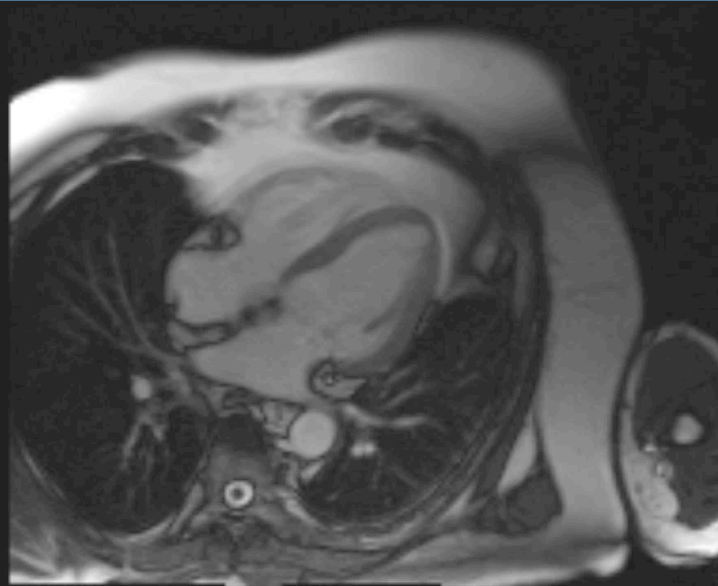


Afib and Cardiac Function

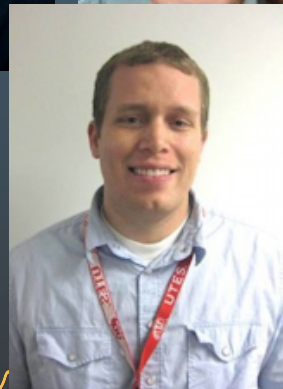
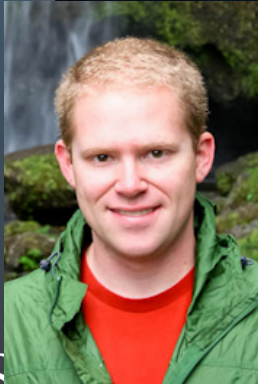
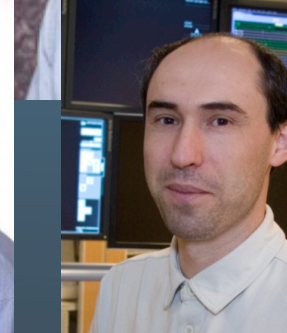
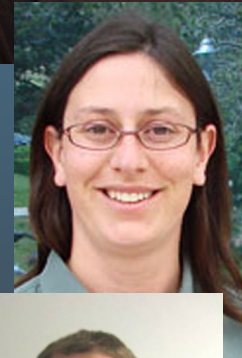
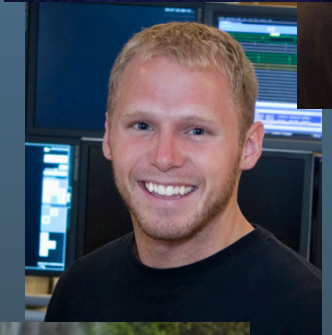
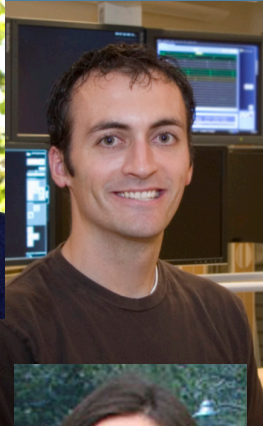
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Normal Contraction

Atrial Fibrillation



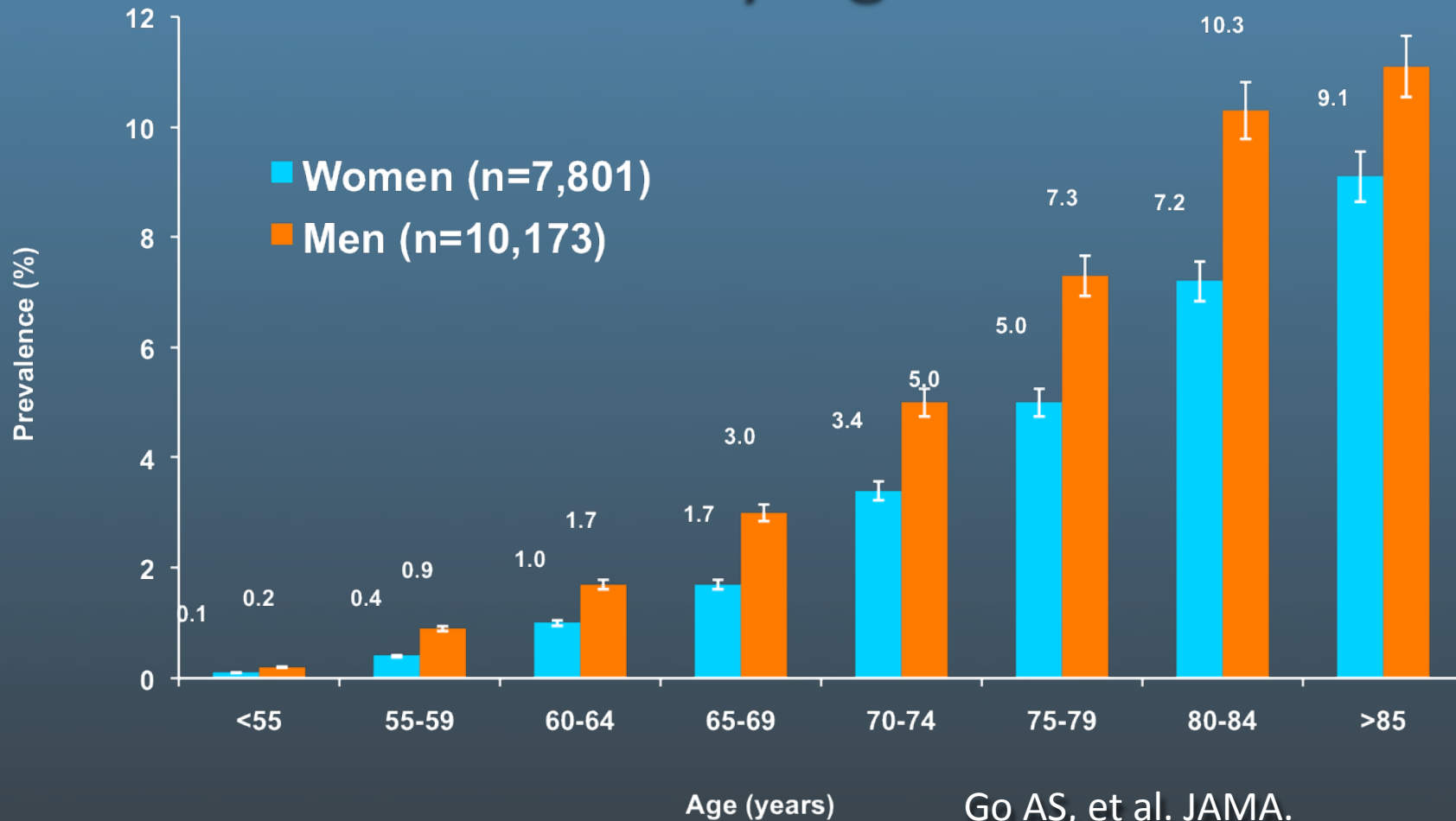
DBP: Atrial Fibrillation



Everyone Should Worry about Afib

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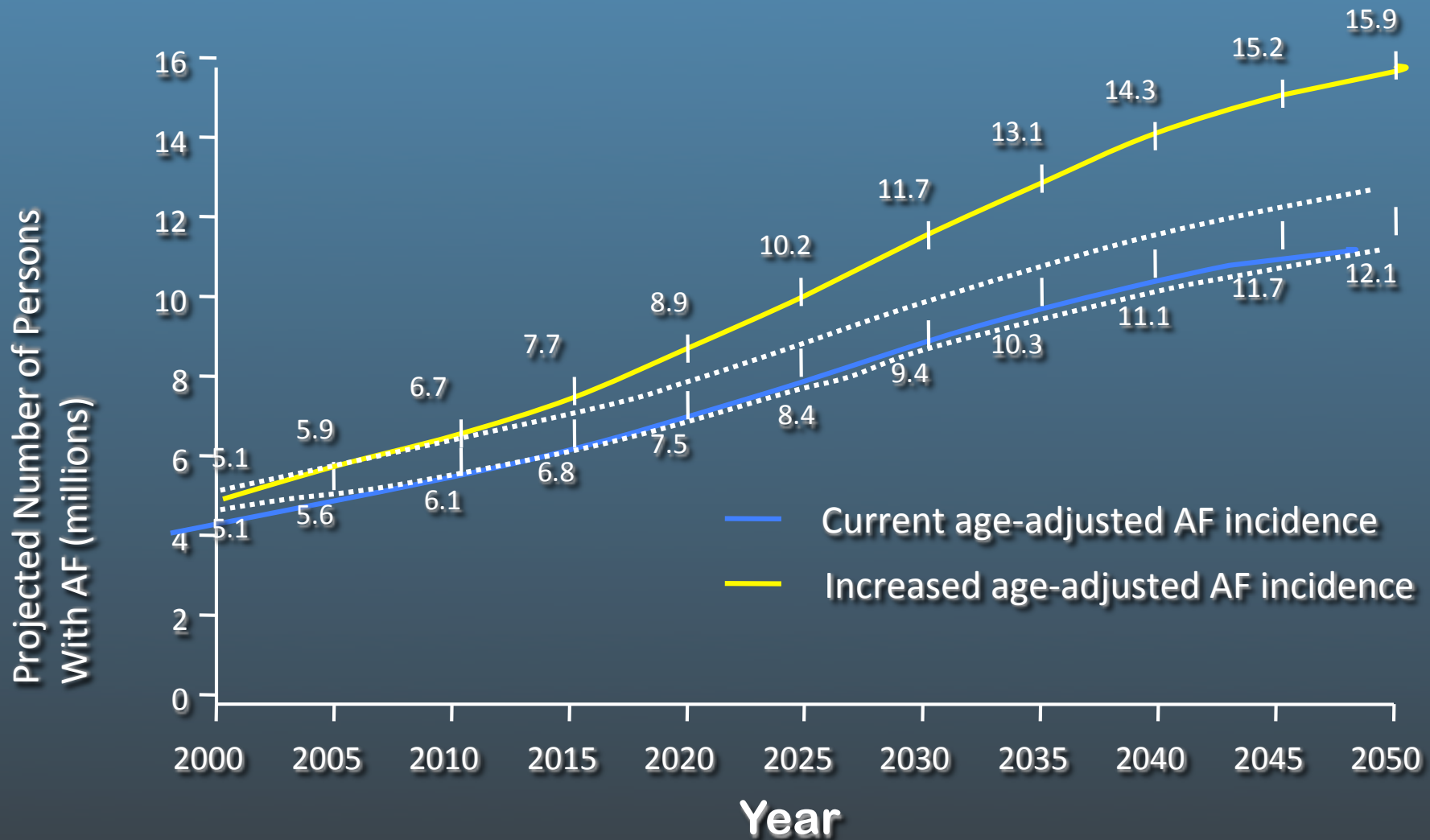
AF Prevalence by Age and Gender^{11.1}



