

# Atrial Fibrillatory Rate Characterization Extracted from Implanted Cardiac Monitor Data

Javier Saiz-Vivo<sup>1,2</sup>, Mostafa Abdollahpur<sup>3</sup>, Luca T Mainardi<sup>2</sup>, Valentina D A Corino<sup>2</sup>, Mirko de Melis<sup>1</sup>, Frida Sandberg<sup>3</sup>

<sup>1</sup> Medtronic: Bakken Research Center, Maastricht, The Netherlands

<sup>2</sup> Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milan, Italy

<sup>3</sup> Department of Biomedical Engineering, Lund University, Lund, Sweden

**Aims:** This study aimed to characterize Atrial Fibrillatory Rate (AFR) extracted from a cohort of continuously monitored Atrial Fibrillation (AF) patients as function of episode duration and onset time.

**Methods:** The f-wave signal used to compute the AFR was extracted from the single lead ECG strip of the first 2 minutes of the AF episodes recorded by an Implantable Cardiac Monitor (ICM) in a cohort of 99 patients (67% male;  $57 \pm 12$  years; 26% non-paroxysmal AF). The f-wave signals were obtained from 1400 AF episodes using a spatiotemporal QRST cancellation process and the AFR was estimated as the fundamental frequency of a harmonic model fitted to the extracted f-waves. We investigated the relationship between AFR and episode duration and episode onset time, respectively.

**Results:** AFR was significantly lower ( $p$ -value $<0.05$ , Student's t-test) in short episodes ( $< 20$  min) ( $5.30 \pm 0.63$  Hz) than in longer episodes ( $5.44 \pm 0.65$  Hz). AFR was significantly higher for episodes with onset time at night (12pm-6am) ( $5.44 \pm 0.65$  Hz) than for episodes with onset during the day (10am-20pm) ( $5.35 \pm 0.65$  Hz). No significant differences were found between the relative AFR (ratio between the AFR and the average AFR of the patient) and episode duration and/or episode onset time.

**Conclusion:** Data extracted from ICMs can be used to characterize the AFR of patients suffering from AF. Results suggest that nighttime AF onset and longer duration AF episodes are more common in patients with higher AFR.

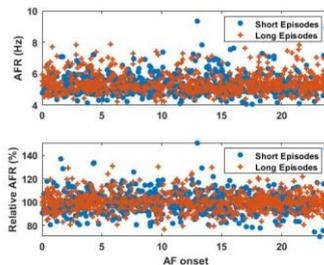


Fig. 1 AFR and Relative AFR distribution in time.