part of this submission for consistency purposes. There is no change to the software itself). A deficiency letter was received July 1st 2010. Responses to these deficiencies were submitted on the 3rd of August 2010 (G090066/S8). A second deficiency letter was received September 3rd 2010 citing 2 deficiencies. Both the deficiencies were discussed and resolved via a teleconference with the FDA held on September 10th 2010. The deficiency letters along with the meeting minutes are provided in appendix 119 through 121.

Detailed information regarding the Promote Quadra devices is provided below:

The model with the 'Q' header suffix will use one (b) (4) connector cavity for the Left Ventricular lead connection, one (b) (4) connector cavity for the Right Ventricular lead connection, and one (b) (4) connector cavity for the Atrial lead connection.

The model without the 'Q' suffix will use one (b) (4) connector cavity for the Left Ventricular lead connection, one (b) (4) and two (b) (4) connector cavities for the Right Ventricular lead connection, and one (1) IS-1 connector cavity for the Atrial lead connection.

Feature sets:

The following features are added to the Promote Quadra as compared to the Promote Q:

- 40J Safety Shock
- Low Frequency Attenuation Filter (T-Wave Oversensing Filter)
- Extended ATP programming (ATP prior to and during Charging)
- Percent Pacing Alerts (remote/in-clinic – not a patient notification)

All of these features are currently available on the market approved SJM Unify CD3231-40 (Q) device. (P030054/S141, approved on May 7th 2010).

A list of these features sets is provided below:

- 40 Joules Delivered HV Therapy
- Low Frequency Attenuation Filter
- Extended ATP Programming (during and before HV charge in VF zone)
- Programmable % ventricular pacing to the selection of device alerts (MED)

In addition, the following hardware updates are included in the Promote Quadra devices to match our market approved Unify (CD3231-40/40Q) and Promote Accel (CD3215-36Q) devices. The table below shows the hardware comparison of the Promote Quadra device to the predicate devices.

Promote Quadra CD3245 -40/40Q	Unify CD3231-40/40Q (P030054/S141, Approved on May 7th 2010)	Promote Q CD3221-36 (G090066/S002, Approved on October 28th 2009)	Promote Accel CD3215-36Q (P030054/S131 Approved January 29th 2010)
(b) (4)			

A brief list of the hardware updates is provided below:

- Battery and Transformer
- Headers and (b) (4) Connectors
- Can
- (b) (4) Organic Substrate

The company also provided a brief summary of the software (firmware) used in the implanted device.

Unify Quadra: CRT-D Pulse Generators

SJM is requesting market approval for the Unify Quadra device Model 3249-40/40Q. These devices are based on modifications to the Promote Quadra and the Unify devices to allow for manufacturing consistency, reduction in manufacturing cost and availability of similar feature sets across SJM CRT-Ds.

The model with the 'Q' header suffix will use one (b) (4) connector cavity for the Left Ventricular lead connection, one (b) (4) connector cavity for the Right Ventricular lead connection, and one (b) (4) connector cavity for the Atrial lead connection.

The model without the 'Q' suffix will use one (b) (4) connector cavity for the Left Ventricular lead connection, one (b) (4) and two (b) (4) connector cavities for the Right Ventricular lead connection, and one (1) IS-1 connector cavity for the Atrial lead connection.

The following features are being included to the Unify Quadra Models CD3249-40/40Q.

- 40J Safety Shock
- Low Frequency Attenuation Filter (T-Wave Oversensing Filter)
- Extended ATP programming (ATP prior to and during Charging)
- Percent Pacing Alerts (remote/in-clinic)

All of these features are currently available on the market approved SJM Unify CD3231-40 (Q) device. (P030054/S141, approved on May 7th 2010). This feature set is also identical the Promote Quadra Model 3245-40/40Q feature set.

In addition, the following hardware updates are included in the Unify Quadra devices to accommodate feature sets from the Unify (CD3231-40/40Q) and Promote Quadra (CD3245-40/40Q) devices. The table below shows the hardware comparison of the Unify Quadra device to the SJM predicate devices.

Major Components	Similarities to predicate SJM devices
Can	(b) (4)
Header	
Hybrid	
RF Module	
Output Flex	
Patient Notifier	
Telemetry Coil	
HV Capacitor	
Battery	
Feedthru Configuration	

Major Components	Similarities to predicate SJM devices
Accelerometer	(b) (4)
DF-4 Connector*	
IS-4 Connector*	

A description of these changes is provided within the submission.

A detailed comparison of the Promote Q device to Promote RF device to Promote Accel device to Promote Quadra device to Unify device to Unify Quadra device is provided in the table below.


(b) (4)


(b) (4)

Model 3330 v12.1.1 Programmer Software

The Model 3650 Merlin PCS programmer is a portable, dedicated programming system designed to interrogate, program, display data, and test St. Jude Medical® implantable devices. A comprehensive overview of the requirements for the modifications to the software are described in the submission.

INDICATIONS FOR USE

There were no changes to the indications for use, which are provided below.

The ICD/CRT-D systems are intended to provide ventricular anti-tachycardia pacing and ventricular defibrillation for automated treatment of life-threatening ventricular arrhythmias. AF Suppression™ pacing is indicated for suppression of paroxysmal or persistent atrial fibrillation in patients with the above ICD indication and sinus node dysfunction.