Go AS, et al. JAMA.
2001;285:2370-2375.

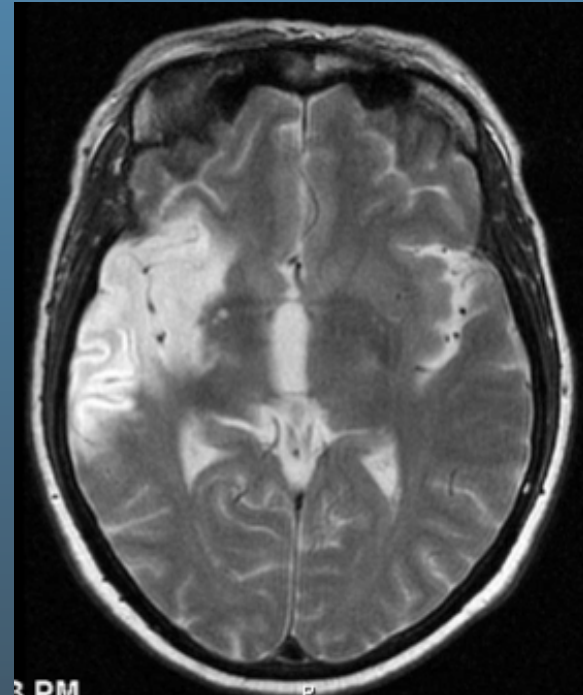
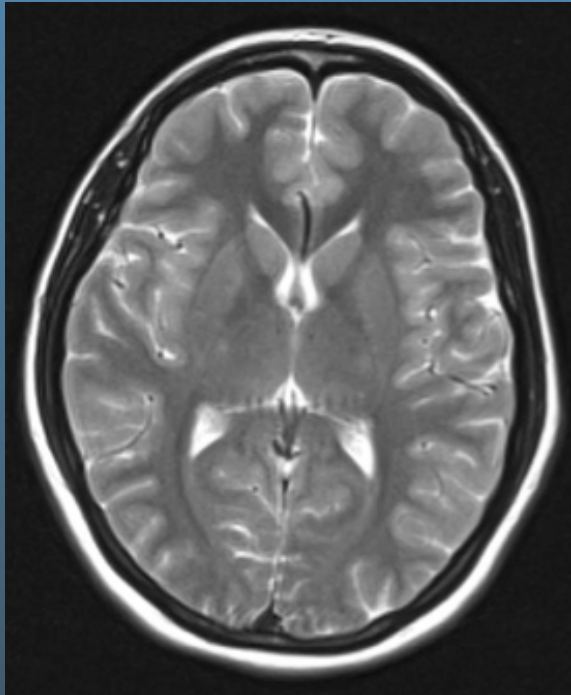
AF Prevalence Is Increasing Rapidly

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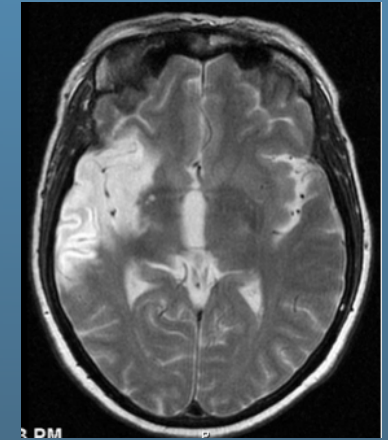
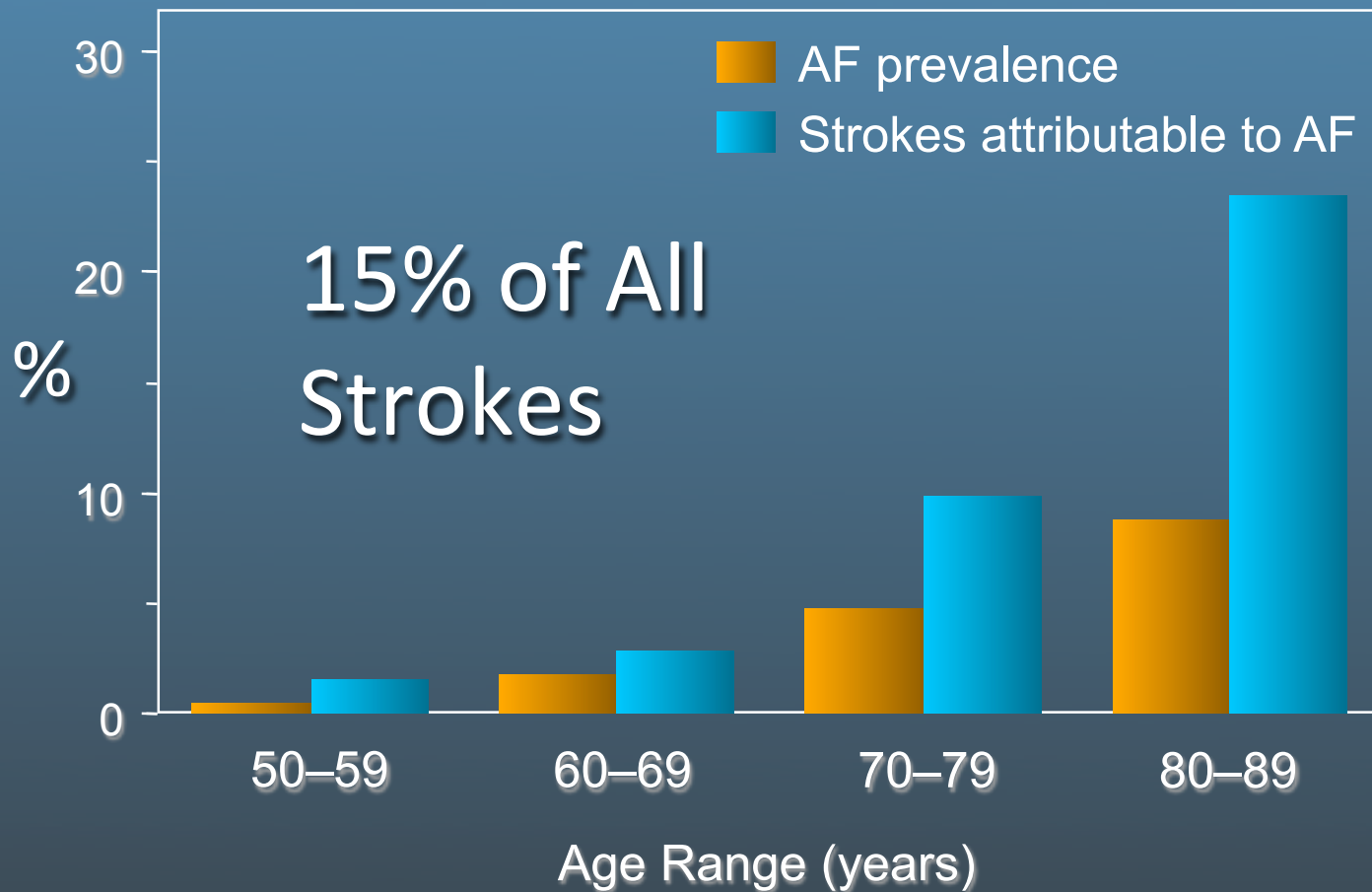
Afib and the Brain

