LVOT VTI were similar but improved compared to RV septal pacing. This provides a potential indication for physiologic pacing in patients with long PR.

MIMIC HEART RATE VARIABILITY ALGORITHMS FOR PACEMAKERS

Magdalena Maria Defeo MD; Leopoldo Garavaglia and Isabel Irurzun Prof

**Background:** Heart rate variability (HRV) is the physiological variation in the duration of cardiac cycles. HRV is a complex signal composed of multiple frequencies that give it chaotic characteristics. These characteristics are not taken into account in current cardiac pacing devices, whose operation is fundamentally periodic, with variations according to the level of activity.

**Objective:** In this work we propose an algorithm to imitate the heart rate variability of a healthy individual. This algorithm can be used in all currently available cardiac pacing devices.

**Methods:** Electrocardiographic records of adult individuals were examined in order to establish relationships between different cardiac intervals (RR, RT, TP, PR, TR, RP, and PT). Based on the HRV series of about 700 healthy individuals of both genders, in an age range from 1 month to 99 years, we established mathematical relationships that are used in this work to mimic HRV in pacemakers.

**Results:** The figure shows the dependence of the mean value of the RR intervals (\(\bar{RR}\)) and the standard deviation (SDRR) on age and gender ((a) and (b) respectively). The HRV series can be normalized to \(\bar{RR}=0.5\) and SDRR = 1, and the power spectrum can be simulated by mixing pink noise and brown noise (c). Time series with the same power spectrum can be mathematically generated (d) and then used as stimuli in a pacemaker. Figure (e) and (f) show the synchronization between the RR interval and all the intervals containing the TP. The TP interval is the basic interval, and the end of the repolarization process indicates the beginning of the cardiac cycle.

**Conclusion:** Cardiac pacing devices can mimic the HRV of healthy individuals if the intervals are measured from the end of the repolarization period.

DYNAMIC CHANGES IN HIS BUNDLE STRENGTH DURATION CURVES FAVOR SELECTIVE PACING STRATEGIES

Michael V. Orlov MD, PhD; Timothy G. McIntyre MSBE, CEPS, CCDS; Ahad Jahangir MS; David A. Casavant MSBE, FHRS, CCDS and Darya Lee HSDG

**Background:** His bundle pacing (HBP) has been hampered by unpredictable increase in chronic pacing thresholds (PT). Little data is available on changes in HBP strength-duration curve (SDC).

**Objective:** To characterize acute and chronic HBP SDC, compare them to RV SDC and come up with programming recommendations.

**Methods:** Acute (post implant) or chronic (6 months) PT measurements were performed in 26 pts. Dynamic (both acute and chronic) data were available in 9 pts. Rheobase and chronaxie were calculated. Rheobase characterizes the flat portion of SDC (lowest PT at that portion of the curve) and chronaxie value (pulse width at twice the rheobase PT) allows to program outputs at safety margin.

**Results:** Chronic SDC for HBP is shifted up and left compared to acute SDC. Chronic HBP chronaxie decreases and RV chronaxie
increases (Fig. 1) compared to acute. This is primarily driven by non-selective HBP measurements which have a similar SDC. Chronaxie decreases significantly in follow-up for nonselective HBP (p = 0.05), there is a trend for increase in RV chronaxie in these pts. Selective HBP SDC and chronaxie demonstrate minimal change over time (Fig. 2). Chronic rheobase increases significantly for nonselective HBP (p = 0.025), insignificantly for corresponding RV capture but not for selective HBP. Dynamic measurements in 9 pts with acute and chronic SDC confirm same observations.

**Conclusion:** 1. Chronaxie for HBP decreases in follow up. 2. Use of lower pulse widths could decrease battery current drain but is negated by increase in nonselective PT. 3. Selective HB chronaxie and PT change minimally and are low. 4. Achieving selective HBP may allow to program a lower pulse width and to save battery.