The CRT-Ds are also intended:

- to provide a reduction of the symptoms of moderate to severe heart failure (NYHA Functional Class III or IV) in those patients who remain symptomatic despite stable, optimal medical therapy (as defined in the clinical trials section of the labeling) and have a left ventricular ejection fraction less than or equal to 35% and a prolonged QRS duration

- to maintain synchrony of the left and right ventricles in patients who have undergone an AV nodal ablation for chronic (permanent) atrial fibrillation and have NYHA Class II or III heart failure

The intended use for the Quartet Model 1458Q LV lead is similar to existing SJM LV leads. The Quartet Model 1458Q leads are intended for permanent sensing and pacing of the left ventricle when used with a compatible St. Jude Medical biventricular system with an IS-4-LLLL lead receptacle design.

The intended use of the Model 3650 Merlin™ Patient Care System (PCS) remains the same as approved under P030054/S8 on October 12, 2005.

The Model 3650 Merlin PCS programmer is a portable, dedicated programming system designed to interrogate, program, display data, and test St. Jude Medical® implantable devices. The Model 3330 version 12.1.1 software is based on [redacted] (b) (4) and Model 3330 version 10.1.1.2 (ref. P910023/S248) software.

CLINICAL

Clinical Results

[redacted] provided a full review of the clinical results in his review memo. An outline of the clinical study design and results is provided below.

Study Design

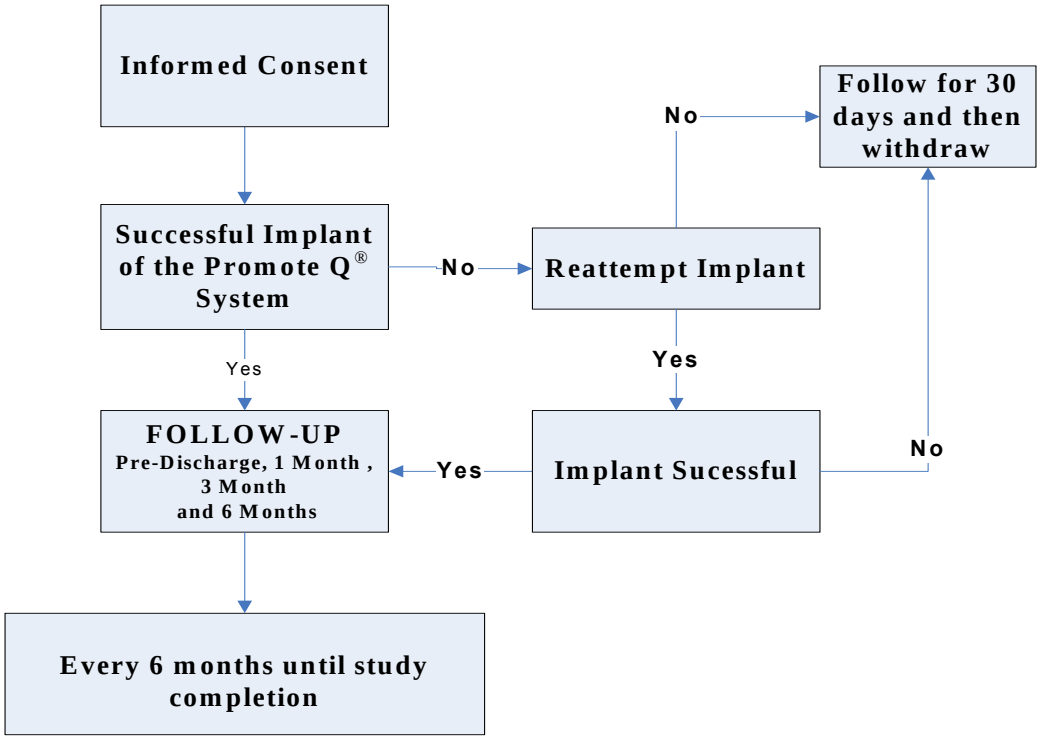
This was a prospective, multi-center non-randomized clinical study to evaluate the safety and efficacy of the Promote Q device system in a patient population indicated for cardiac resynchronization therapy. The

study was conducted at 25 investigational centers located in the U.S. and 178 patients were enrolled in the Promote Q IDE study.

Patients enrolled in the study underwent implantation of the Quartet Model 1458Q lead and the Promote Q Model CD3221-36 CRT-D. Following successful implantation, patient follow-up visits were completed at Pre-Discharge, 1-month, 3-months, and 6 months. Follow-ups after the 6-month visit were every 6 months thereafter until study completion. Refer to Figure 1 for the study flow diagram.

Patients who underwent unsuccessful implantation of the 1458Q lead system were followed for a period of 30 days prior to withdrawal from the study.

The diagram below summarizes the study flow.



Study Endpoints

Primary Safety Endpoint: The primary safety endpoint of the study was freedom from LV lead-related complications through 3 months.

Co-Primary Safety Endpoint: The co-primary safety endpoint of the study was freedom from system-related complications through 3 months. The co-primary safety endpoint was to be tested only if the primary safety endpoint was met.