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Afib and the Brain

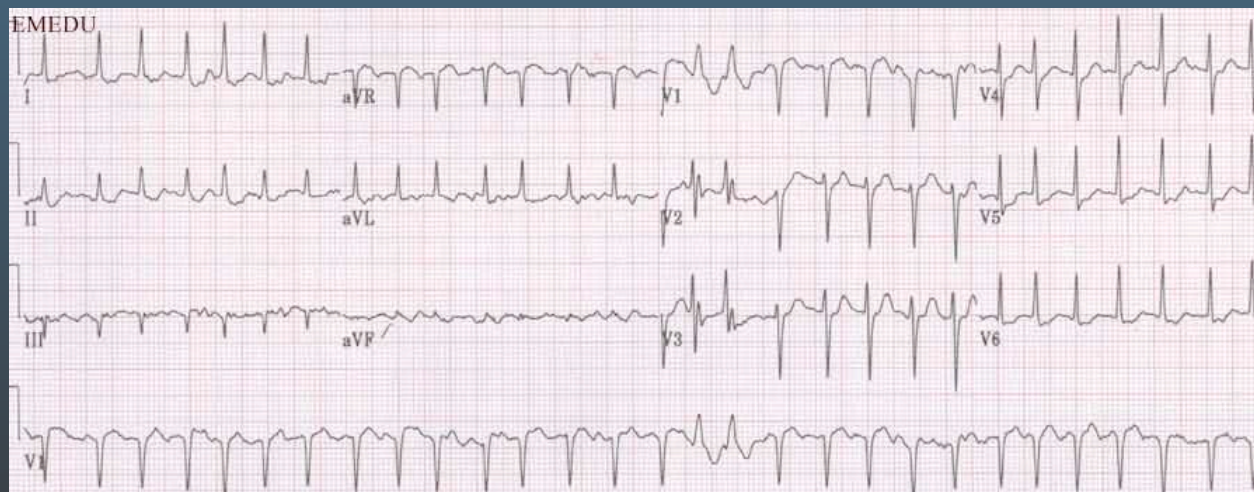
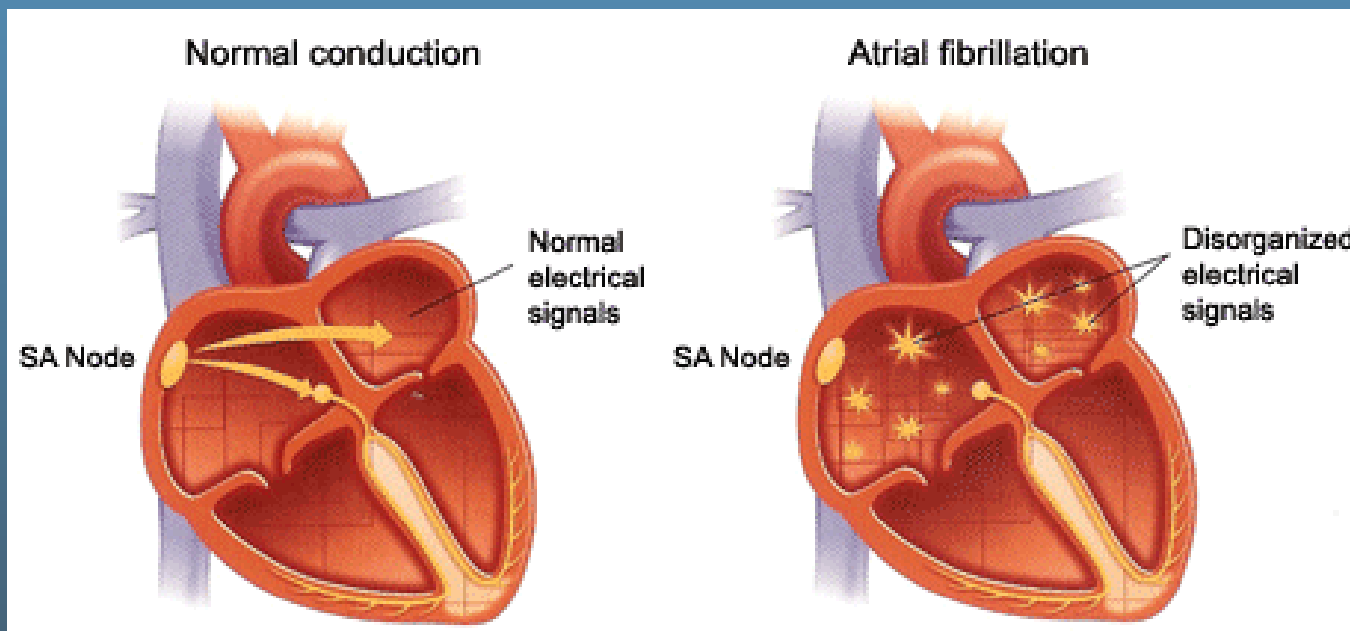
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Wolf et al. Stroke 1991;22:983-988.

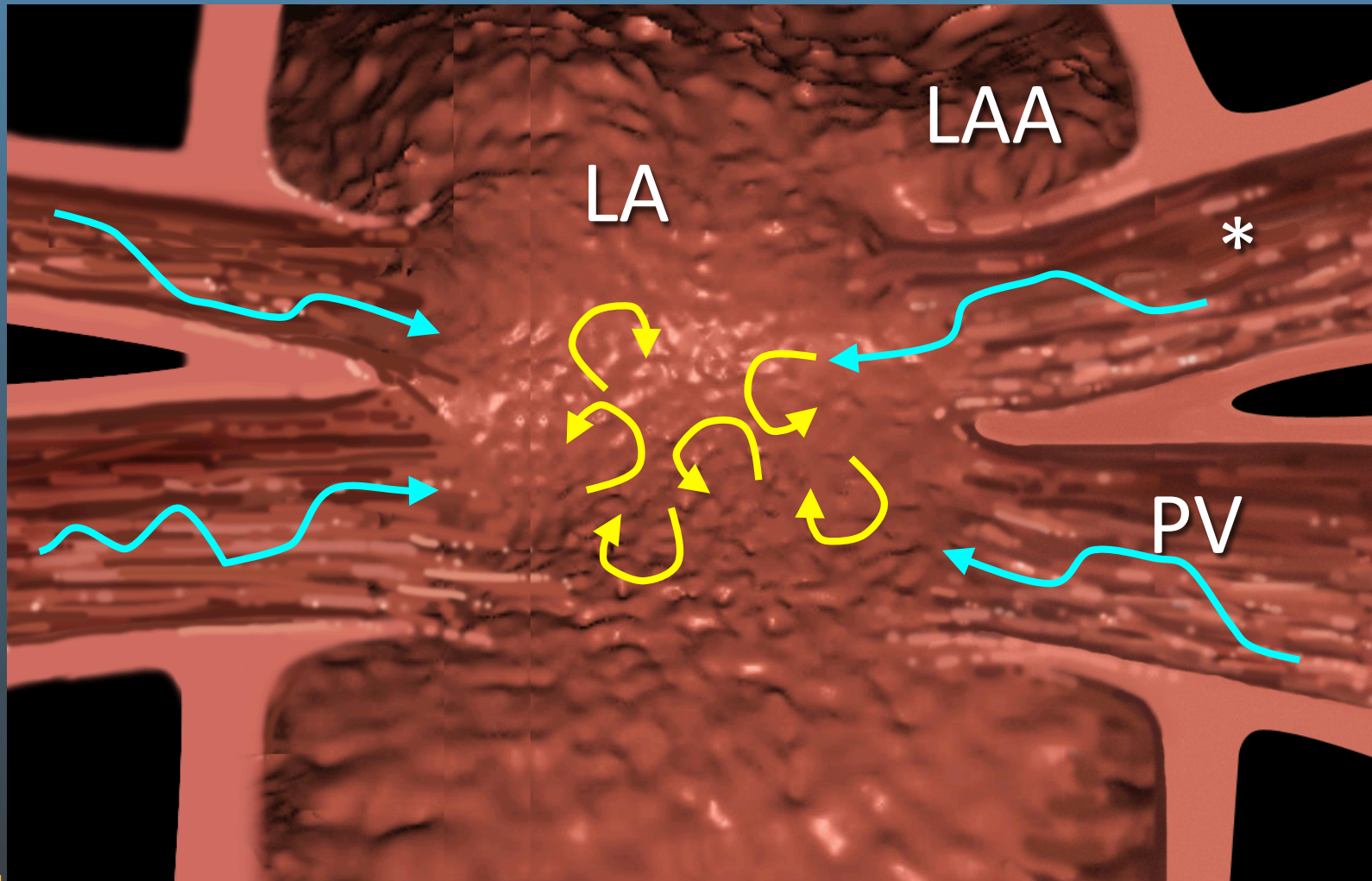
What is AF?

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AF = Substrate + Trigger

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Treating AF

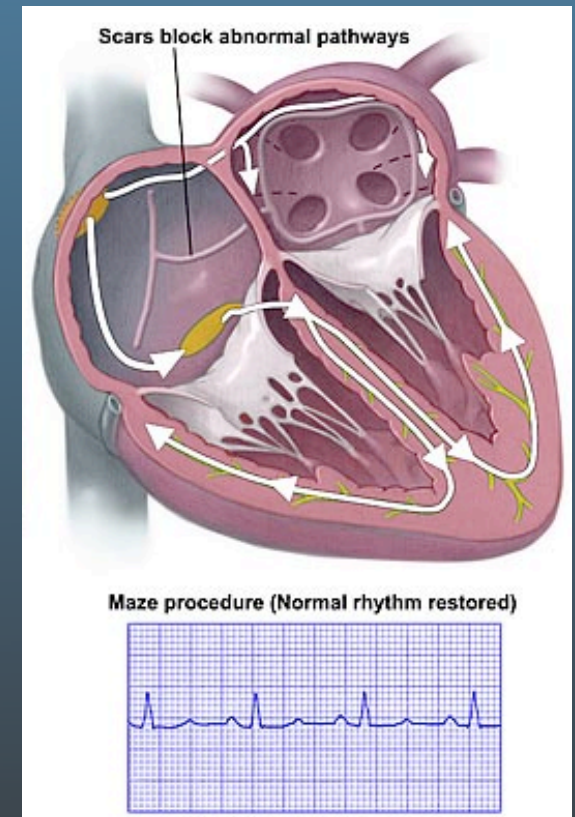
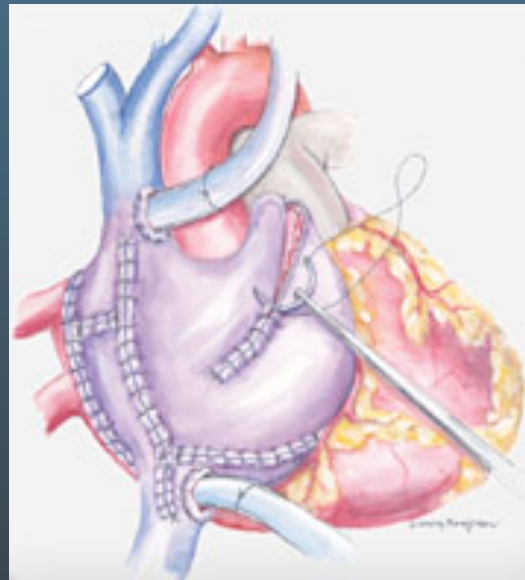
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Drugs + Defibrillation

