## ADAPTING THE THRESHOLD FOR ATRIAL FIBRILLATION DETECTION IN INSERTABLE CARDIAC MONITORS BASED ON EVIDENCE OF IRREGULAR SINUS RHYTHM

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**Background:** Frequent premature atrial contractions and sick sinus syndrome are primary causes of inappropriate atrial fibrillation (AF) detection in insertable cardiac monitors (ICM). An algorithm was developed to reduce inappropriate AF detection based on adapting the threshold for detection in the presence of irregular RR intervals and p-wave evidence.
**Methods:** The AF detection algorithm in Reveal LINQ ICM looks for evidence of AF based on differences in the pattern of RR intervals over a 2-minute period. The p-wave evidence based algorithm (P-SENSE) reduces evidence for AF detection if p-waves are detected. The adaptive P-SENSE enhancement uses the presence of p-wave evidence during periods of RR irregularity as evidence of the presence of sick sinus or ectopy to adaptively increase the threshold for AF detection. The algorithm was developed using Holter data from the XPECT study which collected two leads of surface ECG and continuously uplinked ICM ECG over a 46 hour period. ICM detections were compared with Holter annotations to compute episode and duration detection performance.
**Results:** Valid Holter recordings were analyzed from the first 56 patients in the XPECT study with a total follow-up duration of 2168 hours (39 hours per patient). True AF was observed in 16 patients, yielding 89 true AF episodes ≥2 minutes and 201 hours of AF. In the nominal (and aggressive) mode of operation, the algorithm correctly identified 97.9% (97.8%) of total AF duration and 99.5% (99.6%) of total sinus or non-AF rhythm duration. The algorithm detected 89% (89%) of all AF episodes ≥2 minutes, and 60% (74%) of detected episodes had AF in the nominal mode of operation. The adaptive P-SENSE algorithm in nominal (or aggressive) mode was able to reduce false detects by 76% (87%) compared to an algorithm without P-SENSE and 56% (63%) compared to the nominal (aggressive) P-SENSE without any loss in true episode detection (Figure).
**Conclusions:** An ICM algorithm enhancement for AF detection incorporating p-wave and RR variability information to adapt the AF detection threshold substantially reduced inappropriately detected episodes and duration with minimal reduction in sensitivity for detecting AF. The algorithm needs to be validated in an independent dataset.
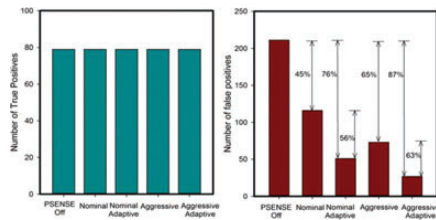


**Conflict of interest:** Salary, Medtronic Plc

## DEVELOPMENT AND VALIDATION OF AN ATRIAL FIBRILLATION KNOWLEDGE QUESTIONNAIRE

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**Purpose:** The aim of this study was to develop and validate a new questionnaire to test the knowledge of patients with atrial fibrillation (AF) about their arrhythmia in general, and oral anticoagulation (OAC) therapy if applicable. Such information can be used for individualised education.
**Methods:** A new Jessa Atrial fibrillation Knowledge Questionnaire (JAKQ) was developed based on existing questionnaires, information content on patient support Websites, and two checklists used to educate AF patients starting on OAC therapy. Content validity was derived from 5 electrophysiologists, 12 nurses with experience in AF management and 10 general practitioners. Face validity was assessed by 78 randomly selected AF patients. An additional specific response process validation was performed in 20 patients to ensure that all questions were correctly interpreted. A total of 363 AF patients, hospitalised (n = 189) or ambulatory (n = 174), completed the original or final versions of JAKQ. Internal consistency was calculated by means of Cronbach's $\alpha$ to determine the reliability of the questionnaire.
**Results:** The initially developed JAKQ contained 24 questions but after validation it was reduced to 16 questions, mainly to shorten the time needed for completion: with 24 questions, completion took $10.9 \pm 4.2$ min (n = 120) vs. $5.9 \pm 1.9$ min for the final version (n = 66). Content validity, face validity and response processes testing helped to eliminate 8 questions. The first 8 questions of the finalised JAKQ are about the arrhythmia itself, its symptoms and possible consequences. The next 5 questions deal with OAC therapy in general, while the last 3 questions are specific about either vitamin K antagonists (VKA) or non-vitamin K oral anticoagulants (NOAC). The questionnaire has a good discriminatory potential: the average score is $55.6 \pm 18.9\%$, with a range from 0/16 to 15/16; and younger patients (age ≤75; n = 218) perform better than older patients (age >75; n = 145) ($59.7 \pm 16.8\%$ vs. $49.5 \pm 20.2\%$, p < 0.001). Cronbach's $\alpha$ for the 8 general questions about AF was 0.672 (n = 363). For the 8 questions about OAC therapy, it was 0.635 or 0.622 for patients on VKA (n = 70) or NOAC therapy (n = 231), respectively. Cronbach's $\alpha$ could not be improved by deleting one of the questions.
**Conclusions:** The JAKQ is a valid instrument to test the knowledge level of AF patients. The questionnaire can be used as a tool to individualise education and to measure the impact of educational interventions.
**Conflict of interest:** none

