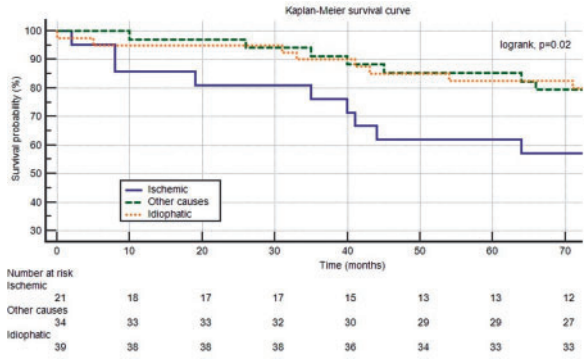
Abstract P1123 Table.

Causes	n (%)
1. Ischemic heart disease	21 (22)
1.1 With heart failure	6 (8)
1.2 Without heart failure	15 (16)
2. Other causes	34 (36)
2.1 Non-ischemic heart failure	15 (16)
2.2 Valvular disease	7 (7)
2.3 Hypertension	3 (3)
2.4 Hypertrophic cardiomyopathy	2 (2)
2.5 Myocarditis	2 (2)
2.6 Alcohol / thyroid dysfunction / hypokaliemia/Obstrutive sleep apnea	5 (5)
3. Idiopathic	40 (42)



Abstract P1123 Figure.

P1124

Effect of heart rate and pacing mode on QRS fragmentation: implications for identification of patients with impaired ejection fraction and ventricular tachycardia

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Introduction: We investigated the effect of heart rate and pacing mode on the QRS fragmentation (f-QRS) and correlated the findings with the ability of f-QRS to distinguish patients with impaired left ventricular ejection function (EF) and ventricular tachycardia (VT) from patients with normal EF.
Method: The study included 306 dual-chamber device recipients who were in sinus rhythm and had preserved atrioventricular conduction. Patients were grouped according to their normal or impaired EF (35 ± 9%) as well as to their baseline narrow or wide QRS. Intrinsic f-QRS in the presence of narrow or wide QRS (f-nQRS, f-wQRS) as well as ventricular-paced f-QRS (f-pQRS) were analyzed following different heart rates (baseline, 100 bpm) and pacing modes.
Results: Patients with impaired-EF VT, compared to those with normal EF, had more f-nQRS or f-wQRS (56% versus 27%, $P < 0.001$) and f-pQRS (62% versus 16%, $P < 0.0001$), irrespective of their baseline QRS. The increased heart rate led to similar detections of intrinsic f-QRS. Ventricular pacing conferred both at baseline, compared with the nonpaced QRS, and at higher rate significantly more f-pQRS in patients with impaired-EF VT ($P < 0.001$). Detection of f-pQRS improved overall specificity (84%) and positive predictive value (91%) in identifying patients with impaired-EF VT, whereby, along with f-wQRS, it appeared particularly useful in patients with baseline wide QRS. (Table I.)
Conclusion: Increased heart rate or/and pacing reveal more fragmented QRS. The presence of f-pQRS as well as f-wQRS offer promise towards noninvasive identification of patients with impaired-EF VT.

Abstract P1124 Table.

QRS-fragmentation	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
f-QRS-BL	56.2	73	83.6	40.6
f-QRS-100bpm	59.2	64.6	77.5	43.4
f-pQRS-BL	62.2	84.3	90.6	47.8
f-pQRS-100bpm	78.8	67.4	85.5	56.6

Diagnostic performance of QRS fragmentation to distinguish patients with impaired-EFVT from patients with normal EF.
BL=baseline heart rate, f-QRS= fragmented intrinsic QRS, f-pQRS= fragmented paced QRS, PPV= positive predictive value, NPV= negative predictive value

P1125

Noninvasive localization of premature ventricular complexes: a research-community-based approach

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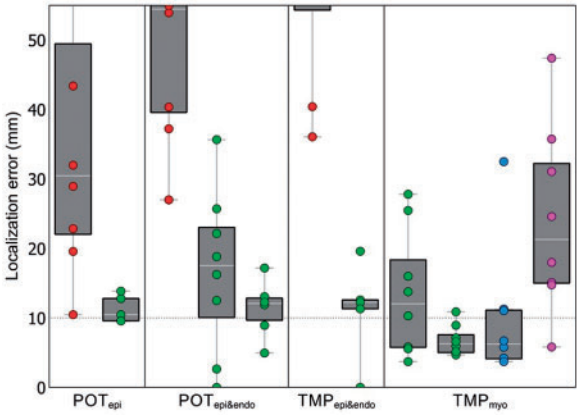
On behalf of: Consortium for Electrocardiographic Imaging

Background: Noninvasive localization of premature ventricular complexes (PVCs) to guide ablation therapy is one of the emerging applications of electrocardiographic imaging (ECGI). Because of its increasing clinical use, it is essential to compare the many implementations of ECGI that exist to understand the specific characteristics of each approach.
Objective: Our consortium is a community of researchers aiming to collaborate in the field of ECGI, and to objectively compare and improve methods. Here, we will compare methods to localize the origin of PVCs with ECGI.
Methods: Our consortium hosts a repository of ECGI data on its website. For the current study, participants analysed simulated electrocardiograms from premature beats, freely available on that website. These PVCs were simulated to originate from eight ventricular locations and the resulting body-surface potentials were computed. These body-surface electrocardiograms (and the torso-heart geometry) were then provided to the study participants to apply their ECGI algorithms to determine the origin of the PVCs. Participants could choose freely among four different source models, i.e., representations of the bioelectric fields reconstructed from ECGI: 1) epicardial potentials (POTepi), 2) epicardial & endocardial potentials (POTepi&endo), 3) transmembrane potentials on the endocardium and epicardium (TMPepi&endo) and 4) transmembrane potentials throughout the myocardium (TMPmyo). Participants were free to employ any software implementation of ECGI and were blinded to the ground truth data.
Results: Four research groups submitted 11 entries for this study. The figure shows the localization error between the known and reconstructed origin of each PVC for each submission, categorized per source model. Each colour represents one research group and some groups submitted results using different approaches. These results demonstrate that the variation of accuracy was larger among research groups than among the source models. Most submissions achieved an error below 2 cm, but none performed with a consistent sub-centimetre accuracy.
Conclusion: This study demonstrates a successful community-based approach to study different ECGI methods for PVC localization. The goal was not to rank research groups but to compare both source models and numerical implementations. PVC localization with these methods was not as dependent on the source representation as it was on the implementation of ECGI. Consequently, ECGI validation should not be performed on generic methods, but should be specifically performed for each lab's implementation. The novelty of this study is that it achieves this in the first open, international comparison of approaches using a common set of gold standards. Continued collaborative validation is essential to understand the effect of implementation differences, in order to reach significant improvements and arrive at clinically-relevant subcentimetre accuracy of PVC localization.



Abstract P1125 Figure.