- Antiarrhythmics
- Anticoagulants
- Side effects
- Life long burden

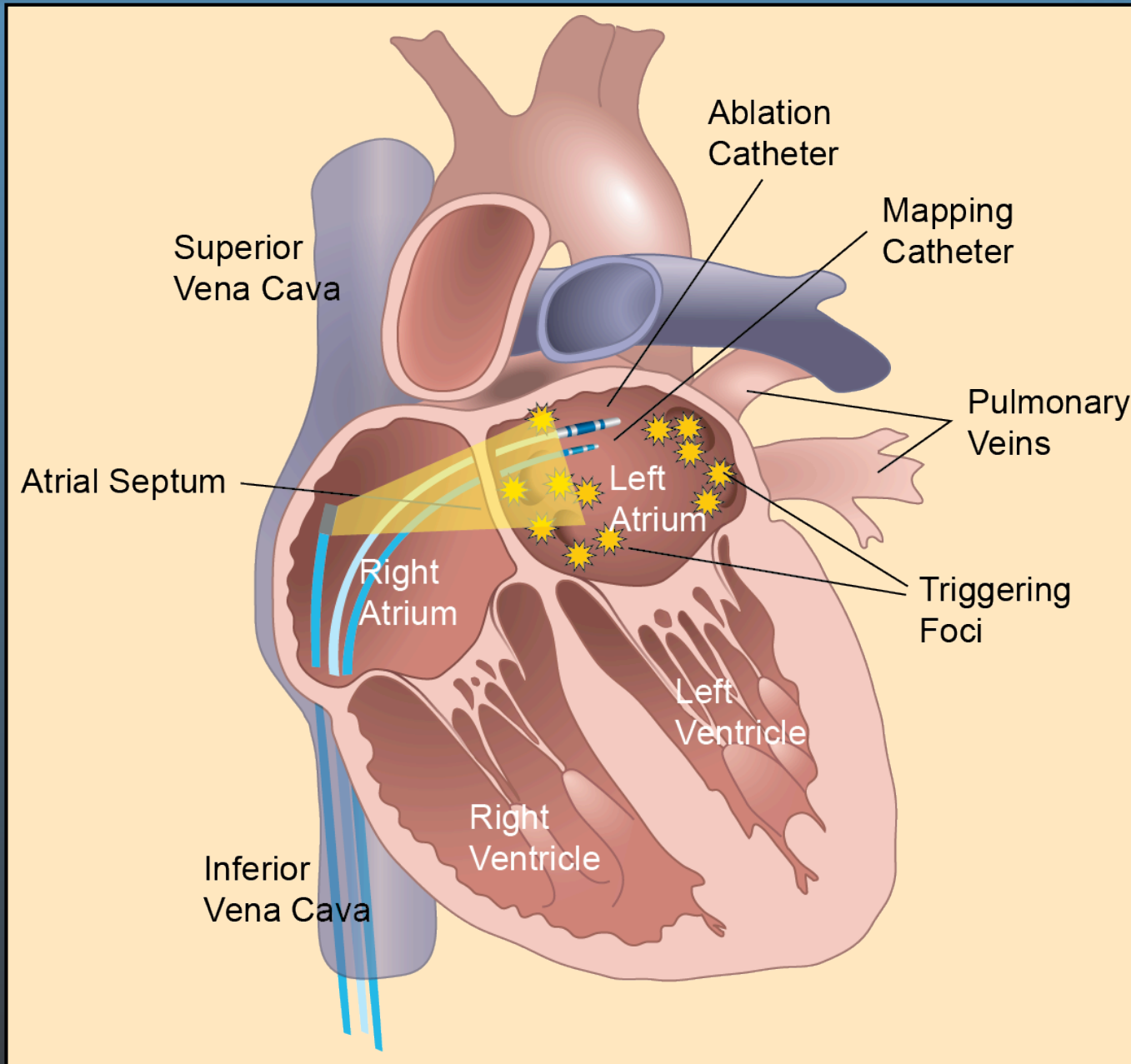
Intervention

- Maze procedure
- Ablation



Ablation of AFib

MIC AHM 2011



Imaging Modalities in AF

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Fluoro

Ultrasound

Anatomical

SIEMENS

Standard IFE

Mode Orient Layout Cfg

Record Import Fork

Device Align Contrast

2D View Ref Marker Clip

12: 2: 42.702
11: 57: 56.092
12: 2: 8.367

12:00:47.765 Resetting Frame of Reference UID.

Clear

What is Image Analysis in AF?

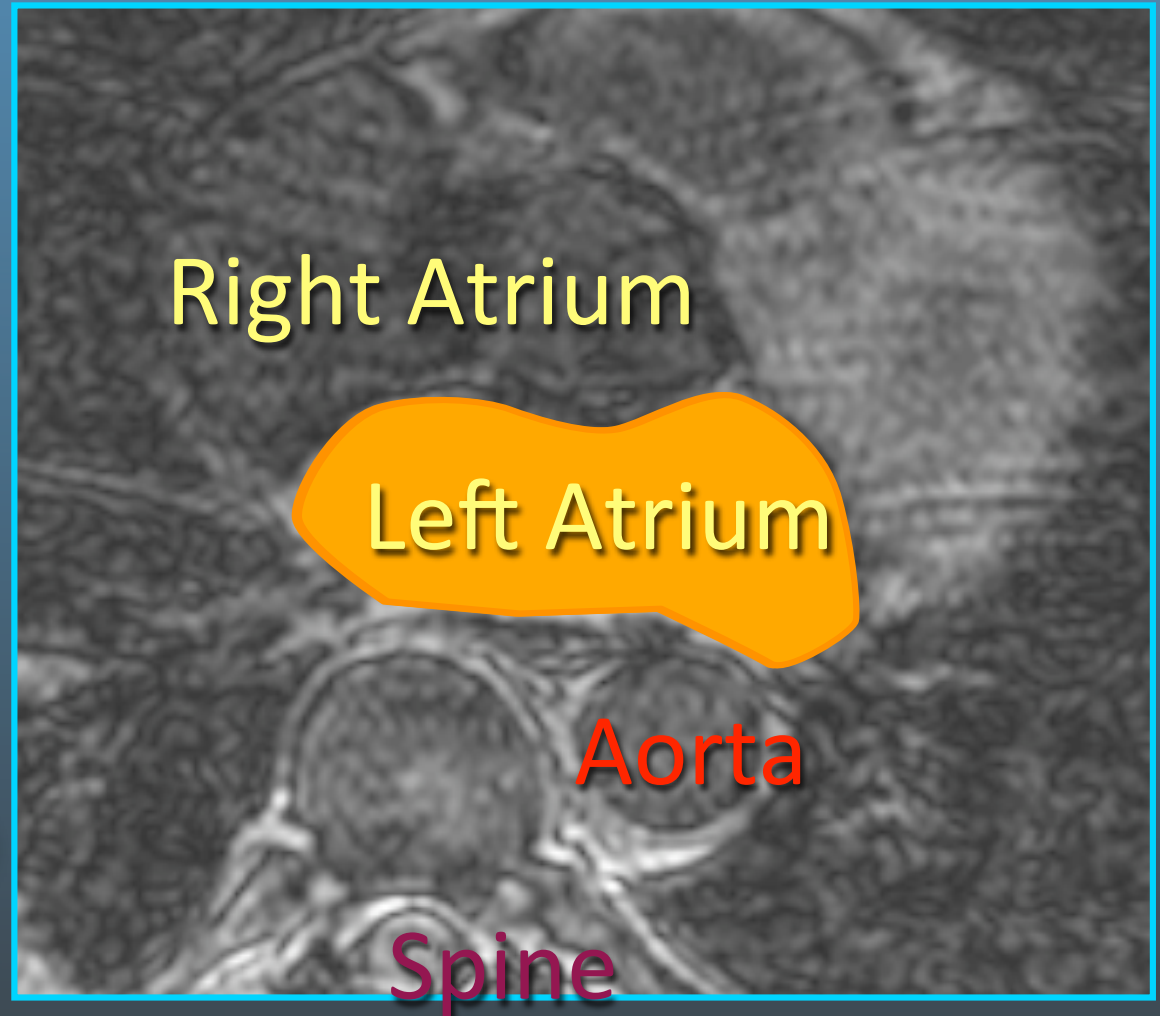
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Identifying
structures

Marking structures
(segmentation)

