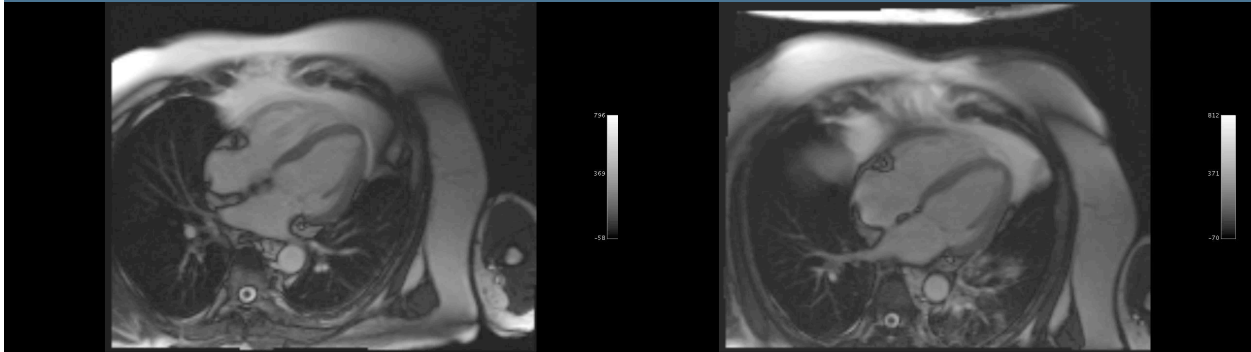


Afib and Cardiac Function

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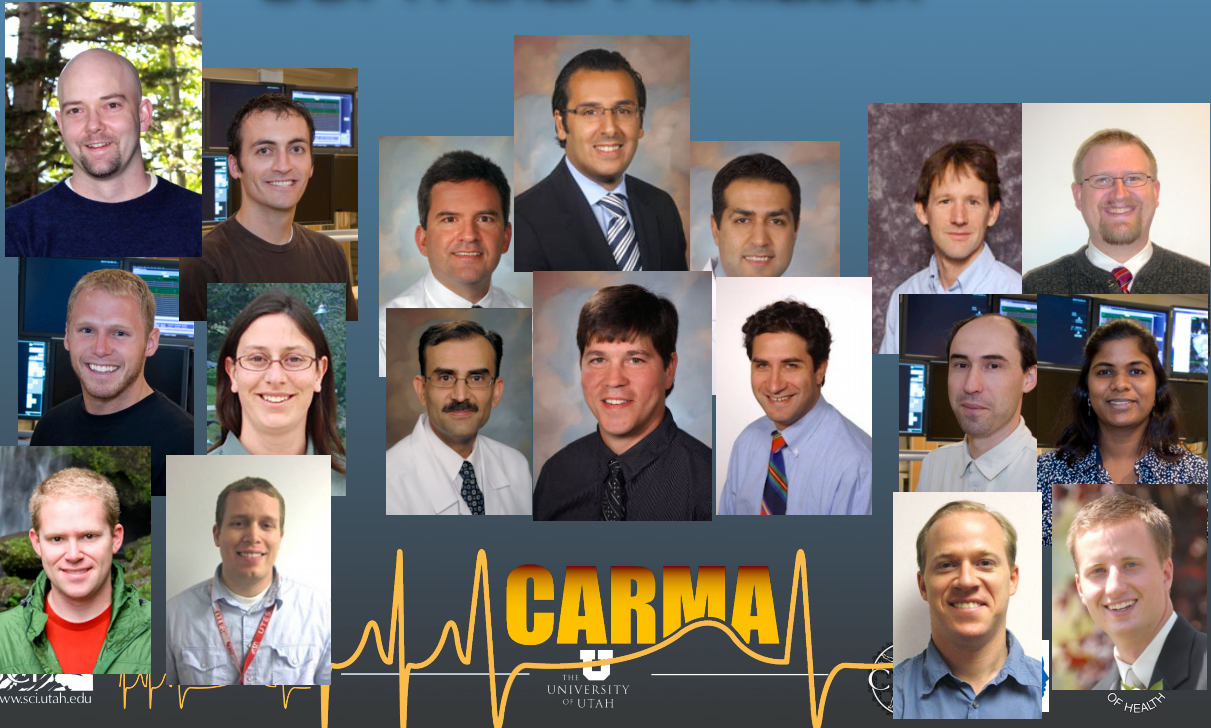
Normal Contraction

