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Letters

TO THE EDITOR

Electrogram Morphology Recurrence and Cycle Length in AF Mapping

From Recurring Concepts to Clinical Practice?

We read with interest the study by Yoo et al,[1] in which the authors provided experimental evidence on the capability of electrogram morphology recurrence, complemented with cycle length, to reflect critical atrial fibrillation (AF) mechanisms.

The use of electrogram morphology recurrence and cycle length for the identification of AF drivers was first proposed by our group.[2] Morphological similarity was logically combined with cycle length to identify among sites with regular activity those driving AF in virtue of their dominant rate.[3] Spatiotemporal patterns of morphological recurrence and cycle length were pointed out in humans in different types of AF.[2-4] Electrogram regularity was also shown to correlate with driver site responding to ablation.[5]

The study by Yoo et al[1] roots exactly in this previous groove. Its added value is the systematic analysis performed to relate recurrence indices with direct measurements of re-entrant activity and tissue characteristics. Recurrence indices were demonstrated to correlate with rotational activity stability and the heterogeneity of parasympathetic innervation, which significantly substantiate their mechanistic rational.

Accumulated indirect evidence[2-4] enriched by these results[1] should stimulate the implementation of recurrence indices into clinical practice. Integration in clinical mapping systems is supported by the single-signal basis and reduced computational cost of the indices, which may allow online construction of 4-dimensional electroanatomic maps. As concerns morphology-based ablation, further steps need to be addressed. First, morphology recurrence should be quantified in large populations and in the presence of additional substrates, in which the role of regular drivers may be less dominant. In this view, adjunctive detection of low-recurrence short cycle length sites through a logic approach[3] may be helpful for identifying critical substrates. Second, to improve procedure reproducibility, recurrence/cycle length thresholds for driver detection should be optimized based on the ground truth of arrhythmia mechanisms or ablation outcomes. Third, stepwise procedures, complementing anatomical and electrogram-based approaches, should be adapted for different patient classes, optimizing step order and tuning threshold sensitivity accordingly.

We believe that, through these steps, electrogram morphology recurrence could be translated from a recurrent idea into clinical practice in AF mapping to improve therapeutic outcome and patient benefit.

*Michela Masè, PhD
*Flavia Ravelli, PhD

*Laboratory of Biophysics and Translational Cardiology
Department of Cellular, Computational and Integrative Biology
University of Trento
Via Sommarive 9, Povo
38123 Trento, Italy
E-mail: flavia.ravelli@unitn.it OR
michela.mase@unitn.it

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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the Author Center.

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