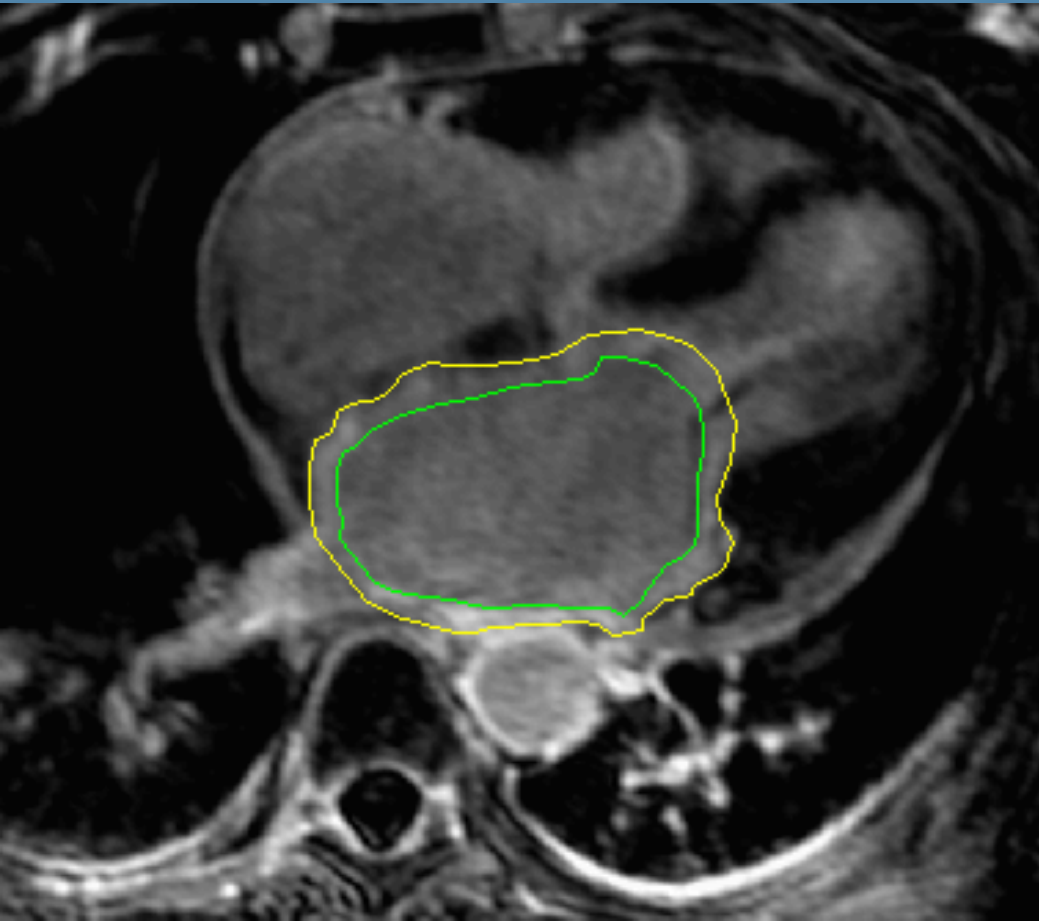
Measuring
structures

Quantifying
changes in structure
(and function)

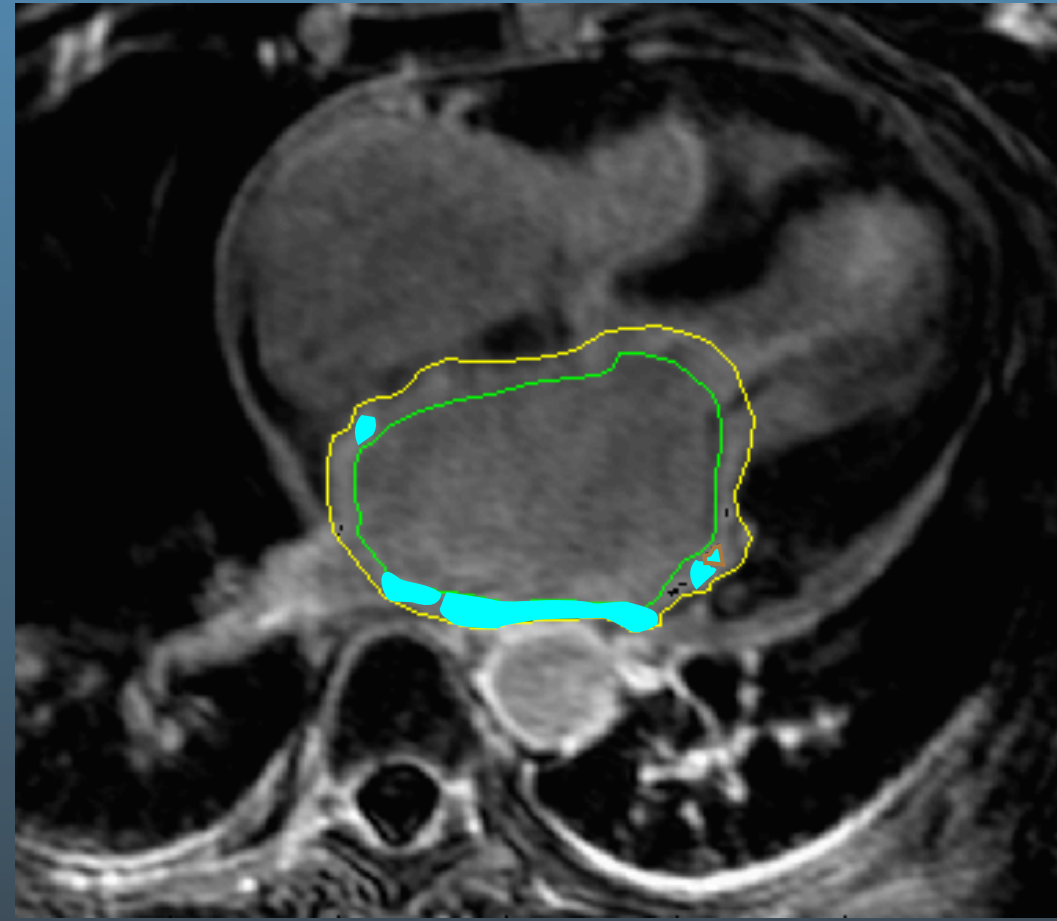


Quantifying Enhancement in Patients

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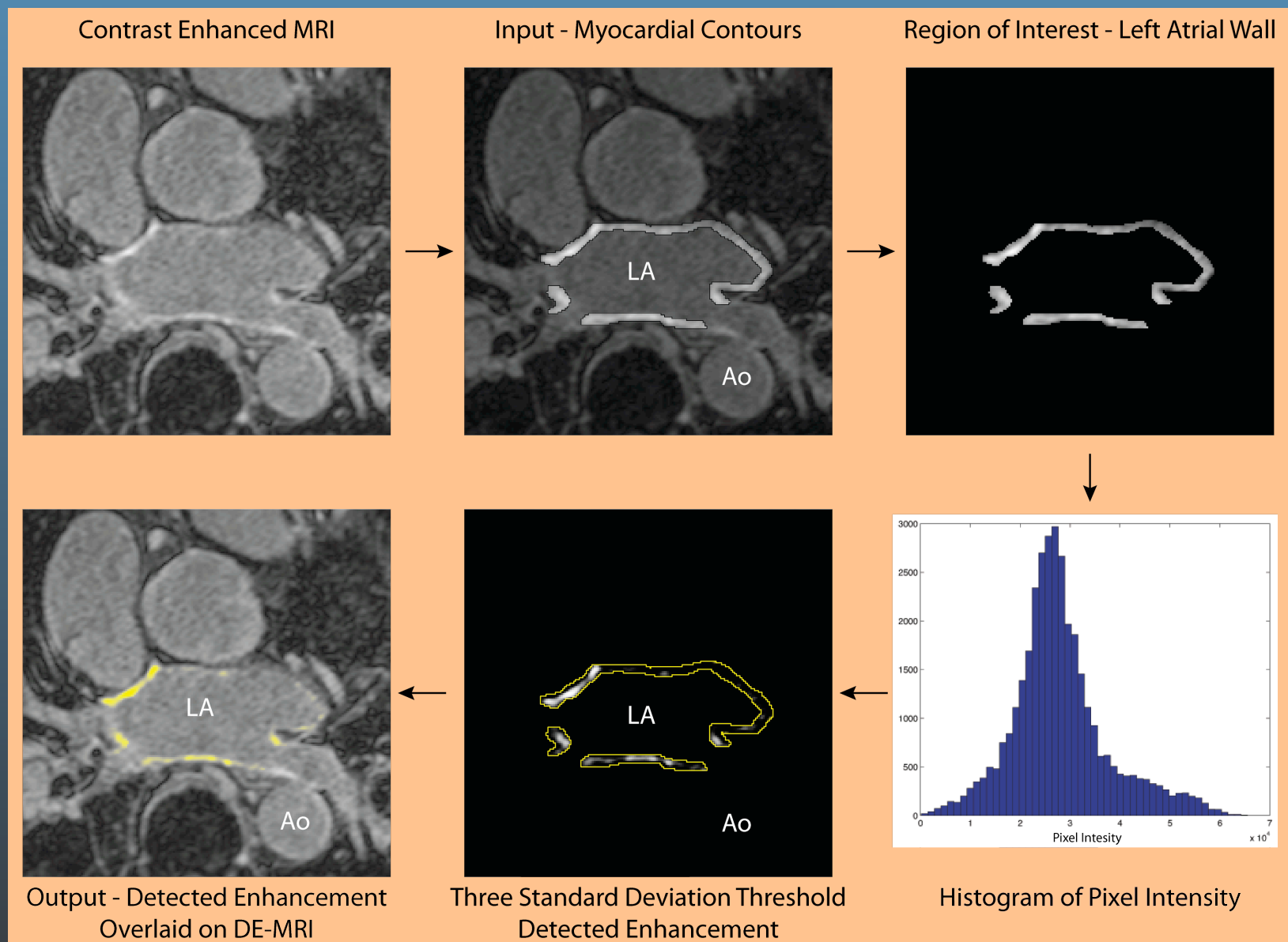
DE-MRI with Segmented Epicardial and Endocardial Borders



