Can sequentially collected electrograms be effectively used for dominant frequency mapping during persistent AF?

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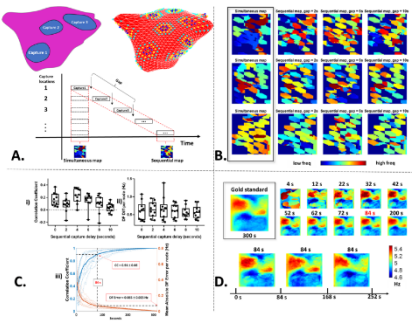

Fig. A. Illustration of the modelling of sequential mapping with multipolar catheter from non-contact simultaneous data and geometry; **B.** Examples of poorly correlated simultaneous map and sequential maps with different delays from 3 subjects; **C.** i) Correlation coefficients between simultaneous map and sequential maps with different delays, ii) absolute DF difference per node between simultaneous map and sequential maps with different delays, iii) the Correlation coefficients and absolute DF difference per node between DF map with full-length data and DF maps with shorter lengths; **D.** Top: examples of DF map with full-length data and DF maps with shorter lengths, bottom: non-overlapping DF maps with recommended duration.

Sequential electrogram collection using multipolar catheters (Pantaray, HD Grid, etc.) is increasingly used in persistent AF (persAF) mapping. However, it is unknow whether sequential mapping is suitable for dominant frequency (DF) mapping, as DF tends to be spatiotemporally unstable. We aim to model and compare simultaneously- and sequentially- collected EGMs for DF mapping.10 persAF patients undergoing left atrial (LA) ablation were enrolled. 2048-channel virtual EGMs (EnSite Array, Abbott; 5 mins) were analysed. After QRST subtraction, fast Fourier transform was used to estimate DF with 4-s sliding windows (2-s overlap). LA meshes were automatically segmented into 20 random-selected captures (Fig. A) to model multipolar catheter captures. Sequential maps were generated altering time delay (gap) between captures and compared with the simultaneous map. Correlation coefficients (CCs) and absolute difference between maps were calculated (Fig C i-ii). Average DF map over 5 mins were generated as ‘gold standard‘(Fig. D) , average DF map using shorter time duration ranging from 0 to 5 mins for all patients were compared with the ‘gold standard‘ map (Fig. C iii).Similarity between simultaneous and sequential maps was low (CC: 0.13 ± 0.12) with significant differences between capture delays ($p<0.05$, Fig. C i). A considerable DF difference at each node (0.61 ± 0.22 Hz) was found (Fig. C ii). As expected, the CC was correlated with increased time for DF map calculation, while DF difference were inverse-correlated (Fig. C iii). Using data for 84 s, CC of 0.91 ±0.06 and DF error of 0.065±0.023 Hz were achieved compared with full-length data (5 mins). This was confirmed visually in Fig. D with fully reproducible 84-s maps.Sequentially collected DF maps with short duration (4 seconds) captures generate distinct results from simultaneously collected maps. A duration of 84 seconds per capture is required to achieve reproducible mapping.