Primary Efficacy Endpoint: The primary efficacy endpoint of the study was the responder rate of biventricular pacing at 3 months. A responder was defined as a patient with an LV pacing threshold of <2.5 V at 0.5ms in Vector 1 and at least one other non-standard programmable biventricular lead vector. See Section 1.2 for definition of standard and non-standard programmable biventricular lead vectors.

Inclusion Criteria

- Approved indication per ACC/AHA/HRS guidelines for implantation of a CRT-D system for treatment of heart failure or life threatening ventricular tachyarrhythmia(s).
- Receiving a new implant or undergoing an upgrade from an existing ICD or pacemaker implant with no prior LV lead placement
- Ability to provide informed consent for study participation and is willing and able to comply with the prescribed follow-up tests and schedule of evaluations

Exclusion Criteria

- Have had a recent CVA or TIA within 3 months of enrollment
- Have a contraindication for emergency thoracotomy
- Have a hypersensivity to a single 1.0mg. dose of dexamethosone sodium phosphate or short term contact with heparin
- Have a classification of Status 1 for cardiac transplantation or consideration for transplantation over the next 3 months
- Have undergone a cardiac transplantation within 40 days of enrollment
- Have had a recent myocardial infarction, unstable angina, or cardiac revascularization (PTCA, Stent, or CABG) within 40 days of enrollment
- Are currently participating in a clinical investigation that includes an active treatment arm
- Are pregnant or planning to become pregnant during the duration of the study
- Have a life expectancy of less than 6 months due to any condition
- Are less than 18 years of age
- Are unable to comply with the follow up schedule

Study Results

The study was approved for 178 patients and 25 centers. Table 2 indicates there were 178 patients enrolled at 24 investigational sites that were actively enrolling patients in the Promote Q® IDE study at the time of data cut-off.

Patient Demographics

The following table summarizes the patient demographics.

Demographic Variable	All Enrolled Patients (N=178)	Patients with Successful Implants (N=170)	Patients with Unsuccessful Implants (N=8)
Age (years)			
Mean ± SD	68 ± 11	69 ± 11	63 ± 9
Range	(31, 87)	(31, 87)	(47, 74)
Gender, n (%)			
Female	56 (31.5%)	53 (31.2%)	3 (37.5%)
Male	122 (68.5%)	117 (68.8%)	5 (62.5%)
Ethnicity, n (%)			
Hispanic or Latino	11 (6.2%)	11 (6.5%)	0 (0.0%)
Not Hispanic or Latino	161 (90.4%)	153 (90.0%)	8 (100.0%)
Failed to Report	6 (3.4%)	6 (3.5%)	0 (0.0%)
Race, n (%)			
Asian	5 (2.8%)	4 (2.4%)	1 (12.5%)
Black or African American	29 (16.3%)	28 (16.5%)	1 (12.5%)
White	140 (78.7%)	134 (78.8%)	6 (75.0%)
Other	2 (1.1%)	2 (1.2%)	0 (0.0%)
Failed to Report	2 (1.1%)	2 (1.2%)	0 (0.0%)
NYHA Class, n (%)			
Class III	175 (98.3%)	167 (98.2%)	8 (100.0%)
Class IV	3 (1.7%)	3 (1.8%)	0 (0.0%)
LV Ejection Fraction (%)			
Mean ± SD	25 ± 7	25 ± 7	29 ± 5
Range	(9, 50)	(9, 50)	(20, 35)
Cardiomyopathy Etiology, n (%)			
Ischemic	103 (57.9%)	98 (57.6%)	5 (62.5%)
Non-Ischemic	75 (42.1%)	72 (42.4%)	3 (37.5%)
Alcoholic	3 (1.7%)	2 (2.8%)	1 (33.3%)
Hypertensive	24 (13.5%)	24 (33.3%)	0 (0.0%)
Idiopathic	27 (15.2%)	26 (36.1%)	1 (33.3%)
Valvular Disease	7 (3.9%)	6 (8.3%)	1 (33.3%)
Other	14 (7.9%)	14 (19.4%)	0 (0.0%)

Successful and Unsuccessful Implants

One hundred seventy (170) of the 178 Promote Q device system implant attempts were successful (95.5%). Alternative legally marketed transvenous LV leads could be implanted in only three of the remaining eight patients. There were 8 unsuccessful Promote Q system implants. Four (4) implants were unsuccessful because a stable lead position could not be achieved. In two patients, poor venous anatomy or the inability to advance the lead into a small caliber coronary sinus vein resulted in the unsuccessful placement of the Quartet LV lead Despite several lead placement attempts, one (1) patient had an unsuccessful Promote Q device system implant due to diaphragmatic/phrenic nerve stimulation.