Enhancement Detection

Pre-Ablation Imaging

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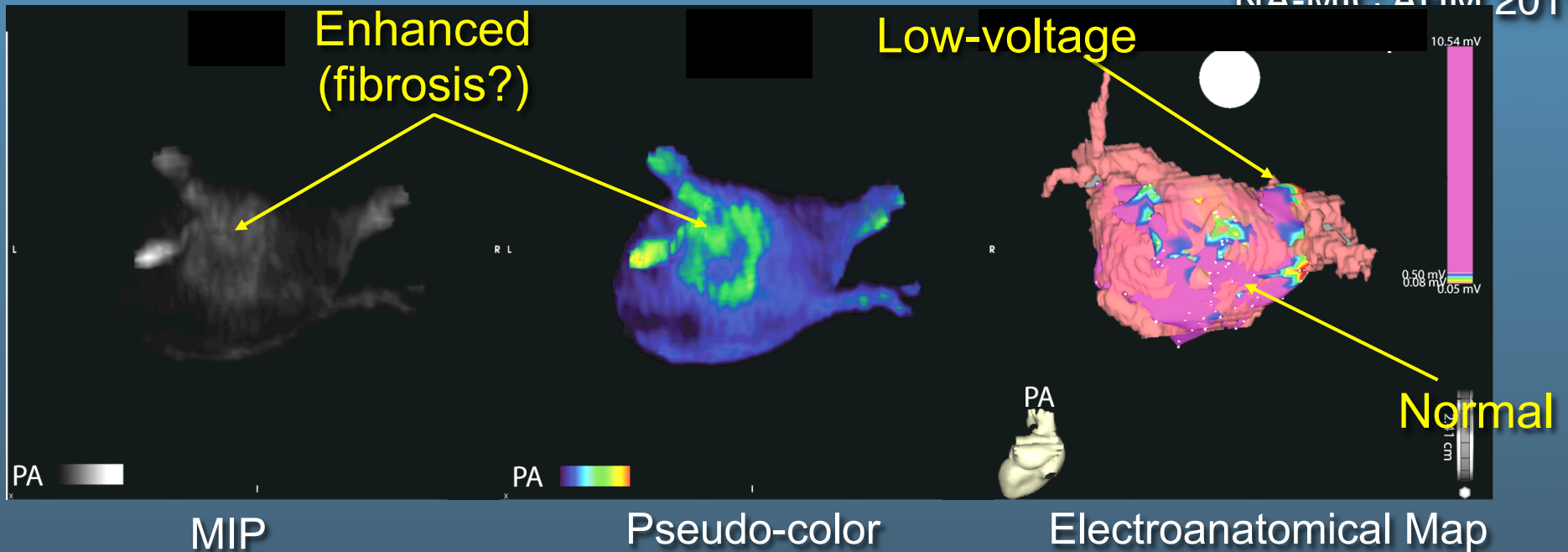


Diagnostic Analysis

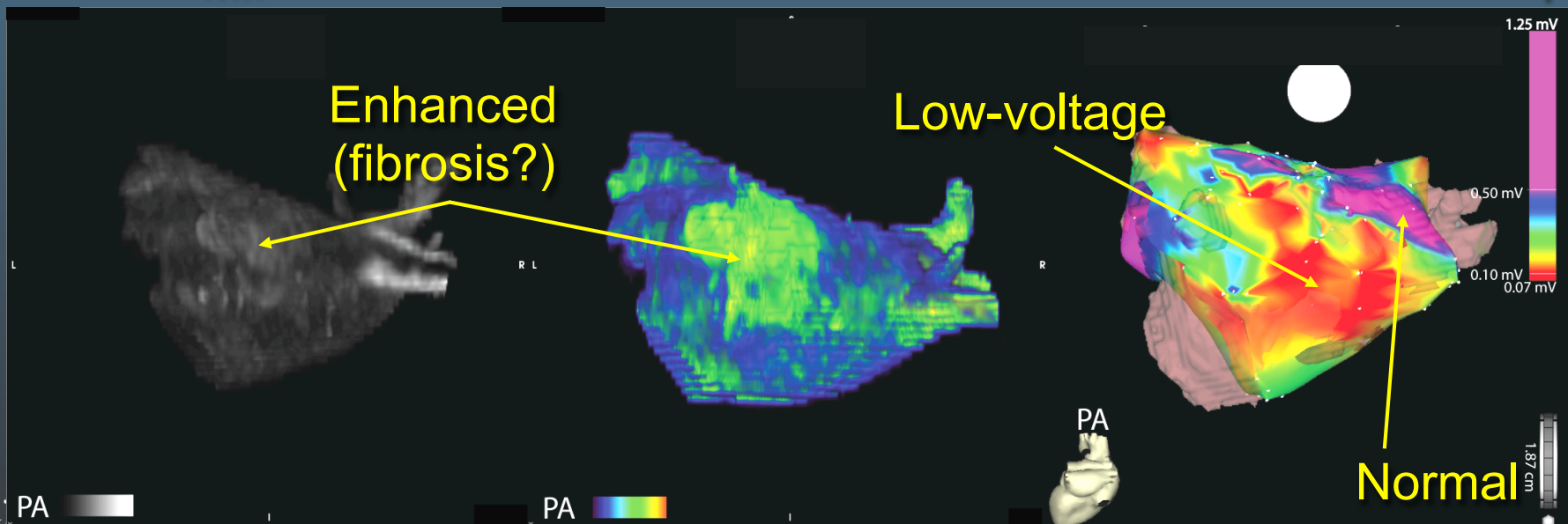
Successful vs. Unsuccessful Ablation

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Success



Failure



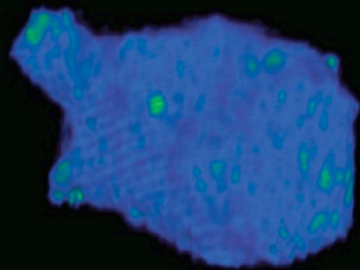
Utah AFib Staging

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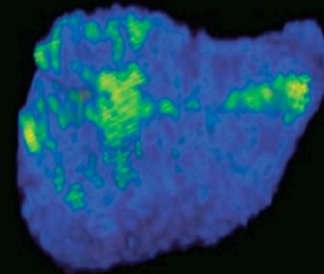
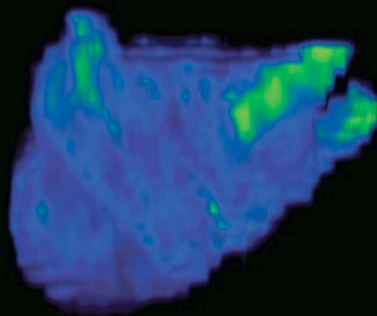
The University of Utah

Comprehensive Arrhythmia
Research & Management Center



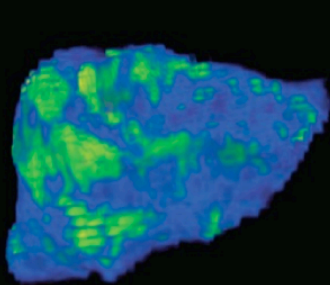
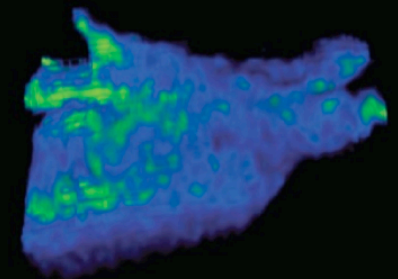
Utah I

——— 0-5% Enhancement ———



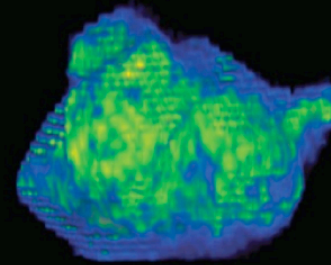
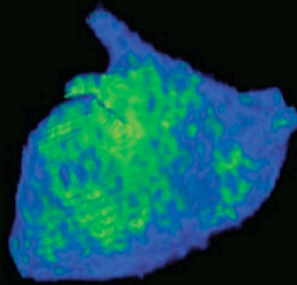
Utah II

