

# Source Ablation of Atrial Fibrillation Outperforms Conventional Ablation Strategies in Preventing Re-Initiation In-Silico

Victor G Marques, Ali Gharaviri, Simone Pezutto, Pietro Bonizzi, Stef Zeemering, Ulrich Schotten

Maastricht University, Maastricht, Netherlands

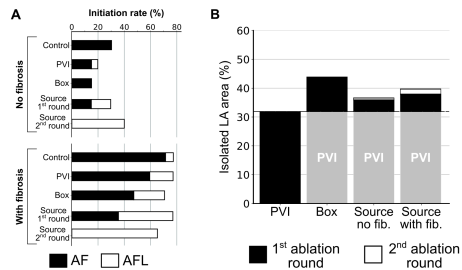
**Background:** Pulmonary vein isolation (PVI) is the standard ablation method for atrial fibrillation (AF), but recurrences are frequent, requiring better ablation strategies. This proof-of-principle study compares a novel source-based approach with conventional anatomical ablation methods beyond PVI to prevent AF re-initiation.

**Methods:** We compared two conventional strategies (PVI alone and PVI combined with posterior wall isolation [box ablation]) with our recently proposed source-based approach. In this approach, a high-density mapping catheter is guided sequentially upstream following the direction of repetitive local conduction patterns until a source is detected. After PVI, these sources were ablated and connected to nearby anatomical obstacles. We assessed the performance of the strategies based on AF re-initiation rates after pacing from 20 sites and measured the ablated and electrically isolated areas. Analyses were conducted for anatomies without and with structural remodeling.

**Results:** Box ablation did not significantly reduce AF re-initiation rates compared to PVI alone (15% vs.

15% and 50% vs. 40% for PVI and box, in the atria without and with fibrosis, respectively,  $p > 0.3$ ), even though a substantial portion of the left atrial surface was isolated (32% and 44%, respectively). Conversely, ablation of AF sources completely prevented AF re-initiation in both remodeling stages, isolating a smaller portion of the left atrium than box ablation (no fibrosis: 38%; with fibrosis: 41%) but including lesions in the right atrium. Atrial flutters occurred frequently after source ablation.

**Conclusion:** Ablating AF sources with our proposed approach prevented AF re-initiation while isolating smaller areas of the left atrium.



AF initiation (A) and electrically isolated areas (B) per ablation strategy