

## Short-term variability of repolarization is equally modulated by atrial and (bi)ventricular high rate pacing in patients with an indication for an implantable cardioverter defibrillator

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**Background:** An increase in temporal dispersion of repolarization, quantified as short-term variability of the QT-interval (STV-QT), precedes ventricular arrhythmias and has therefore been proposed as a marker for monitoring of imminent arrhythmic risk. A reversal of an increased STV by high rate pacing at 100 bpm was anti-arrhythmic in the chronic atrioventricular block dog model susceptible to Torsade de Pointes arrhythmias upon challenge with an IKr-blocker. The objective of the current study was to investigate the physiological modulation of STV by pacing in patients with an indication for an implantable cardioverter defibrillator (ICD), and to compare atrial and ventricular pacing.

**Methods:** ECG recordings were obtained with a sampling frequency of 1200 Hz in 10 dual chamber ICD patients and 10 patients with cardiac resynchronization therapy with defibrillation function (CRT-D) during the implantation or replacement. One-minute recordings were made during sinus rhythm (SR), and during pacing at 80 and 100 beats per minute (bpm) from the atrium (AAI), atrium and right ventricle (DDD RVp), and during atrio-biventricular pacing (DDD BiVp). The QT-interval was determined offline with fiducial segment averaging at one minute of each pacing rate, and 31 consecutive beats were used to calculate STV-QT with the following formula:  $\sum |D(n+1) - Dn| / (N \times \sqrt{2})$ , where D represents the determinant of repolarization (in this case the QT interval), and N represents the number of beats taken into account minus 1.

**Results:** In the patients overall, STV-QT decreased from  $1.27 \pm 0.38$  ms in SR ( $\pm 58$  bpm) to  $0.86 \pm 0.26$  ms\* during AAI80, and to  $0.68 \pm 0.22$  ms\*† during AAI100 (\*p < 0.05 compared to SR, †p < 0.05 compared to 80 bpm). The same decrease was seen during DDD80 RVp ( $0.81 \pm 0.28$  ms\*) and during DDD100 RVp ( $0.66 \pm 0.22$  ms\*†) (fig. 1). Additionally, DDD BiVp decreased STV-QT to  $0.78 \pm 0.20$  ms\* at 80 bpm and to  $0.62 \pm 0.19$  ms\* at 100 bpm in CRT-D patients (fig. 2).

**Conclusion:** Pacing at 80 and 100 bpm decreases STV-QT compared to sinus rhythm both in dual chamber ICD patients and CRT-D patients. The modulation of STV-QT is similar during atrial, and atrio- right ventricular and atrio-biventricular pacing.

Abstract Figure. Modulation of STV-QT by AAI and DDD RVp

