

Intracardiac Myocardial Elastography in humans *in vivo* during radio-frequency ablation

Julien Grondin¹, Elaine Wan², Alok Gambhir², Stanley Okrasinski¹, Hasan Garan², Elisa Konofagou¹

¹Department of Biomedical Engineering, Columbia University, New York, NY, USA

²Department of Medicine – Division of Cardiology, Columbia University, New York, USA

Email: jlg2216@columbia.edu

Background, Motivation and Objective:

Intracardiac echocardiography (ICE) is commonly used during radio-frequency (RF) ablation procedures for procedural guidance. Besides its imaging function, ICE could be used to assess mechanical properties of the myocardium to improve the ablation outcome. The objective of this study was to demonstrate the feasibility of imaging myocardial strains *in vivo* within the same imaging plane as ICE at high temporal resolution.

Statement of Contribution/Methods:

A 5.8-MHz center frequency ICE probe was used to image the heart of two humans with atrial arrhythmias *in vivo* before and after RF ablation at high frame rates (1200 Hz) and the channel data were acquired on a clinical ultrasound system. The RF signals were reconstructed on a 9cm depth and 90° field of view region with a delay-and-sum algorithm and axial cumulative displacement estimation was performed using 1-D cross-correlation using a window size of 2.6mm and 95% overlap. Axial cumulative strains were obtained from the axial displacements using a least-squares estimator with a kernel of 5.1 mm.

Results/Discussion:

Cumulative axial strains in the left atrium during systole were 23% and 18% for both subjects before ablation then 8% and 11% on the same site after ablation. This provides some new prospects to monitor ablation induced lesions.