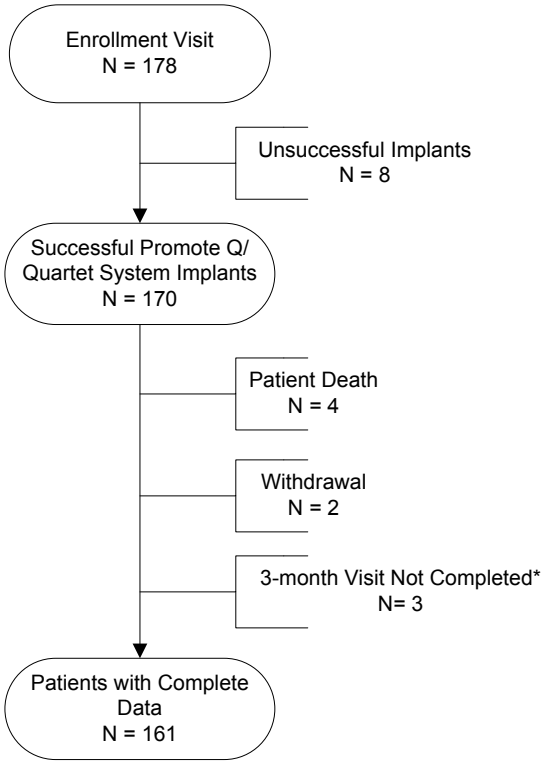
During the implant procedure, one (1) patient experienced cardiopulmonary arrest resulting in unsuccessful implantation of the Promote Q device system.

Outcomes of the eight (8) unsuccessful implants include the following. Three (3) patients in whom the Quartet lead could not be implanted due to poor venous anatomy or the inability to obtain stable lead position received a legally marketed transvenous LV lead. The remaining 5 patients with unsuccessful implants of the Quartet lead could not receive a transvenous LV lead of any kind. In three (3) patients, an LV lead was not implanted and a single or dual chamber ICD was implanted. In the other 2 patients, a legally marketed epicardial LV lead was implanted. .

All eight (8) patients were followed for a period of 30 days for adverse events and then were withdrawn from the study.

Results

The following figure shows the status of enrolled patients.



Primary Safety Endpoint

The primary safety endpoint for this study is freedom from left ventricular lead-related complications through 3 months. The null and alternative hypotheses were formulated as:

H0: Freedom from LV lead-related complications through 3 months ≤ 85%

Ha: Freedom from LV lead-related complications through 3 months > 85%

The desired outcome is to reject the null hypothesis. The null hypothesis is rejected at the 2.5% significance level if the 97.5% lower confidence bound (LCB) for freedom from LV lead-related complications through 3 months is greater than 85%.

Co-Primary Safety Endpoint

The co-primary safety endpoint for this study is freedom from system-related complications through 3 months. The null and alternative hypotheses were formulated as:

H0: Freedom from system-related complications through 3 months ≤ 75%

Ha: Freedom from system-related complications through 3 months > 75%

The desired outcome is to reject the null hypothesis. This is a one-sided hypothesis, and the null hypothesis is rejected at the 2.5% significance level if the 97.5% lower confidence bound (LCB) for freedom from Promote Q® system-related complications through 3 months is greater than 75%.

Primary Efficacy Endpoint

The primary effectiveness endpoint for the Promote Q system was the responder rate to biventricular pacing at 3 months. A responder per protocol was defined as a patient with an LV pacing threshold of <2.5 V at 0.5ms in the D1-M2 pacing configuration (Vector 1) AND at least one other non-standard programmable biventricular lead vector. Non-standard vectors included Vector 2 (D1-P4), Vector 4 (M2-P4), Vector 6 (M3-M2), Vector 7 (M3-P4), Vector 8 (M3-RV coil), Vector 9 (P4-M2) and Vector 10 (P4-RV coil).

The null and alternative hypotheses were formulated as:

H0: Responder rate at 3 months ≤ 75%

H1: Responder rate at 3 months > 75%

The desired outcome was to reject the null hypothesis. This is a one-sided hypothesis, and the null hypothesis is rejected at the 2.5% significance level if the exact 97.5% lower confidence bound on the responder rate at 3 months is greater than 75%.

The responder rate at 3 months in this analysis was estimated as 79.7% with a 97.5% LCB of 73.0%. The null hypothesis was not rejected at the 2.5% level of significance since the 97.5% LCB was marginally below the OPC. **The study failed to meet the primary efficacy endpoint using the methods outlined in the predefined statistical analysis plan. However, the sponsor provided additional supporting data to demonstrate the performance of the lead.**

Alternative Analyses of the Primary Efficacy Endpoint Data

The company presented a variety of different analyses (7), which are summarized in the following table.

