Letter by Bisbal et al Regarding Article, “Repeat Left Atrial Catheter Ablation: Cardiac Magnetic Resonance Prediction of Endocardial Voltage and Gaps in Ablation Lesion Sets”

We read with great interest the article of Harrison et al.1 The authors report that delayed-enhancement cardiac magnetic resonance (DE-CMR) is unable to predict the site of pulmonary vein (PV) reconnection after ablation of atrial fibrillation. They found a weak point-by-point correlation between DE-CMR and peak-to-peak endocardial voltage. The authors are to be commended for their thorough analysis of DE-CMR and voltage data; however, some study limitations should be acknowledged, which we believe preclude the dismissal of DE-CMR evaluation of PV reconnection based on the results of their study.

A recently published study by our group demonstrated that ablation at the gaps depicted on the DE-CMR (CMR-gap) led to reisolation of 95.6% of PVs, even when the earliest activation did not match a CMR-gap.2 This necessarily means that DE-CMR can reliably identify the sites of PV reconnection. The sensitivity/specificity and positive/negative predictive values of detecting PV reconnection with DE-CMR were 100%/57% and 94%/100%, respectively.3

Several DE-CMR acquisition, image postprocessing, and procedural differences might explain these conflicting results. Compared with our study, Harrison et al. collected a significantly lower number of points to create the map, with a mean of 338±210 points per map (range, 51–901), compared with 808±159 points per map in our study (range, 520–1004). Of note, 3 maps (15%) in their study had <100 points. The lower mapping density could have led to insufficient voltage information in the areas of interest to clearly define small breaks in ablation lines. The lack of a contact force mapping catheter, which was used in our study, could potentially result in false low-voltage areas because of poor tip-tissue contact. In addition, DE-CMR was acquired with a greater voxel size (1.25×1.25×2.5 mm) than has been reported by other groups (1.25×1.25×2.5 mm),4 which would preclude detection of smaller anatomic gaps. Remarkably, 55% of patients in their study had >1 prior ablation. Evidence has been published on the attenuation over time of gadolinium signal-intensity at sites of scar.5 The use of restrictive signal-intensity thresholds in patients with >1 prior procedures may misclassify, as healthy myocardium, areas of less intense scar created on the first procedure. To overcome this issue, we included only patients undergoing a second procedure.

Finally, we disagree with the statement that the DE-CMR acquisition and postprocessing protocol used by Harrison et al is a validated method. In addition to the aforementioned limitations, this technique has not been externally validated, and thus its superiority over other reported methodologies cannot be demonstrated.3,4 However, voltage mapping also has not been validated as a reliable tool to predict PV reconnection. Considering that the spatial resolution of a point-by-point map using a 3.5-mm tip catheter is ≈6 mm in diameter and that the voxel size of DE-CMR can be as small as 1.25×1.25×2.5 mm,3,4 we consider it inappropriate to use voltage mapping as the gold standard. In light of these facts, we believe that the conclusions of the study by Harrison et al must be interpreted with caution and considered hypothesis-generating rather than as a definitive demonstration.

Disclosures
Dr Mont has served as a consultant for Biosense Webster, Boston Scientific, and St. Jude Medical. The other authors report no conflicts.

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References
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