# Dominant Frequency and Organization Index for Substrate Identification of Persistent Atrial Fibrillation

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**Aims**: The organization index (OI) helps to define the robustness of the dominant frequency (DF) to represent atrial fibrillation (AF) activation rate, which can be used to identify AF drivers and guide ablation. The combined use of DF and OI might help to identify atrial regions with organized, fast activation rates. This work sought to retrospectively determine thresholds for DF and OI based on electrophysiologic responses following AF substrate modification.

**Methods**: 2048-channel electrograms (30-s, EnSite Array) were analysed from 10 persistent AF patients undergoing DF-guided ablation. After QRST subtraction, fast Fourier transform was used to calculate DF and OI. AF cycle length (AFCL) was measured before and after each ablation point (10-beat average, left atrium appendage). Electrograms were grouped in two classes: collected at regions that ablation resulted in AFCL increase ($\geq 10$ ms) and AFCL non-increase ($< 10$ ms). Patient-specific z-score DF (DFz) and OI (OIz) were tested to separate the two classes (individually and AND-logic). Higher values for DFz and OIz were assumed to correlate with AFCL-increase group. Informedness (J), accuracy (Acc) and F1 score were used to test classification performance. Best classification was defined at max{J}.

**Results**: 3206 electrograms were analysed from the 10 patients (947 [30%] AFCL-increase, 2259 [70%] AFCL-non-increase). Best individual classifications (Figure 1) were achieved at DFz = 0.64 (J = 0.16, Acc = 65%, F1 = 0.41), and OIz = 0.60 (J = 0.19, Acc = 70%, F1 = 0.40). Best classification for combined DFz and OIz (AND-logic, Figure 2) was achieved at DFz = -0.52 and OI = 0.49 (J = 0.23, Acc = 71%, F1 = 0.43).

**Conclusions**: Although DF and OI could be used individually to guide ablation, their combination might help in the identification of patient-specific AF substrate characterized by organized, fast activation rates to guide ablation in future clinical studies.