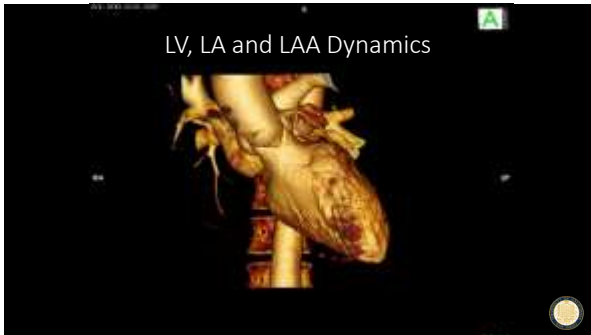


4DCT and MRI of the Heart

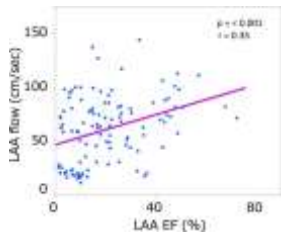
Elliot McVeigh, PhD
Departments of Bioengineering, Radiology, Cardiology
UC San Diego, La Jolla, CA



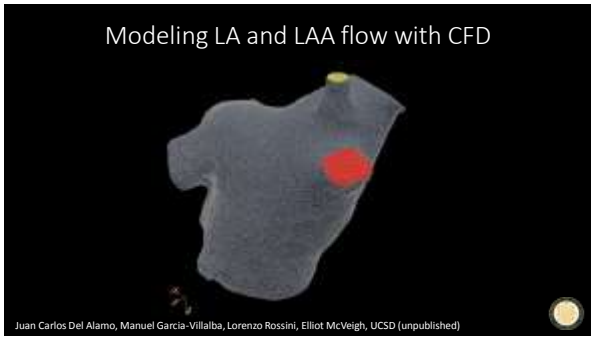
Disclosures: Dr. McVeigh is an inventor on licensed US patents for real-time MRI and interventional devices. Dr. McVeigh is a co-founder and shareholder of MR Interventions Inc. Dr. McVeigh's funding, career advancement and livelihood depend on publishing positive results.

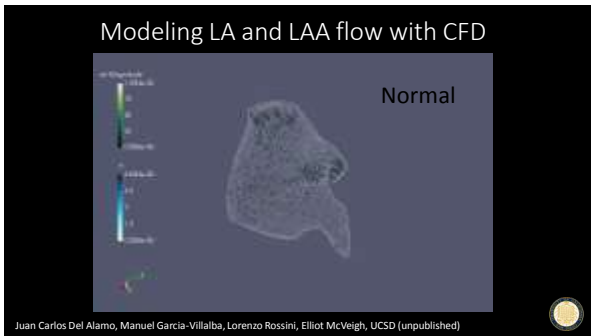


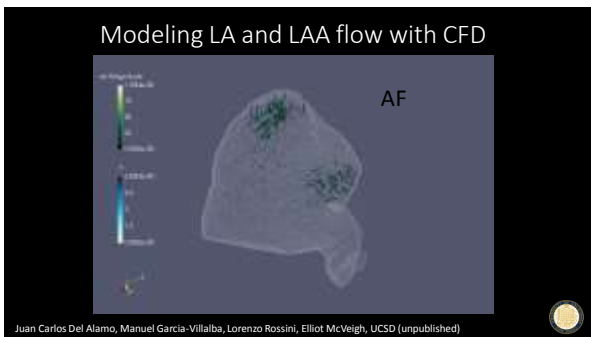
Left Atrial Appendage Flow Velocity **does NOT correlate** with LAA Ejection Fraction

