atrial pacing and evoked response sensing configuration, using evoked response peak amplitude and time information, to classify beats as capture, fusion or non-capture.

Methods: The study was performed during device implant or replacement. An Insignia 2AT study device was connected to the acute or chronically implanted standard pacing leads, and an empty pacemaker can was used to facilitate the measurements. A series of atrial threshold tests (pulse duration 0.4ms) were then performed while recording surface ECG and intracardiac electrograms using an AstroMed Digital Recorder. A randomized scheme of atrial threshold tests at 10 and 20 bpm above intrinsic rate (with and without backup pacing) was performed in either DDDR or AAI mode for a given patient. Data were transferred to a computer system, where success or failure of each automatic threshold test was analyzed.

Results: Data from 26 patients (15M/11F; 72.6±10.8 years), were studied. All pts received a DDDR(P) racemaker with a bipolar atrial lead, each from a variety of manufacturers. The AAT tests were run in DDDR mode for 11 pts, and in AAI for 15 pts, with 15 acute/11 chronic (6.4±3.1 years) atrial leads. Of the 26 patients, automatic tests were successful in 8 pts and were within 0.2V difference from the manual threshold test. The other 18 pts presented with a variety of failures, e.g., due to false classification of beats as fusion or an evoked response signal below the fixed minimum allowed by the AAT algorithm. Once these failures were analyzed and solutions were implemented, the collected data were evaluated against this newly revised AAT algorithm. As a result, AAT tests were successful in 25/26 (96%) patients. The AAT test failed in 1 patient because the atrial evoked response signal amplitude was below the absolute minimum required by the algorithm. Success or failure was ascertained in particular for tests with unipolar pacing and no backup during AAT, as this configuration reflects the current design of the AAT algorithm.

Conclusion: With the newly revised AAT algorithm, a highly accurate detection system using evoked response peak and timing information with an independent atrial pacing and evoked response sensing configuration, can be implemented in a pacemaker.

516 Improved performance of new AutoCapture algorithm with non low polarization ventricular pacing leads

D. Luria1, O. Gurvitz2, D. Bar Lev2, Y. Tiach2, M. Eldar2, M. Glikson2
1Sheba Medical Center, Heart Institute, Ramat Gan, Israel; 2Sheba Medical Center, Heart Institute, Tel-Hashomer, Israel

Purpose: The AutoCapture (AC) function of St. Jude Medical (SJM) pacemakers (PM) is successfully used with specially designed low polarization (LP) ventricular leads. The applicability of this function with standard leads, which lack LP properties, is controversial. Recently, a new AC algorithm has been introduced for use in new models of SJM PMs. We compared AC performance with non LP leads by the old versus the new version of the AC algorithm.

Methods-Results: The study group comprised 220 consecutive patients with AC PM’s connected to non LP leads: 67 had PM models with the old AC algorithm (Microny and Regency) and 153 had PM models with the new version (Entity, Affinity and Verity). One hundred patients with SJM LP leads (of whom 55 had PM’s with the new AC algorithm) served as the control group. The study protocol included an acute AC function assessment (polarization testing and automatic threshold determination) at four different pulse widths. Failure to determine correctly lead polarization magnitude with increasing pulse widths was observed in 50 patients (75%) with the old AC algorithm, compared to 37 patients (24%) with the new algorithm (p<0.0001). The advantage of the new algorithm was related mostly to its better performance with the passive fixation leads (1 of 97 (1%) vs 16 of 24 (66%) failures in new vs old algorithm respectively, p=0.0001). Active fixation leads have similar and high failure rates with both algorithms (36 of 55 (65%) vs 34 of 43 (79%) failures, p=0.1). No polarization measurement failure was seen in the control group.

Conclusion: The new generation AC algorithm facilitates successful AC application with a wider range of non LP pacing leads. However, AC function should not be used with non LP active fixation leads due to risk of incorrect pacing threshold determination.

517 The auto capture™ function can be used for high septal right ventricular pacing

M. Meine1, S. Schl ter2, C. Melchers2, G.V. Sabin2
1Bochum, Germany; 2Elisabeth-Hospital, Cardiology and Angiology, Essen, Germany

Introduction: Auto Capture™ (AC) is a function to safely pace the patient with a minimum pacemaker output especially in patients with high degree atrioventricular block who needs 100% ventricular pacing. The same patient population may also benefit from high septal right ventricular (RV) pacing in comparison to RV apical pacing. The aim of this study was to examine the AC function with pacing leads that were implanted in the high septal RV wall.

Methods: 36 pts (75±15 years, 13 females) underwent implantation of pacemakers with AC (26 DDDR, 10 VVIR, Verity ADx XL SR/DR, Identity ADx (XL) SR/DR, St. Jude Medical). 23 leads were implanted in the RV apex (15 screw, 8 tines) and 13 leads were screwed into the high septum of the RV. The lead functions were analyzed during implantation using the analyzer and after implantation by the programmer.

Results: The AC function was successfully performed in all 36 patients both with apical and septal lead positions. The pacing thresholds (PT) determined by AC were significantly lower than the PT during implantation (0.5±0.1V vs 0.6±0.2V at 0.5ms, p<0.01). There was no significant difference between the PT concerning the lead position (apical: 0.6±0.2V vs 0.7±0.2V at 0.5ms).

Conclusion: AC can safely be used in RV septal pacing in the same way as in RV apical pacing.

518 Evaluation of a rate overdrive algorithm for reliable automatic atrial capture threshold measurement

J. Snell3, G. Bombini1, L. Sloman3
1St. Jude Medical, Inc., Research (712), Sylmar United States of America; 2St. Jude Medical, Inc., Research, Sylmar, CA, United States of America; 3St. Jude Medical, Inc., Research, Sylmar, CA, United States of America

Introduction: The atrial evoked response integral (AERI) is effective for atrial capture determination in pacemakers, similar to ventricular AutoCapture™. To determine capture the AERI method requires the evoked response (ER) be recorded in a 40 millisecond ER detection window following the pacing pulse. If a P-wave falls inside this window (i.e. fusion) then capture detection can be compromised. Further, if the sinus rate exceeds the base rate for a significant time then the threshold may not be measured due to inhibition. For this reason an atrial rate overdrive algorithm has been developed to minimally overdrive the sinus rate while producing fusion-free atrial pacing.

Methods: healthy adult human volunteers (n=21) were fitted with Holter monitors to record heart rate intervals. A mean of 99,412 consecutive beats (9,043 to 130,928 per person) were recorded from each while performing a variety of normal lifestyle activities. A computer was used to simulate the proposed overdrive. This simulation applied the overdrive algorithm to every sequence of 30 consecutive beats within all the Holter data sets. Subsequently four canines with chronically implanted permanent pulse generators had custom software downloaded...