Endpoint Definition	Type of Analysis	No. of Analyzable Patients	Handling of Missing Data	Result	
				Responder Rate (97.5% LCB)	Greater than OPC of 75% (Y/N)
Per Protocol: Threshold < 2.5 V in Vector 1 **and** at least one non standard vector	Analysis per SAP	177	8 Unsuccessful Implants ⇒ Non Responders 8 Successful Implants with Missing 3 month data ⇒ LOCF	79.7% (73.0%)	No
	Complete Case Analysis	161	NA	83.9% (77.2%)	Yes
	Analysis per SAP with five Unsuccessful Implants Excluded	172	3 Unsuccessful Implants ⇒ Non Responders 5 unsuccessful Implants ⇒ Excluded ;did not receive any LV leads 8 Successful Implants with Missing 3 month data ⇒ LOCF	82.0% (75.4%)	Yes
Revised: Threshold **≤** 2.5 V in Vector 1 and at least one non standard vector	Analysis per SAP	177	8 Unsuccessful Implants ⇒ Non Responders 8 Successful Implants with Missing 3 month data ⇒ LOCF	81.9% (75.4%)	Yes
Revised: Threshold **<** 2.5 V in at least one standard vector (Vector 1, 3 or 5) **and** one non standard vector	Analysis per SAP	177	8 Unsuccessful Implants ⇒ Non Responders 8 Successful Implants with Missing 3 month data ⇒ LOCF	85.3% (79.2%)	Yes
Revised: Threshold **<** 2.5 V in at least one of 10 available vectors	Analysis per SAP with five Unsuccessful Implants Excluded	172	3 Unsuccessful Implants ⇒ Non Responders 5 unsuccessful Implants ⇒ Excluded ;did not receive any LV leads 8 Successful Implants with Missing 3 month data ⇒ LOCF	93.0% (88.1%)	Yes
Revised: Threshold **<** 2.5 V in at least one of 10 available vectors	Analysis per SAP	177	8 Unsuccessful Implants ⇒ Non Responders 8 Successful Implants with Missing 3 month data ⇒ LOCF	90.4% (85.1%)	Yes

Some of these analysis method result in a positive result, meeting the new primary effectiveness endpoint. However, presentation of the results using only a responder's analysis does not present a complete picture of the data. At FDA's request, the sponsor provided additional supporting data, to demonstrate the effectiveness of the lead. A summary of the most relevant data is provided below.

The table below summarizes the number of patients who had capture thresholds < 2.5V in each vector at pre-discharge, 1 month and 3 months. The data show that multiple vector with capture threshold < 2.5V are available at each visit.

		Capture threshold < 2.5 @ Predischarge		Capture threshold < 2.5 @ 1 Month		Capture threshold < 2.5 @ 3 Month	
	Vector	# of pts (total = 170)	% of pts	# of pts (total = 167)	% of pts	# of pts (total = 161)	% of pts
1	D1 - M2	131	77%	140	84%	136	84%
2	D1 - P4	129	76%	140	84%	137	85%
3	D1 - RVCOIL	147	86%	152	91%	145	90%
4	M2 - P4	92	54%	85	51%	90	56%
5	M2 - RVCOIL	114	67%	118	71%	119	74%
6	M3 - M2	70	41%	61	37%	68	42%
7	M3 - P4	74	44%	56	34%	61	38%
8	M3 - RVCOIL	94	55%	90	54%	93	58%
9	P4 - M2	40	24%	31	19%	32	20%
10	P4 - RVCOIL	49	29%	42	25%	40	25%

The table below summarizes the final selected vector at each visit. In the IDE study, the final vector selection was left at physician's discretion.

		Programmed at Pre-discharge		Programmed at 1 Month		Programmed at 3 Month	
Vector #	Vector	# of pts (total = 170)	% of pts	# of pts (total = 168)	% of pts	# of pts (total = 164)	% of pts
Standard							
1	D1-M2	90	52.9%	89	53.0%	79	48.2%
3	D1-Rv coil	34	20.0%	38	22.6%	36	22.0%
5	M2-RV coil	28	16.5%	20	11.9%	27	16.5%
Total		152	89.4%	147	87.5%	142	86.6%
Nonstandard							
2	D1-P4	1	0.6%	0	0.0%	1	0.6%
4	M2-P4	2	1.2%	3	1.8%	1	0.6%
6	M3-M2	0	0.0%	0	0.0%	1	0.6%
7	M3-P4	1	0.6%	2	1.2%	3	1.8%
8	M3-RV coil	6	3.5%	10	6.0%	12	7.3%
9	P4-M2	0	0.0%	0	0.0%	0	0.0%
10	P4-RV coil	8	4.7%	6	3.6%	4	2.4%
Total		18	10.6%	21	12.5%	22	13.4%

Based on the data provided by the sponsor, FDA believes that the lead does provide additional clinically useful vectors for pacing of the left ventricle.

Comparison to Previous Clinical Studies

FDA believed that it would be helpful to compare and contrast the results from the quadripolar Quartet lead with the results of the commercially available bipolar QuickFlex left ventricular lead. Therefore, FDA requested a comparison of the two studies including the pacing capture threshold data. The sponsor provided the data in the following table.

Variable	Patients in Quartet IDE (N=178)	Patients in QuickFlex µ IDE (N=86)
LV leads Related Complications		
Kaplan - Meier Estimate	.96	.99
97.5% Lower Confidence Bound (LCB)	.93	.96
System Related Complications		
Kaplan - Meier Estimate	.92	.96
97.5% Lower Confidence Bound (LCB)	.88	.92
Bipolar LV Pacing Capture Threshold Responder Rate (< 2.5V in D1-M2 vector in Quartet IDE vs LV tip to LV ring in Quickflex µ IDE)		
Responder Per SAP, n (%)		
No	35 (19.8%)	16 (18.6%)
Yes	142 (80.2%)	70 (81.4%)
Responder LOCF & Death treated as Nonresponder, n (%)		
No	39 (21.9%)	18 (20.9%)
Yes	139 (78.1%)	68 (79.1%)
Responder Complete, n (%)		
No	25 (15.5%)	9 (11.8%)
Yes	136 (84.5%)	67 (88.2%)
Responder Worst, n (%)		
No	42 (23.6%)	19 (22.1%)
Yes	136 (76.4%)	67 (77.9%)
Unipolar LV Pacing Capture Threshold Responder Rate (< 2.5V inD1-RV coil vector in Quartet IDE vs. LV tip to RV coil in Quickflex µ IDE)		
Responder Per SAP, n (%)		
No	24 (13.6%)	9 (10.5%)
Yes	153 (86.4%)	77 (89.5%)
Responder LOCF & Death treated as Nonresponder, n (%)		
No	29 (16.3%)	12 (14.0%)
Yes	149 (83.7%)	74 (86.1%)
Responder Complete, n (%)		
No	15 (9.3%)	4 (5.2%)
Yes	146 (90.7%)	73 (94.8%)
Responder Worst, n (%)		
No	32 (18.0%)	13 (15.1%)
Yes	146 (82.0%)	73 (84.9%)