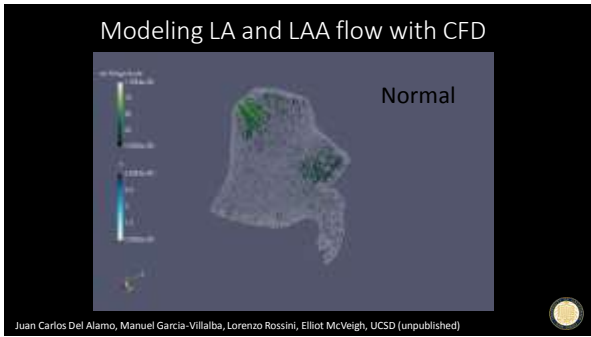


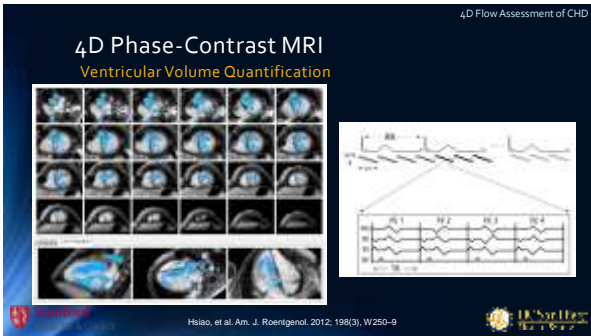
Matsumoto Y, et al. Characteristics of Anatomy and Function of the Left Atrial Appendage and Their Relationships in Patients with Cardioembolic Stroke: A 4-Dimensional Transesophageal Echocardiography Study. J Stroke Cerebrovasc Dis. 2017;26(3):470-479. PMID: 28089095