Atrial Fibrillation



DBP: Atrial Fibrillation

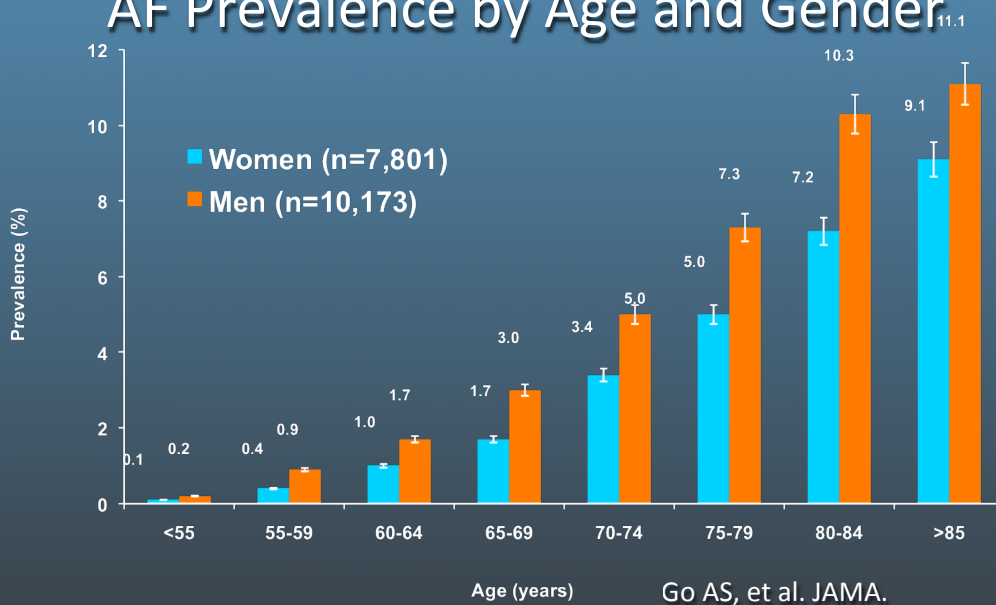
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Everyone Should Worry about Afib

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AF Prevalence by Age and Gender

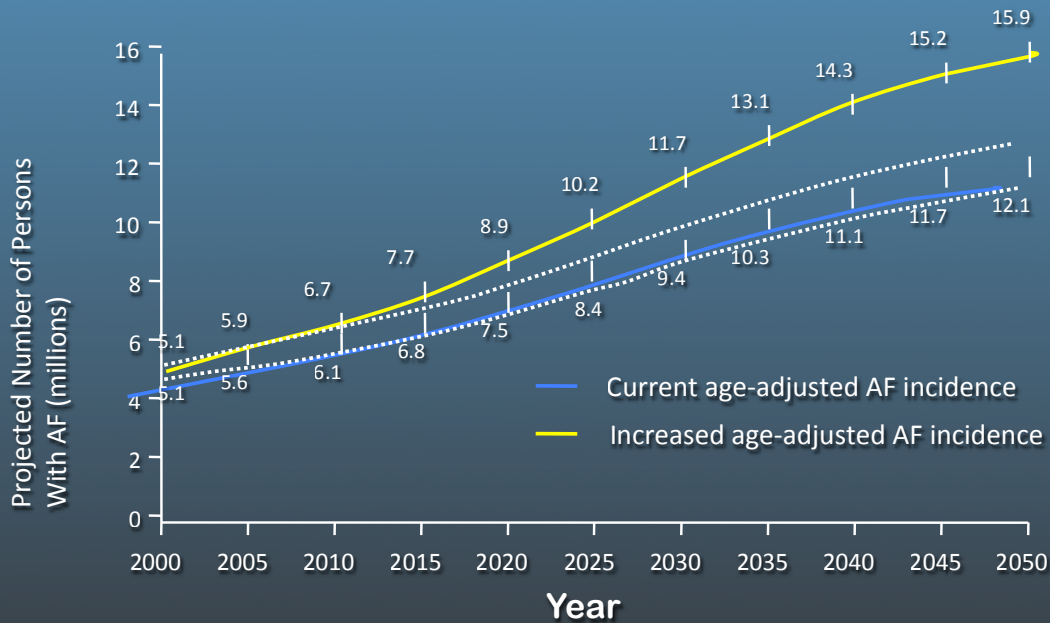


Go AS, et al. JAMA. 2001;285:2370-2375.