Mean Capture threshold @ 0.5 ms		
Bipolar capture threshold (D1-M2 vector in Quartet IDE vs. LV tip to LV ring in Quickflex μ IDE		
Implant	1.8 ± 1.6 (n = 169)	1.4 ± 1.3 (n = 81)
Pre-discharge	1.8 ± 1.7 (n = 170)	1.4 ± 1.2 (n = 81)
1 month	1.6 ± 1.4 (n = 167)	1.3 ± 1.1 (n = 80)
3 month	1.7 ± 1.3 (n = 161)	1.4 ± 1.3 (n = 76)
Unipolar capture threshold (D1-RV coil vector in Quartet IDE vs. LV tip to RV coil in Quickflex μ IDE)		
Implant	NA[1]	0.99 ± 0.9 (n=81)
Pre-discharge	1.4 ± 1.4 (n = 170)	1.0 ± 0.9 (n = 81)
1 month	1.1 ± 1.2 (n = 167)	0.9 ± 0.7 (n = 81)
3 month	1.1 ± 1.2 (n = 161)	0.9 ± 1.1 (n = 81)
Comparison of Missing Data		
Unsuccessful Implant, n (%)	8 (4.5%)	5 (5.8%)
Patient Death, n (%)	4 (2.2%)	3 (3.5%)
Patient withdrawn, n (%)	2 (1.1%)	1 (1.2%)
Three month visit not due yet, n (%)	1 (0.6%)	0 (0%)
Missed Three month visit, n (%)	2 (1.1%)	0 (0%)
Missing, n (%)	0 (0%)	1 (1.2%)
Total, n (%)	17 (9.6%)	10 (11.6%)
Implant Success Rate		
Unsuccessful Implants	8 (4.5%)	5 (5.8%)
Successful Implants	170 (95.5%)	81 (94.2%)
Phrenic Nerve Stimulation Comparison		
Patients (%) in whom PNS was clinically observed	23 (12.9%)	10 (11.6%)
Patients (%) in whom PNS was clinically observed and could not be resolved	0 (0%)	2 (20%)
Patients (%) in whom PNS was clinically observed and resolved by switching to a different pacing configuration	17 (74%)	4 (40%)
Patients (%) in whom PNS was clinically observed and resolved by changing pacing output	6 (26%)	4 (40%)

Conclusion

The following conclusion was provided by the sponsor.

The primary safety endpoint of left ventricular lead-related complications through 3 months and the co-primary safety endpoint of system related complications were met at the 2.5% significance level. The LV lead related complication free rate at 3 months of 96% (97.5%LCB: 93%) was comparable to the performance of the Quickflex μ 1258T lead in the IDE pivotal study. The complication free rate observed with the Quickflex μ 1258T lead at 3 months was 98.7% (97.5% LCB: 91%).

The primary efficacy analysis, as defined in the Statistical Analysis Plan, did not quite reach statistical significance at the 2.5% significance level. The 97.5% LCB at 73.0% was marginally below the OPC of 75%. However, other analyses of the efficacy data demonstrate statistically significant benefit.

When the definition of a responder was revised to include all standard vectors instead of just Vector 1, the 97.5% LCB at 79.2% was above the OPC of 75%. When the definition of responder was revised to simulate how the lead will be used in actual clinical practice (acceptable capture thresholds, i.e., < 2.5V in at least one of the 10 available vectors), the 97.5% LCB at 88.1% was greater than the OPC of 75%.

The primary analysis represents a worst case scenario. The additional analyses performed reflect clinical efficacy better because they evaluate the Promote Q™ device system as it will be used in clinical practice and use appropriate criteria to judge efficacy.

Summary

The following summary was provided by the sponsor.

The freedom from left ventricular lead-related complications through 3 months was estimated at 96% with a 97.5% LCB of 93%. This primary safety endpoint was met at the 2.5% significance level.

The freedom from system-related complications through 3 months was estimated as 92% with a 97.5% LCB of 88%. This co-primary safety endpoint was met at the 2.5% significance level.