### HBP AND RV SDC FOR ALL PATIENTS (ACUTE VS CHRONIC)

![Graph showing HBP and RV SDC for all patients](image)

### SELECTIVE HBP AND RV SDC (ACUTE VS CHRONIC)

![Graph showing selective HBP and RV SDC](image)

**PO-619-06**

**PRIME SCORE PREDICTS NEED FOR PERMANENT PACEMAKER AFTER TRANSCATHETER AORTIC VALVE REPLACEMENT**

Christopher Barrett; Alexis Z. Tumolo MD; Matthew M. Zipse MD; Lohit Garg MBBS, MD; Wendy S. Tzou MD, FHR; Paul D. Varosy MD, FHR; Ryan G. ALeong MD, FHR; Jason West; Lukasz Cerbin MD; James Arthur Mann MD; Syed Rafay Ali Sabzwari MBBS, MD; Johannes C. von Alvensleben MD, CEPF-P and Anneath Sandhu MD

**Background:** High grade atrioventricular block is a common complication of transcatheter aortic valve replacement (TAVR). Current models for predicting risk of permanent pacemaker (PPM) after TAVR are not designed to be applied clinically to assist with pre-procedural planning and risk-benefit discussions with patients.

**Objective:** To aid procedural planning and patient discussion, we sought to produce a simple predictive scoring system that can be applied pre-TAVR to stratify risk of PPM after TAVR.

**Methods:** We analyzed consecutive patients undergoing TAVR at the University of Colorado from 2013-19. Pre-procedural clinical data were recorded. Patients were split into a training cohort to develop a predictive model and a testing cohort for model validation. Stepwise and binary logistic regression were performed on the training cohort to create a simple scoring system for predicting PPM implantation. Scores then were applied to the validation cohort and receiver operating characteristic (ROC) analysis was performed to assess predictive accuracy.

**Results:** Of 699 patients who underwent TAVR, 606 were analyzed for this study; 483 (80%) were included in the training cohort and 123 (20%) in the validation cohort. Pre-existing PPM before undergoing TAVR was the principal reason for exclusion. Pacemaker was implanted in 78/483 patients from the training cohort. The need for PPM post TAVR was associated with five pre-procedure variables: PR interval > 200 ms, Right bundle branch block (RBBB), valve In valve procedure, prior Myocardial infarction, and self-Expandable valve. The PRIME scoring system (Figure) was developed in the training cohort using these five clinical features, and was highly accurate for predicting PPM implantation both in the model training cohort (area under the curve [AUC] 0.804) and in the model validation cohort (AUC 0.830). The PRIME score offered substantial improvement over the use of RBBB alone (AUC for RBBB alone = 0.671) for the prediction of PPM after TAVR.

**Conclusion:** The PRIME score is a simple and accurate pre-procedural tool for predicting the need for PPM implantation after TAVR.

**PO-619-07**

**CHEST WALL ADIPOSE TISSUE EXCISIONAL BIOPSY DURING PACEMAKER OR DEFIBRILLATOR IMPLANTATION: FIRST REPORT OF A NEW TECHNIQUE TO DIAGNOSE AND SUBTYPE AMYLOIDOSIS**

Chi Zhang MD; Daniel Ross Musikantow MD; Daniel N. Pugliese MD, MSc; Emmanuel Ekanem MD; Sumeet Mitter MD, MSc; Noah Moss MD; Donnampa Mancini MD, MSc; Jonathan Gandhi MD; Abhishek Maan MD, MSc; Tatjana N. Sljapic MD; Joshua Lampert MD; William Whang MD, FHR; Jacob S. Krouth MBBS, MD; Marie-Noelle S. Langan MD; Mohit K. Turagam MD; Srinivas R. Dukkipati MD, FHR; Marc A. Miller MD and Vivek Y. Reddy MD

**Background:** Availability of disease-modifying therapies has made early diagnosis of amyloidosis crucial. Clinical criteria and