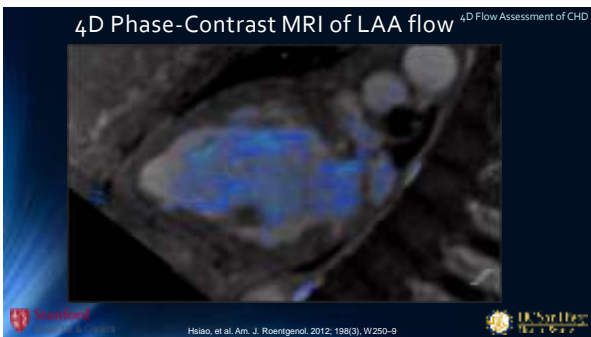


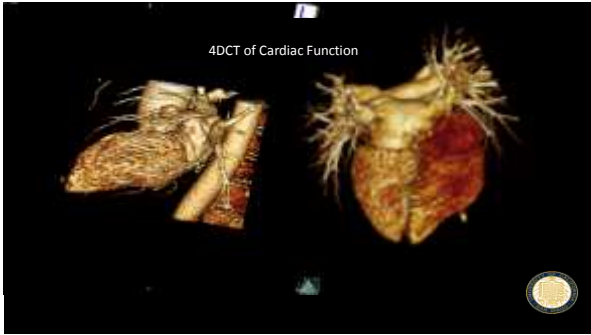


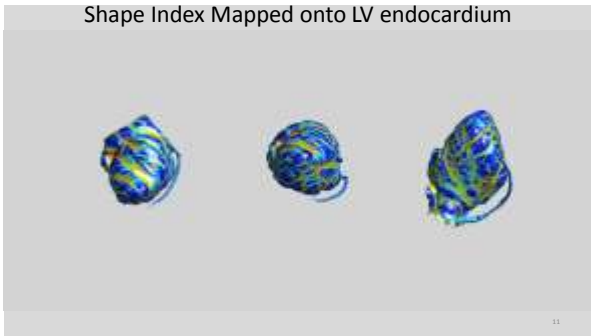






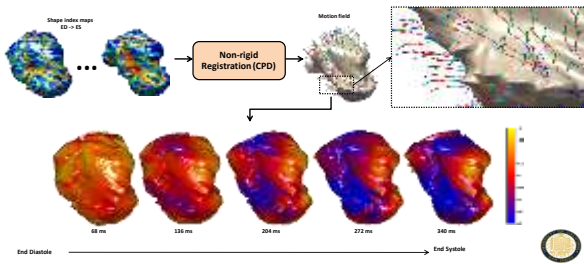




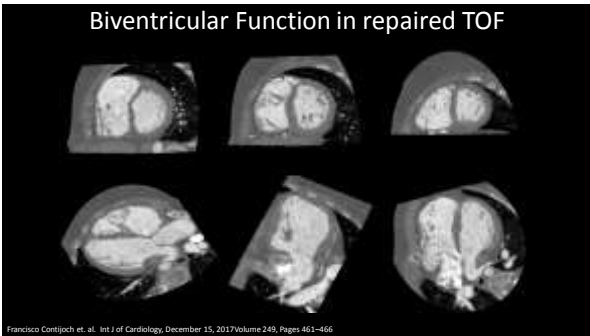


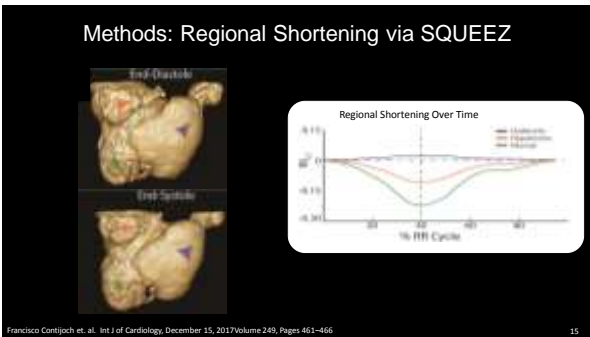
Calculation of LV strain from SQUEEZ

Pourmorteza et. al. Circ Imaging xxxx, McVeigh et. al. JCCT xxxx







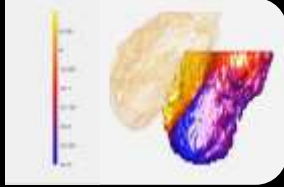


Regional Shortening

Control Subject



Adult Repaired TOF

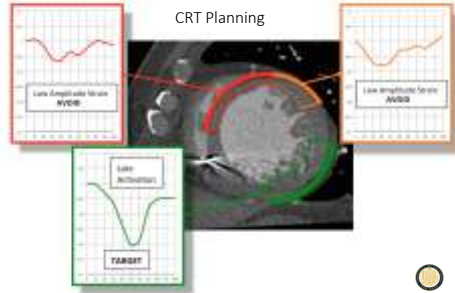


Francois Contjoch et al. Int J of Cardiology, December 15, 2017 Volume 249, Pages 461-466

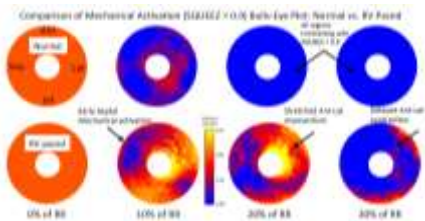
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SQUEEZ value vs. %RR for Septum, Anterior, and Inferior-Lateral walls of LV

CRT Planning



SQUEEZ in Dyssynchronous LV



Tendyne Trans-apical Mitral Valve Device

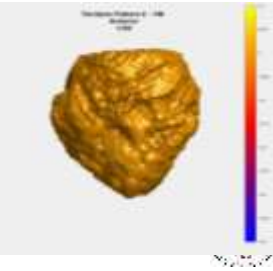
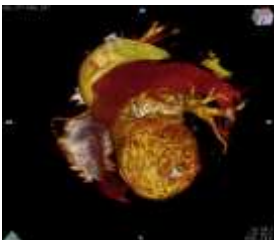


Ac: Anterior Cuff, T: Tether, EP: Epicardial Pad

Visualizing LV Function with the TMVR device



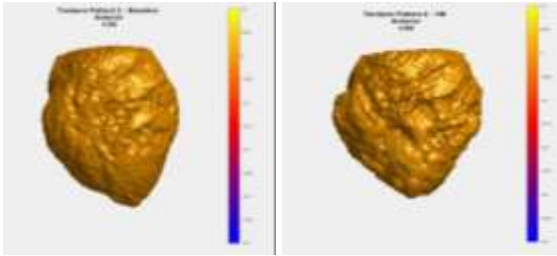
Mapping LV Strain During Systole with SQUEEZ



Gabrielle Colvert, E. McVeigh, J. Leipsic et. al. (unpublished)

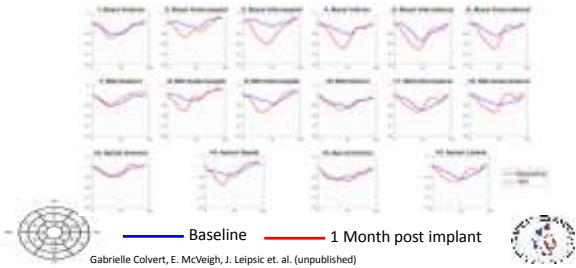
McVeigh et al.

