

## **Title: Inter-Procedural Reproducibility of Electrographic Flow Mapping Between Procedures Separated by 3 Months or Longer**

### **Authors:**

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### **ABSTRACT:**

#### **Background**

Over the last decade, various algorithms for localizing extra-pulmonary vein (PV) AF drivers/sources (focal or rotational activity) have been studied. Validating these mapping systems is confounded by lack of ground truth, typically manifesting as poor map reproducibility. Short of optical mapping studies, it remains difficult to prove that identified drivers are true drivers, so other criteria are needed to buttress the specificity of identified sources. Electrographic flow (EGF) mapping uses a novel technique to create full, near real-time spatiotemporal visualizations of atrial electrical wavefront propagation to identify putative atrial fibrillation (AF) sources.

#### **Objectives**

To evaluate whether AF source activity identified by EGF mapping is reproducible over procedures separated by  $\geq 3$  months.

#### **Methods**

As part of the FLOW-AF trial (NCT04473963), 18 pts underwent *de novo* balloon-based PVI and post-PVI EGF mapping with a 64-pole basket catheter. At  $\sim 3$  months, a remap procedure included PVI check + EGF mapping. Confirmation with  $\geq 20$  min wait to confirm isolation was required for post-PVI EGF mapping in both procedures. One pt was excluded as the post-PVI basket position was not stored with the EGF map such that anatomic location could not be verified, and 5 pts were excluded since AF was non-inducible at remapping.

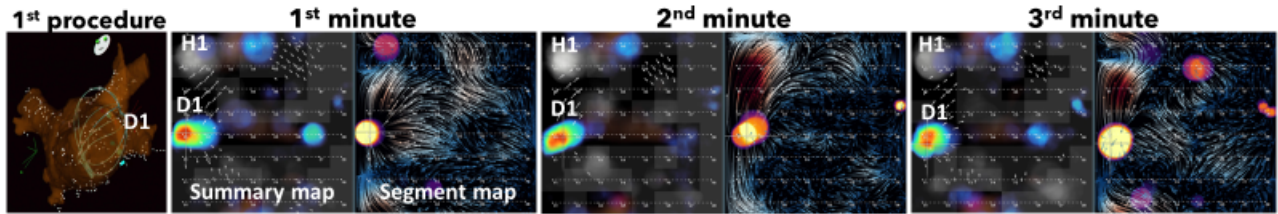
#### **Results**

Of the 12 pts who were fully mapped and re-mapped (at  $99.7 \pm 20.9$  days post-PVI), after *de novo* PVI, 18 sources with activity  $> 26\%$  (the threshold to qualify a source as legitimate) were detected (10 RA, 8 LA, 7 both atria). The remap procedures revealed that 16 of 18 (89.0%) sources were at the same anatomic location as in the initial procedure; the remaining 2 sources were detected in the SVC after the initial procedure post-PVI and were again seen in the SVC on remap, but in a different aspect of the SVC. One patient did not have any sources detected post-PVI in the *de novo* procedure, but was found to have an RA source after the PVs were re-isolated during the remap procedure.

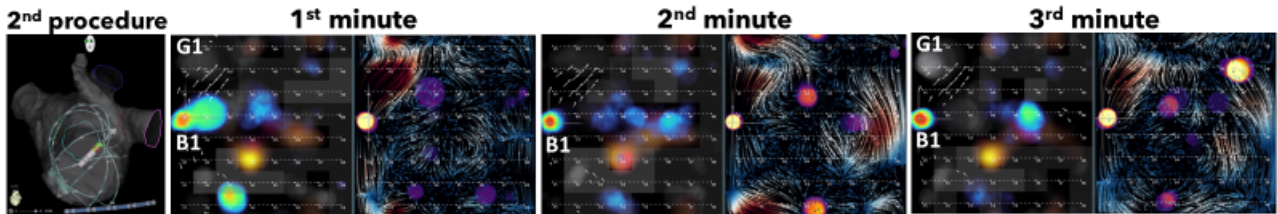
#### **Conclusions**

EGF mapping produces reproducible results from one procedure to the next, such that if a clinically relevant source was detected post-PVI during the first procedure, but was not ablated, the source was again detectable at remapping performed at 3-mo after *de novo* PVI. This inter-procedural reproducibility may enable longitudinal follow-up of individual patients' AF pathophysiology.

**Figure: Reproducibility of EGF Mapping Performed in Procedures over 3 Months Apart**



De novo PVI-only, June 2020: electroanatomic map showing basket position (far left); from L - R: EGF summary maps from 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> minute of recording show an exact match of the leading source prevalence (intensity of red indicates higher source activity) and location (D1) in lateral LA anterior to LIPV. Source at D1 drives passive rotation (H1) near LAA. 2 second EGF segment maps show conservation of overall flow fields (red = stable homogenous flow; blue = less stable flow).



Redo Ablation, September 2020: electroanatomic map showing basket position (far left); from L - R: EGF summary maps from 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> minute of recording again show an exact match of the leading source prevalence and location (B1) in lateral LA anterior to LIPV. Spatial relationship to passive rotation (G1) near LAA and dominant flow fields are also conserved.