## ELECTRICAL STORM AS PHENOTYPIC MANIFESTATION OF MALIGNANT REPOLARIZATION SYNDROME

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A 46 y/o male was brought in our ED after 5 consecutive appropriate ICD discharges for ventricular fibrillation (VF), each of them preceeded by syncope. The ICD was implanted as secondary prevention after an episode of resuscitated VF. The patient denied any history of angina or dispnoea. He had a positive history for arterial hypertension and hypercholesterolemia. His family history was negative for sudden cardiac death or significant cardiovascular diseases.
 ECG at admission showed normal sinus rhythm with no conduction abnormalities but also a discrete J wave and a localized early repolarization aspect in the infero-lateral leads. Repeated lab tests ruled out acute myocardial necrosis and inflammation. Echocardiography showed no regional contraction abnormalities and a normal ejection fraction of the LV. However, cardiac MRT revealed a scar of the LV posterior wall, most likely post myocarditis. Coronary angiography showed normal epicardial coronary arteries.
 12 lead ECG Holter monitoring revealed reproducibly spontaneous ST – segment elevations in the infero-lateral leads which occurred in the night, followed by early coupled PVC with a relatively narrow QRS complex. The patient denied any angina during these episodes. PVCs initiated repeated episodes of polymorphic VT degenerating subsequently into VF. Once the treatment with amiodarone was initiated, the number of PVCs decreased tremendously and no further appropriate ICD therapies were required.
 The ECG alterations with dynamic giant J wave, in the absence of any structural disease, is most likely to represent a phenotypic expression of an ion channel disease such as in early repolarisation syndrome.



**Conflict of interest:** none

## ENHANCED ANTIARRHYTHMIC EFFECTS OF DOFETILIDE IN A LARGELY AFRICAN AMERICAN POPULATION

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**Purpose:** Dofetilide is a class III antiarrhythmic agent which prolongs myocyte repolarization by acting on the delayed rectified potassium ion channel. This occasionally results in QT interval prolongation requiring in-hospital EKG monitoring during therapy initiation. Participants included in manufacturer trials were >90% Caucasian and >70% male. The purpose of our study was to measure clinical outcomes in a more diverse patient population.
**Methods:** This retrospective cohort study identified all patients who recently underwent initial administration of dofetilide at our institution for control of atrial or ventricular arrhythmias. Medical and demographic data was collected through chart review. We then compared the rate of dose adjustment, therapy discontinuation, and cardioversion with published data on mostly Caucasian patients. The Fisher's Exact Test was used for statistical analysis.
**Results:** Out of 54 patients, 27 male and 27 female, 35 identified themselves as African American, 12 as Caucasian, 6 as Hispanic, and 1 as Asian. Adjustment of the initial dose, on the basis of creatinine clearance, was similar to previous studies (24% vs 23%, P 0.86). While fewer patients required dose down titration due to QTc prolongation, this was not statistically significant (14.8% vs 22.1%, P 0.37). Notably, dofetilide therapy was stopped due to QTc prolongation more frequently in our population (22.2% vs 6.5%, P 0.015). Our patients also experienced a much greater rate of cardioversion from atrial fibrillation or atrial flutter to sinus rhythm (77.7% vs 27.4%, P <0.0001) during the first 36 hours of therapy. One person experienced Torsades de Pointes. There were no statistically significant gender differences in QTc prolongation or rate of cardioversion.
**Conclusions:** In a population consisting of mostly African American and Hispanic patients, dofetilide was much more effective at converting atrial fibrillation and atrial flutter to sinus rhythm. However, the rate of therapy discontinuation due to QTc prolongation was also increased. We believe further investigation is warranted into the etiology of these findings.
**Conflict of interest:** none