# Characterization of conduction velocity from intracavitary electrical recordings during atrial fibrillation

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Characterization of biomarkers of atrial fibrillation (AF) patients such as conduction velocity (CV), can help to better guide ablation procedures, although this task during AF is complex due to chaotic activity and wavefront collisions. This works presents a novel method to increase the robustness of CV measures in intracardiac signals by combining multiple approaches.

Using multiple sets of 3 nearby electrodes (a), CV was measured for each activation, approximating the conduction to that of a planar wave (b), based on relative differences in activation time obtained by two different methods: 1. based on classic dV/dt detection as local maximum in time derivative (c); 2. measuring their delay as the temporal shift maximizing cross-correlation (d). CV measurements were only accepted when both methods were consistent (>40% of samples in median ± 150 mm/s) and provided physiological measurements (150 to 1500 mm/s).

Intracavitary electrograms (60 seconds) and electrode locations of 7 patients (4 men, 71 ± 6 yo) with a 64-electrodes basket were analyzed during AF episodes, obtaining CV measures of median 367 mm/s [IQR 266 – 480 mm/s]. Comparing CV distributions, it was obtained that paroxysmal vs persistent and initial rhythm at procedure did not present relevant differences in CV measures (e). However, CV was significantly reduced in patients with AF duration longer than 1000 days (320 mm/s vs 418 mm/s, $p<0.001$).

Robust CV measurement during AF will help to improve guidance models for ablation procedures by including the patient-specific substrate characterization, which may increase therapy success compared to classic stratification.