Conduction Block Extraction from Body Surface Potential Maps of Atrial Fibrillation

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Aims: Conduction blocks (CBs) can initiate rotors in atrial fibrillation (AF), and as their size is larger than phase singularity points, could be easier to track. We aim to investigate whether we could extract CBs from 252-lead body surface potential maps (BSPMs).

Methods: A super-resolution (Sup-Res) BSPM was obtained using Gaussian Process for Regression (GPR) on the 252-lead BSPM. A Sup-Res phase map was then calculated using the Hilbert transform. The maximal phase difference with the neighboring nodes at each time instant was used to form a Sup-Res gradient map to reveal the wavefronts, and the maximal duration for wavefronts to stay continuously at each node as a CB duration map. To verify the usefulness of the CB duration map, we performed the above step on the simulated AF CBs and rotors.

Results: Long-staying CBs appear on the CB duration map for our simulated atrial CB and rotors.

Conclusions: We were able to extract CBs from BSPMs through the CB duration map, and this may be useful in classifying different AF mechanisms.