

## Assessment of inter-operator Reproducibility of CardioInsight ECG-Imaging

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ECG Imaging (ECGI) provides non-invasive, single beat panoramic assessment of cardiac electrophysiological parameters, which makes it a promising tool in different clinical settings. Reproducibility is a key aspect for any methodology with potential for clinical translation, but it remains undetermined for ECGI. This study aimed to assess clinically significant ECGI reproducibility impacting ventricular epicardial mapping.

Ten ( $n=10$ ) patients underwent ECGI during left-ventricular epicardial pacing delivered from cardiac resynchronization therapy devices. Two experts performed ECGI (CardioInsight, Medtronic, MN), using the same cardiac computed tomography and body-surface ECG recordings (matched QRS complexes), but independently performing semi-automatic cardiac segmentation and identification of 252 body-surface electrodes. The closest epicardial sites on the two cardiac geometries were paired. Similarity of reconstructed unipolar electrograms (UEG) was assessed measuring the pairwise correlation coefficient between them ( $r_{\text{UEG}}$ ) and the absolute difference of their peak-to-peak amplitudes ( $|\Delta A_{\text{UEG}}|$ ). Agreement between ECGI activation time (AT) maps was assessed using the correlation coefficient ( $r_{\text{AT}}$ ) and absolute percentage difference ( $|\Delta \text{AT}|$ ).

The median number of ECGI epicardial sites was 1828 (1768, 1929) and 2028 (1812, 2447) for operator 1 and 2, respectively, with median number of paired sites equal to 1790 (1762, 1906). The median and maximum (95%) distance between them was 2.9 (2.5, 3.1) mm and 10.0 (8.6, 11.1) mm, respectively. Reconstructed UEG were similar, with median  $r_{\text{UEG}} = 0.97$  (0.94, 0.98) and median  $|\Delta A_{\text{UEG}}| = 10.3\%$  (8.5%, 12.5%). Local AT were also similar, with  $r_{\text{AT}} = 0.85$  (0.74, 0.88) and median  $|\Delta \text{AT}| = 2.5$  (2.0, 3.0) ms, while the maximum (95%)  $|\Delta \text{AT}| = 40.5$  (27.6, 62.0) ms.

In conclusion, the morphology of UEGs was not significantly impacted by inter-operator variability in cardiac segmentation and electrode identification, but local AT may differ in a small number of cardiac sites.

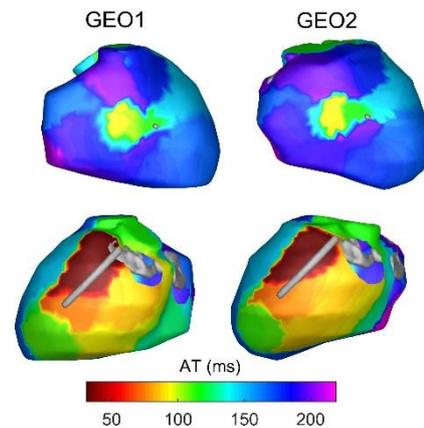


Figure 1. Activation time (AT) maps using geometries segmented by 2 operators (left vs right). Top and bottom show different views.