

Post-processing of Electrocardiographic Imaging Signals to Identify Atrial Fibrillation Drivers

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Introduction. Phase mapping of inverse-computed electrograms (ECGI) is used for rotor activity identification to guide ablation procedures in atrial fibrillation (AF) patients. This study aims at identifying the post-processing settings that best allow tracking meaningful rotors.

Methods. ECGI signals of 24 AF patients prior to pulmonary vein isolation (PVI) were recorded. Patients were divided according to their 6 months outcome (sinus vs. no sinus). Rotor metrics were compared using 3 types of processing: none, a narrow band-pass filtering (NBP) centered at the highest dominant frequency (HDF), and Kuklik filtering (sinusoidal recomposition). Different thresholds for rotor duration were also compared (0.5, 1, and 1.5 turns).

Results. Differences in rotor metrics between sinus and no sinus patients were best identified with raw ECGI signals than filtered ECGI signals ($p < 0.05$, Table 1). In contrast, rotor duration threshold had little effect on the statistical differentiation between groups. A higher number of turns for singularity point detection does not change the major differences for each post-processing method studied.

Conclusion. Filtering of AF ECGI signals does not improve rotor identification to predict PVI outcome. Threshold duration for rotational activity is not critical for identifying relevant rotors.

	0.5 Turns			1.5 Turns		
	No Filter	Kuklik	Narrow Band	No Filter	Kuklik	Narrow Band
Rotors per second	0,01	0,01	0,00	0,01	0,01	0,00
Mean Time with Rotors (%)	0,02	0,02	0,71	0,00	0,00	0,14
Mean Rotor Duration (s)	0,00	0,09	0,57	0,01	0,80	0,49

Table 1. P-value of unpaired t-test results between patients with sinus rhythm and no sinus rhythm 6 months after PVI for ECGI signals with different filters and thresholds for rotor identification