

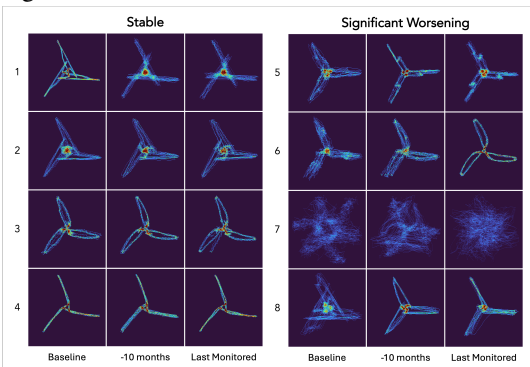
ATTR-CM Complete ECG Morphological Assessment Using SPAR - a Novel Waveform Analysis Technology

Miquel Serna-Pascual*, Alexander Melarti, Ulrike Lorch, Edward Shelley, Jörg Taubel, Manasi Nandi, James Rickard
King's College London & Richmond Pharmacology / Research Institute
London, United Kingdom

Introduction: The 12-lead electrocardiogram (ECG) remains of crucial importance in the evaluation of patients with cardiac amyloidosis. ECG analysis currently focuses on simplified biomarkers, such as rate, PQRST intervals and wave amplitudes. A novel algorithm, Symmetric Projection Attractor Reconstruction (SPAR) facilitates the assesment of the complete morphology of ECG recordings, using every available data point to generate a visual ECG representation, termed an ‘attractor’. SPAR amplifies morphology changes on ECGs, which may be missed by current, single-point detection approaches. In this study we investigated the potential utility of SPAR in highlighting whole-waveform morphology changes in ECG recordings from patients with transthyretin amyloid cardiomyopathy (ATTR-CM).

Methods: A 40-month ATTR-CM ECG database of 22 human patients was annotated by a practicing physician, classifying trajectories of each subject into stable, moderate worsening or significant worsening. On this pilot study, we focused our analysis on the two extreme groups. Data from patients with ECG recordings available for 5 or more monitoring time points were utilised. We selected ECG windows to be processed using an internal attractor signal quality index. All data management and attractor generation was performed using an internally developed MATLAB GUI software tool. Results for this study were obtained qualitatively assessing visual SPAR differences over time.

Results: We observed a high degree of inter-individual variability in baseline ECG morphologies, as highlighted by their SPAR attractors. Images from stable patients were mostly unchanged, while worsening patients showed significant intra-individual variation over



time. These results add to existing evidence and support the potential of SPAR as a clinical decision support tool for the management of ATTR-CM patients.