——— >5-20% Enhancement ———



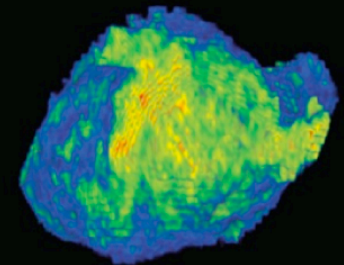
Utah III

——— >20-35% Enhancement ———



Utah IV

——— >35% Enhancement ———



Post Ablation Analysis

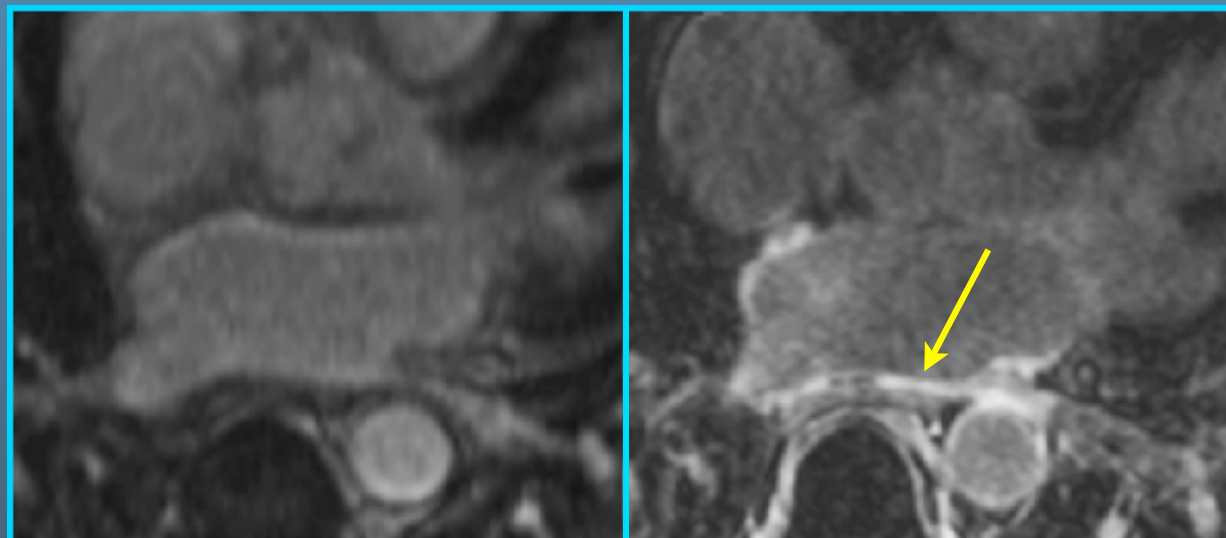
Scar Mapping

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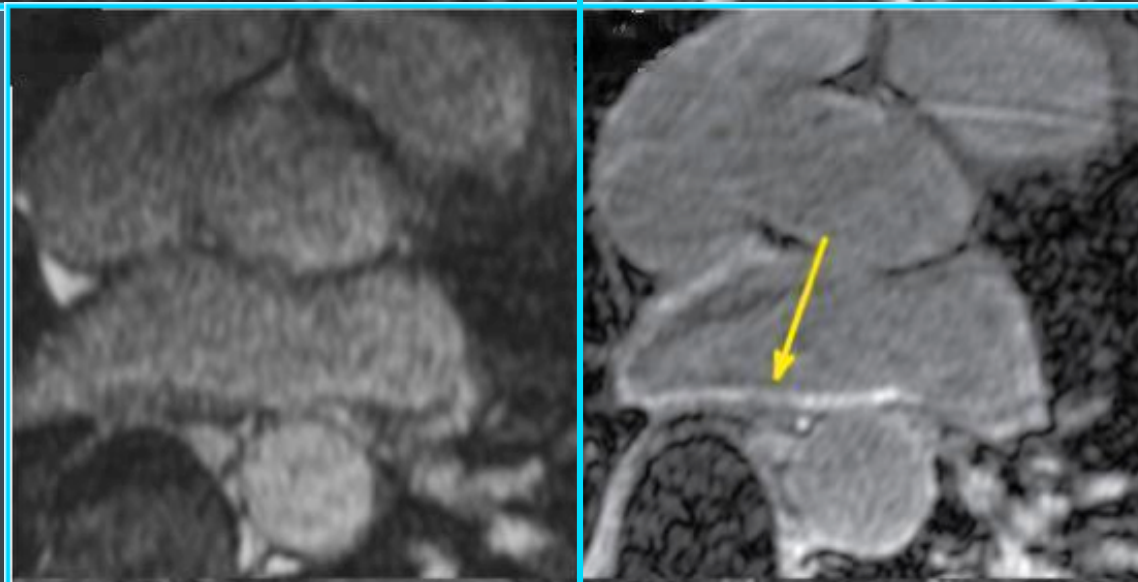
Pre