Defining a responder as a patient with a pacing capture threshold less than 2.5V in Vector 1 (D1-M2) and one other nonstandard vector, the primary effectiveness analysis was estimated as 97.5% LCB was 73%, which is slightly below the OPC of 75%. However, when analyses are performed to reflect how the lead will be used in clinical practice, when patients who are unable to receive any legally marketed LV lead are excluded, or when a minor modification to definition of responder is made (< or = 2.5V), then the 97.5% LCB in even the worst case scenario is above the OPC. In addition, in clinical practice, the patients who will benefit most are those who have the non-standard vectors as options when their pacing thresholds are high using the standard vectors; this is best evaluated by analyzing the percentage of patients with a pacing capture threshold less than 2.5V in all available vectors.

Out of clinic diaphragmatic/phrenic nerve stimulation was reported in 23 (14.3%) of patients with a successful implant and all of these events were resolved without invasive intervention. Diaphragmatic/phrenic nerve stimulation was eliminated by VectSelect in 17 out of 23 (73.9%) patients.

There was one (1) elevated capture threshold event reported and this event was resolved noninvasively with VectSelect.

PULSE GENERATOR HARDWARE TESTING

I personally reviewed the relevant sections of the submission. The company submitted a variety of materials to document the testing of the pulse generators. The following sections outline the testing for the Promote Q, Promote Quadra, and Unify Quadra pulse generators.

Promote Q

Component Qualification Reports:

- Appendix 20 :1 MB External Memory Testing
- Appendix 21 :Header Assembly Qualification Testing
- Appendix 22 (b) (4) Accelerometer Qualification Testing
- Appendix 23 :Unity 1.5 Firmware verification
- Appendix 24 :Biocompatibility and Sterilization Assessment
- Appendix 25 :Biocompatibility Certification - Promote Q CD3221-36 Device

Device Qualification Reports:

- Appendix 26 :Electrical Performance Qualification Report
- Appendix 27 :Electro-Magnetic Compatibility Qualification
- Appendix 28 :Radiated EMI Compatibility Qualification
- Appendix 29 :Electronic Article Surveillance Susceptibility Qualification
- Appendix 30 :Electrosurgical Unit Protection Qualification
- Appendix 31 :External Defibrillation Protection Qualification
- Appendix 32 :Mechanical Performance and Safety Qualification
- Appendix 33 :System Bench Test Report

Process Validation Report:

- Appendix 34 :Can Weld Validation

Promote Q System Testing:

- Appendix 41 :Promote Q System Verification Report, RF Telemetry System Performance Verification
- Appendix 42 :Animal Study Report -GLP 605 – Final Report
- Appendix 43 :Promote Q System Risk Management Report

Promote Quadra Device

Component Qualification Reports:

- Appendix 44 :Header Qualification Testing (QTR 2466)
- Appendix 45 :RF Module Testing (QTR 2508)
- Appendix 46 :UAIO Hybrid testing (QTR2435/2583)
- Appendix 47 :Can Weld Validation (PVR107-91-128)
- Appendix 48 :Four Pole Feedthru extended voltage qualification testing (QTR2584)
- Appendix 49 :Biocompatibility and Sterilization Assessment (QTR 2467)

Device Qualification Reports:

- Appendix 50 :Electrical Performance Qualification Report - Brady (QTR 2567)
- Appendix 51 :Electrical Performance Qualification Report - Tachy (QTR 2568)
- Appendix 52 :Injected EMI Compatibility Qualification (QTR 2575)
- Appendix 53 : Radiated EMI Compatibility Qualification (QTR 2576)
- Appendix 54 : Electronic Article Surveillance Susceptibility Qualification (QTR2580)
- Appendix 55 :General Safety (QTR2574)
- Appendix 56 :Longevity Qualification Report (60029121)
- Appendix 57 :QHR Battery Qualification (QTR2573)
- Appendix 58 : Mechanical Performance and Safety Qualification (QTR2571)
- Appendix 59 :RF System Testing (60027480)
- Appendix 60 (b) (4) Connector GAP Qualification (QTR2627)
- Appendix 61 : (b) (4) Connector GAP Qualification (QTR2631)

Promote Q System Testing:

- Appendix 68 :Promote Quadra System Verification Report
- Appendix 69 :Promote Quadra System Risk Management Report

Unify Quadra Device

Component Qualification Reports:

- Appendix 70 :RF Module - Modified RF Flex
- Appendix 71 :Header - New Can Shape

- Appendix 72 :Hybrid Qual
- Appendix 73 :Biocompatibility Cert
- Appendix 74 :Biocompatibility Assessment
- Appendix 75 :Sterilization Assessment

Device Qualification Reports:

- Appendix 76 :Unity Downsize Device ICD Electric Verification - Brady
- Appendix 77 :Unity Downsize Device ICD Electric Verification - Tachy
- Appendix 78 :Radiated EMI Compatibility
- Appendix 79 :Electronic Article Surveliance (EAS)
- Appendix 80 :Electro-Magnetic Compliance Qualification
- Appendix 81 :General Safety
- Appendix 82 :Mechanical Verification
- Appendix 83 :RF System Test
- Appendix 84 : Longevity Report
- Appendix 85 : System Test Report
- Appendix 86 :Unify Quadra System Risk Management Report

Overall Analysis of Documentation

The pulse generators included in the submission are modified versions of commercially available devices from the company. I reviewed the list of materials and did not notice anything unusual. At FDA's request, the sponsor provided detailed comparisons to similar products, which were previously reviewed and approved by FDA. Also at FDA's request, the sponsor provided a table summarizing the rationale for testing and the location of the relevant test data within their submission.