Comparing SQUEEZ pre and post implant



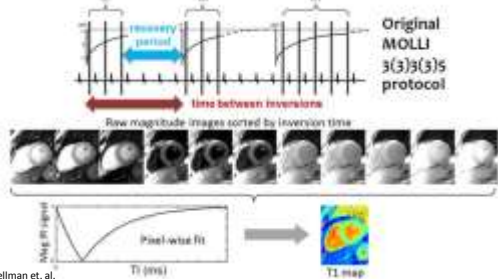
Gabrielle Colvert, E. McVeigh, J. Leipsic et. al. (unpublished)

Comparing SQUEEZ vs time pre and post

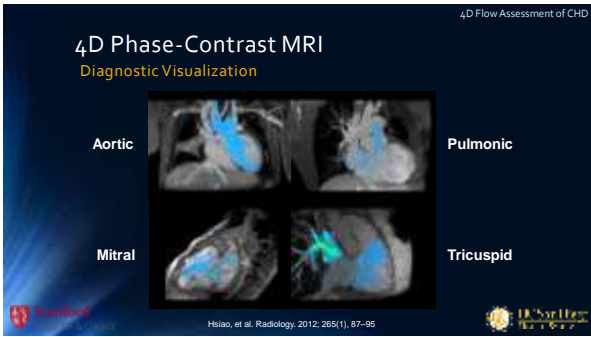


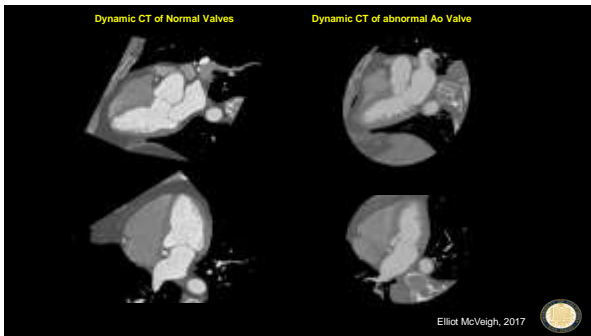
Gabrielle Colvert, E. McVeigh, J. Leipsic et. al. (unpublished)

Evaluating LV viability with Extracellular Volume (ECV)



Peter Kellman et. al.













CT for 3D planning of interventional procedures



Mitul Patel, Elliot McVeigh, Ryan Reeves, Andrew Schluchter, Davis Vigneault, et. al. 2018

Conclusion

“New generation” 4DCT and 4D MR imaging will yield:

- Accurate modeling of dynamic chambers of the heart
- Accurate measurement of regional cardiac function over the whole heart

Mapping change in LVED *Shape* Pre and Post TMVR



Gabrielle Colvert, E. McVeigh, J. Leipsic et. al. (unpublished)

Biventricular Function Imaging with CT

- **Approach:**
 - Low radiation dose
 - Mean dose < 1 mSv²
 - Contrast-enhanced
 - Retrospectively-gated
 - Tube Current modulation
- **Result:** Effectively evaluated global biventricular function in 30 consecutive patients³



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Purpose of the Left Atrial Appendage?

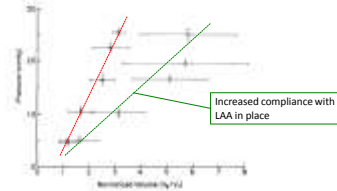


FIG. 3. Compliance of the left atrium with and without the left atrial appendage. The compliance of the left atrium was measured in 10 patients with and without the left atrial appendage. The compliance of the left atrium was measured in 10 patients with and without the left atrial appendage. The compliance of the left atrium was measured in 10 patients with and without the left atrial appendage. The compliance of the left atrium was measured in 10 patients with and without the left atrial appendage.

Davis CA 3rd, Rembert JC, Greenfield JCI. Compliance of left atrium with and without left atrium appendage. Am J Physiol. 1990 Oct;259(4 Pt 2):H1006-8. PMID: 2221109