Post

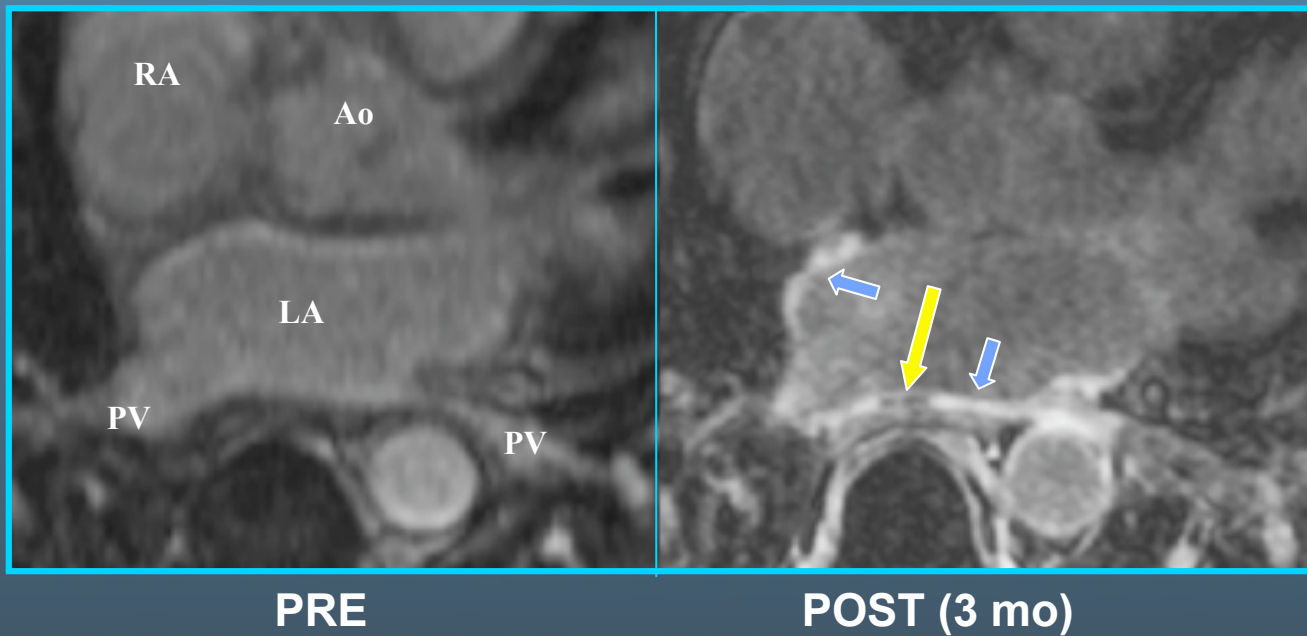
Patient
#1



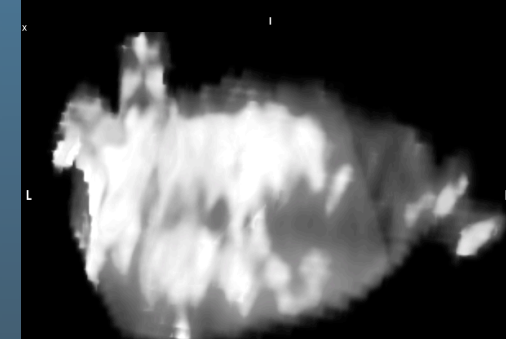
Patient
#2



Quantifying Scar



Pre-procedural MRI Scan



Follow-Up: <24 h



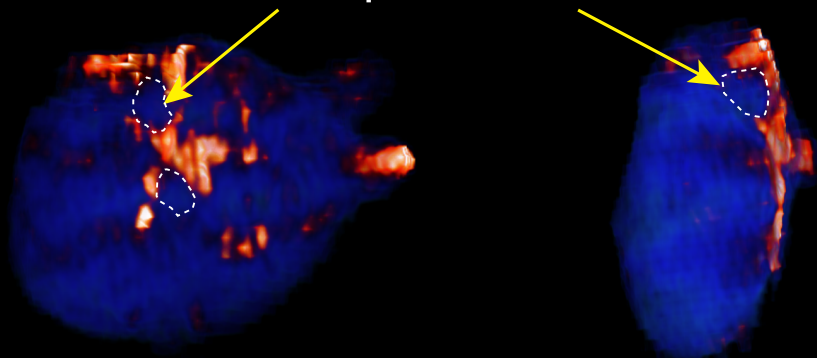
Follow-Up: 3 Months

Post Treatment Evaluation

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Patient 1

Incomplete Isolation

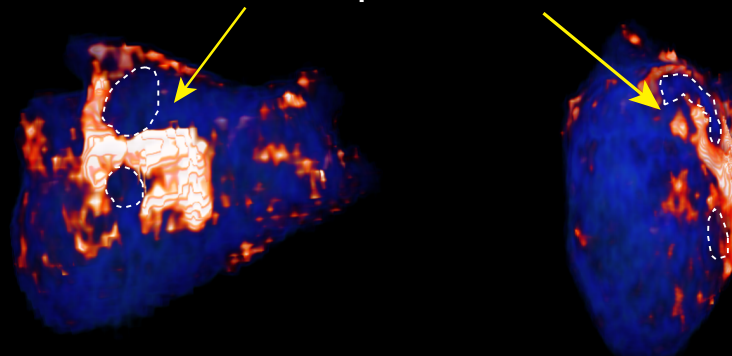


First PVAI - Posterior

Left

Patient 2

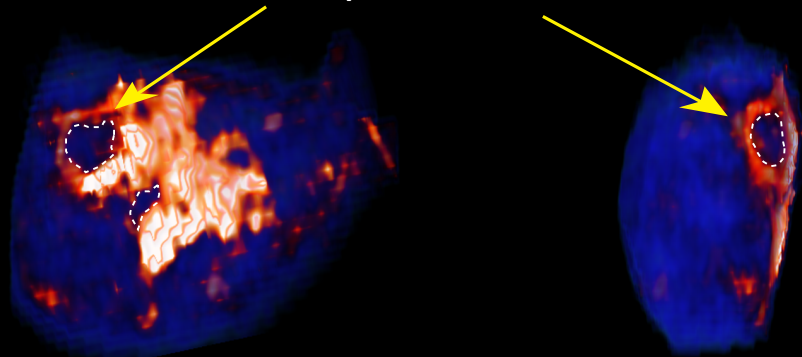
Incomplete Isolation



First PVAI - Posterior

Left

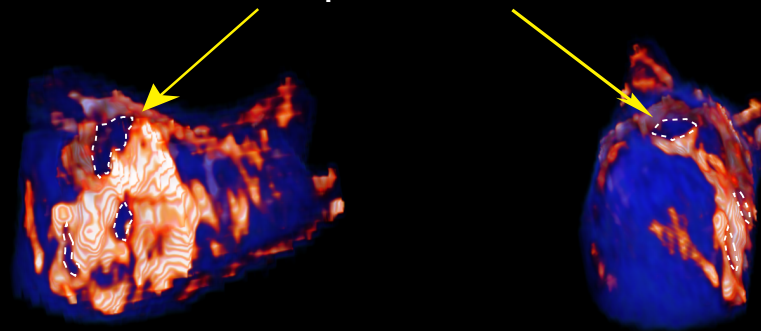
Complete Isolation



Second PVAI - Posterior

Left

Complete Isolation



Second PVAI - Posterior

Left

The NA-MIC Goals

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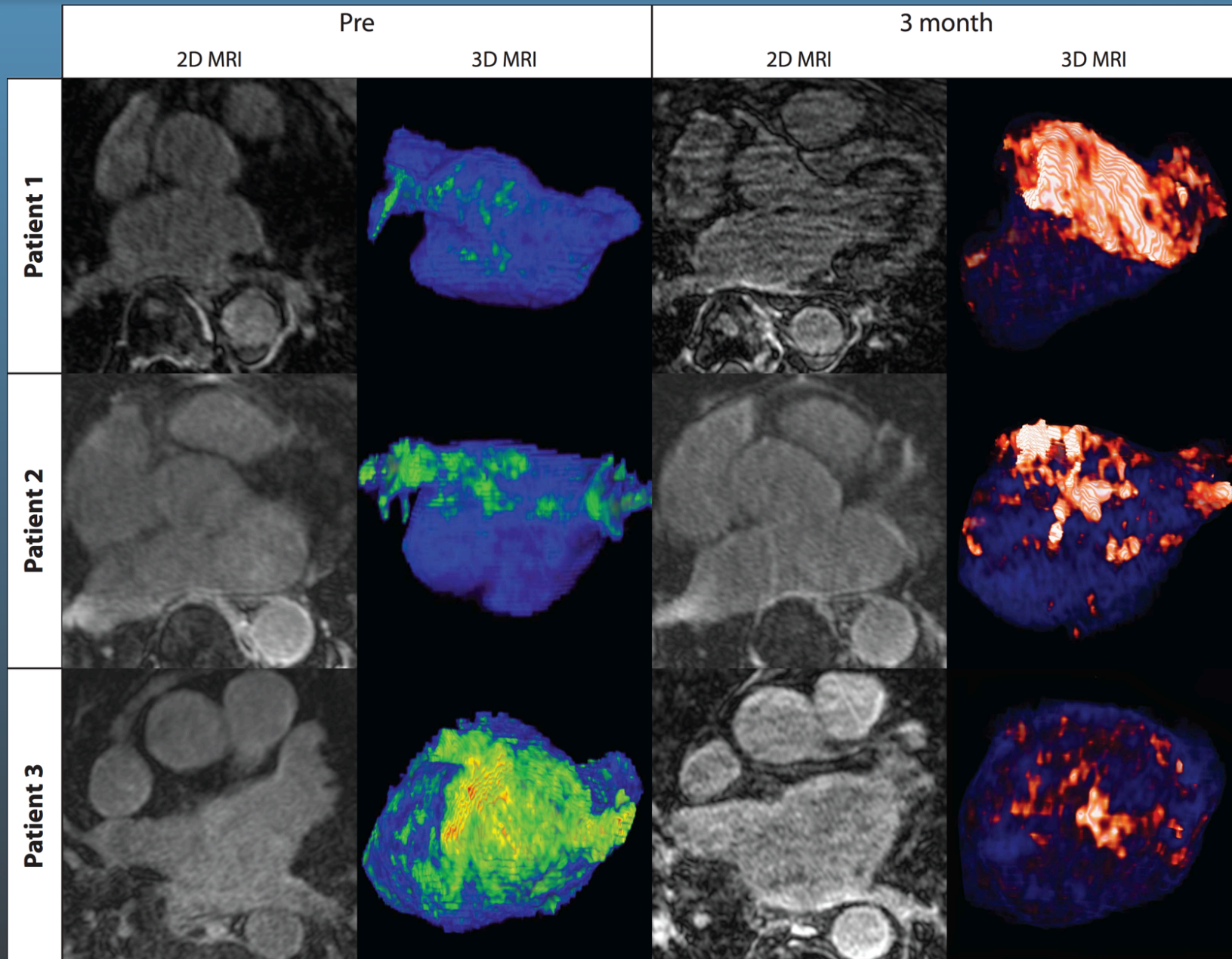
Aim 1. Develop and validate image-based longitudinal diagnostic indices for AF.

Aim 2. Develop automatic segmentation methods for the atrium and adjacent structures.

Aim 3. Develop an AF scoring scheme

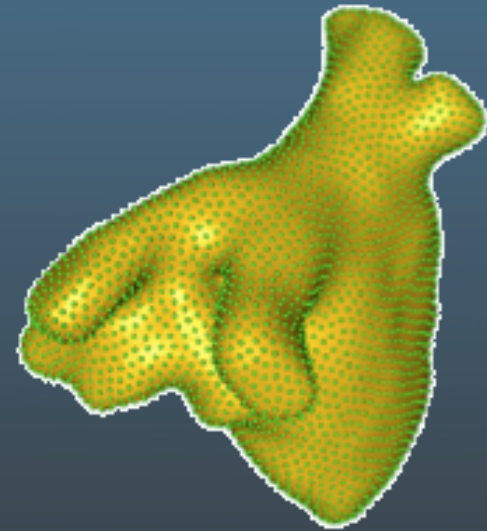
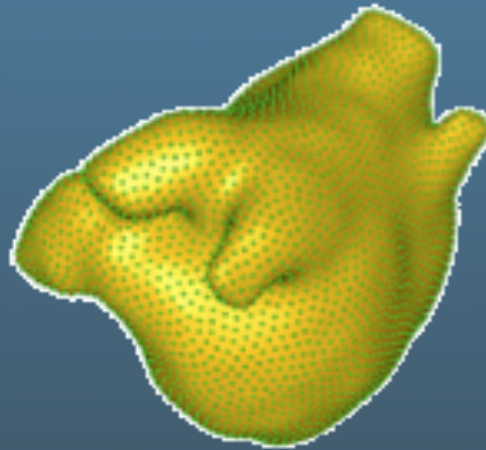
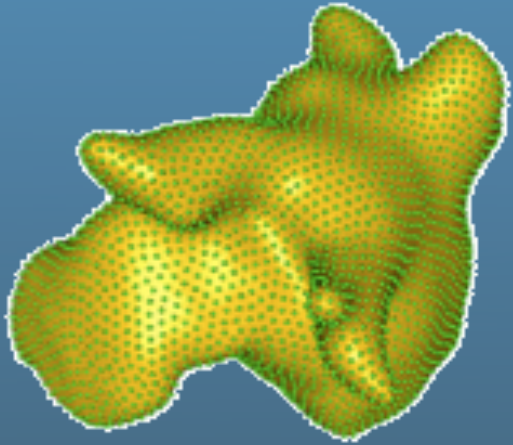
The Data

AHM 2011



The Shapes

NA-MIC AHM 2011



NA-MIC Timetable

NA-MIC AHM 2011

	Year 1	Year 2	Year 3
Aim 1	Evaluate existing algorithms	Integrate linear and nonlinear registration into prototype workflow	Optimize tools, tests, and validation, documentation
Aim 2	Evaluate existing and implement new tools for atrial wall segmentation and for tissue characterization	Joint segmentation of pre- and post-treatment data; efficient implementations through software and hardware acceleration	Refine segmentation tools, tests and validation, integrate post-treatment image segmentation into clinical workflow, documentation
Aim 3	Design of segmentation and registration workflow and application-specific GUI	Prototype workflow system for integrated registration and segmentation, pre-/post-analysis and visualization. Tests on existing database.	Tests on image data shared with other labs, establish database also with nonimage information for prototypical scoring system, training, and dissemination.

More Information

NA-MIC AHM 2011

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ATRIAL FIBRILLATION

PI: Rob MacLeod, University of Utah

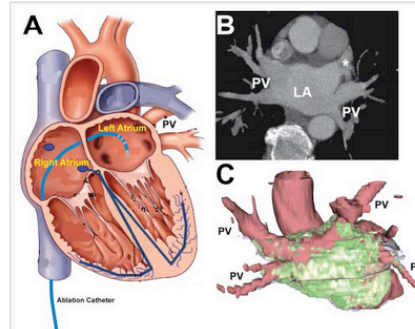


Figure 1: A The platinum-tipped catheter connected to the radiofrequency (RF) energy generator is advanced into the left atrium (LA) to the wall of the chamber, where bursts of RF energy ablate small regions of tissue. B CT of LA and pulmonary veins (PV). C Slicer-created image showing posterior view of segmentation of the LA, aorta, and PV (red) and superimposed segmentation of regions of late gadolinium enhancement (LGE)(green) from post-ablation MRI.

Approximately 0.5% of patients have AF in the 50 to 59 year age group, and up to 9% have AF in the 80 to 89 year age group. Moreover, the prevalence is increasing [1]. AF is associated with increased morbidity (i.e., stroke) and mortality. AF also poses a significant burden on healthcare and is associated with an annual estimated cost of 7 billion US dollars [2]. Yet, despite its high incidence and financial impact, AF management remains unsatisfactory. Traditional treatments to restore and maintain normal heart rate, namely, electrical cardioversion followed by initiation and lifelong maintenance with antiarrhythmic drugs [3], fail in most patients [4-6]. Catheter ablation is a rapidly emerging alternative. This curative approach seeks to suppress the sources of electrical dysynchrony by converting the cells responsible for the arrhythmia to inactive scar tissue. Radiofrequency (RF) energy is applied through a specialized catheter introduced via the venous system into the left atrium (LA) of the heart (Figure 1). This approach offers a true cure, obviating the need for lifelong medication.

www.carmacenter.org

www.na-mic.org/pages/DBP:Atrial_Fibrillation

Enjoy Utah!!