LEFT VENTRICULAR LEAD TESTING

[redacted] reviewed the relevant sections of the submission. The sponsor provided the necessary testing to support the long term performance of the lead. A large portion of the overall review focused on the evaluation of the drug components of the lead. The lead contains the same drug component as previous leads from the company.

The firm was told as a future concern in the IDE approval order that a full drug review would be needed. They did not provide that drug information in their initial submission, so a deficiency was sent (February 2011) requesting it. Separately, FDA and the firm met interactively in December 2010 to discuss the outstanding steroid concerns with all of their leads.

In response to the Major Deficiency letter sent in February, the firm provided drug information and requested to remove the (b) (4) (a design change) to allow them to decrease variability in drug content. CDER presented several remaining concerns with the drug data and specifications which were clearly articulated in the NOAP letter. CDRH presented several concerns with the animal study acceptance criteria and statistical analysis (also clearly articulated in the deficiency letter).

CDRH and CDER worked interactively with the firm to address the concerns identified during the review process. At the end of the review, all of the CDER-related concerns had been addressed.

SOFTWARE VERIFICATION AND VALIDATION

[redacted] reviewed the relevant sections of the submission, related to the software in the programmer and the software in the implantable pulse generator. Her review memo provided a complete evaluation of the documentation used to support the design, verification, and validation of the software. FDA initially identified some concerns, which were subsequently addressed by the sponsor in Amendment 1 (A001).

ANIMAL TESTING

Animal testing was not conducted or submitted as part of this submission. However, animal testing was conducted and submitted for a related file, which was then reviewed for this related submission. [redacted] is the lead reviewer for another file from the company with similar CDER-related concerns: P960013-S061-A001. Due to the similarities in the files, the deficiencies identified in that file were also used for this file. The company submitted data in Amendment 4 (A004), which addressed FDA's remaining concerns.

BIOCOMPATIBILITY

There were no changes relevant to this issue. The patient contacting materials on the Promote Q, Promote Quadra, Unify Quadra CRT-D pulse generators and the Quartet lead are the same as other St. Jude Medical CRT-D pulse generators and leads.

PACKAGING, STERILIZATION, AND SHELF-LIFE

There were no changes relevant to this issue.

Packaging - The packaging process and materials of the Promote Q, Promote Quadra, Unify Quadra CRT-Ds and Quartet lead are the same as those of the legally marketed CRT-Ds and QuickFlex family of leads.

Sterilization - The manufacturing of the Quartet Model 1458Q lead including sterilization is the same as the processes of the legally marketed QuickFlex Model 1158T lead (PMA-S P030054/S49, approved on July 25th 2007)and QuickFlex Micro 1258T lead (PMA-S P030054/S130, approved on May 12th, 2010). The only difference between the Quartet 1458Q lead and these leads is the quadripolar connector at the

proximal end and two additional electrodes at the distal end and a minor modification to the weld electrode. The manufacturing of the Promote Q, Promote Quadra, Unify Quadra CRT-Ds including sterilization is the same as the processes of the legally marketed Promote RF CRT-D Model CD3207-36, Promote Accel Model CD3215-36/Q and Unify Model CD3231-40/Q.

Shelf-Life - The Promote Q, Promote Quadra and Unify Quadra CRT-Ds are packaged in the same packaging materials and use the same packaging processes utilized for legally marketed St. Jude Medical CRT-Ds. Shelf-life of the pulse generators is limited by the battery and is 18 months.

LABELING

The company submitted revised labeling in Volume VIII of the submission. The labeling included product markings, product labels, and product manuals.

The company noted one significant change in the labeling as compared to the labeling used in the IDE clinical study. The Promote Q CRT-D (Model CD3221-36) is a high voltage biventricular device that is equipped with an IS-4 low voltage connector to facilitate implantation of an IS-4 left ventricular (LV) four electrode lead (Quartet Model 1458Q lead). The Promote Q CRT-D was originally approved under IDE G090066 with a SJ4-LLLL low voltage connector. The Low Voltage SJ4-LLLL and the High Voltage SJ4-LLHH connectors were designed and developed to the most current IS-4/DF-4 standard (ISO27186) at the time. Now that the standard is published SJM would like to update the labeling of these devices to indicate conformance with the IS-4 and DF-4 standards. The DF-4 labeling conformance is currently approved for SJM devices under P030054/S148 (main), approved on June 22nd, 2010.

[redacted] performed a complete review of the labeling. Deficiencies in the presentation of the clinical data were noted in initial version of the labeling. The company included updated labeling in Amendment 4 (A004) in order to address these concerns. FDA reviewed the revised labeling and requested additional clarifications. These remaining concerns were addressed interactively with the company.

POST-MARKET REQUIREMENTS

[redacted] reviewed the relevant sections of the submission, including the proposed post approval study protocol. Deficiencies were initially noted in the proposed study. These concerns were interactively shared and addressed with the sponsor. Amendment 3 (A003) included and updated protocol, which addressed the remaining concerns.