AF Prevalence Is Increasing Rapidly

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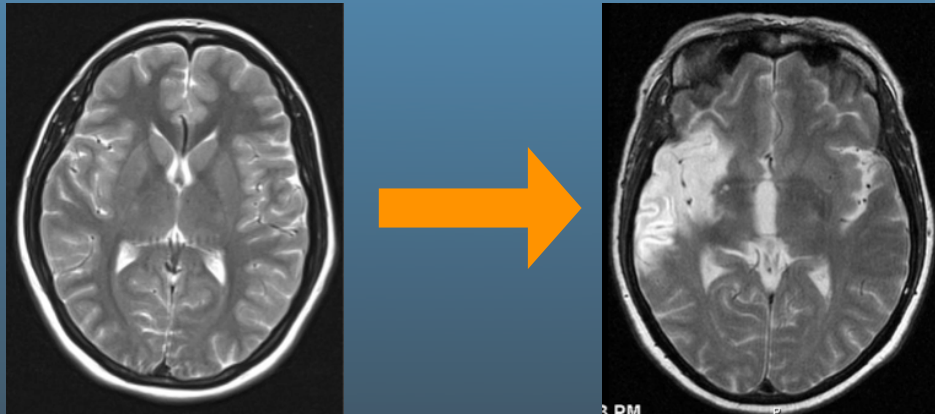


Miyasaka et al. Circulation. 2006;114:119-125



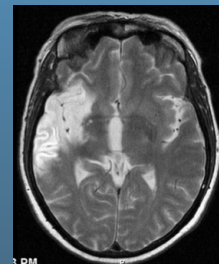
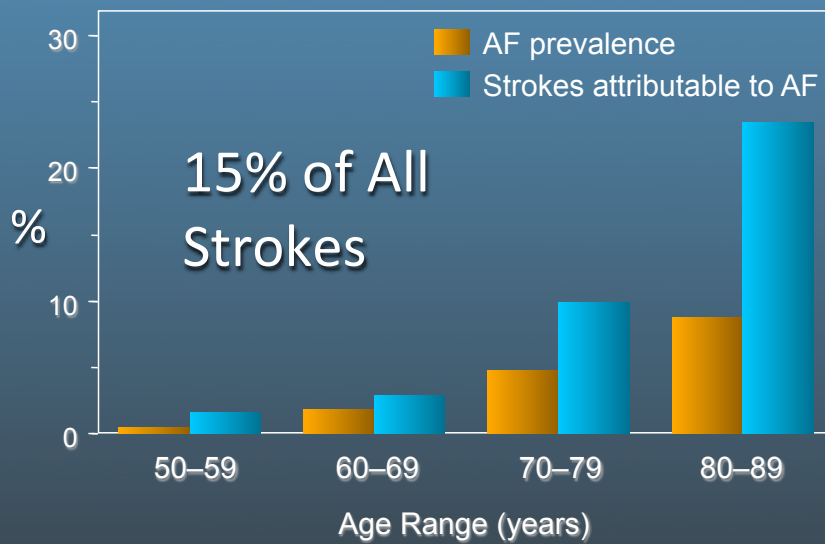
Afib and the Brain

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Afib and the Brain

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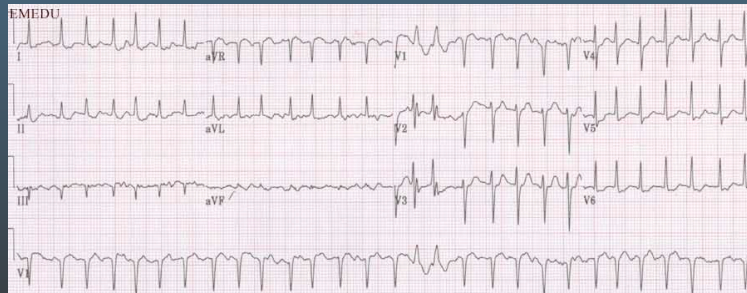
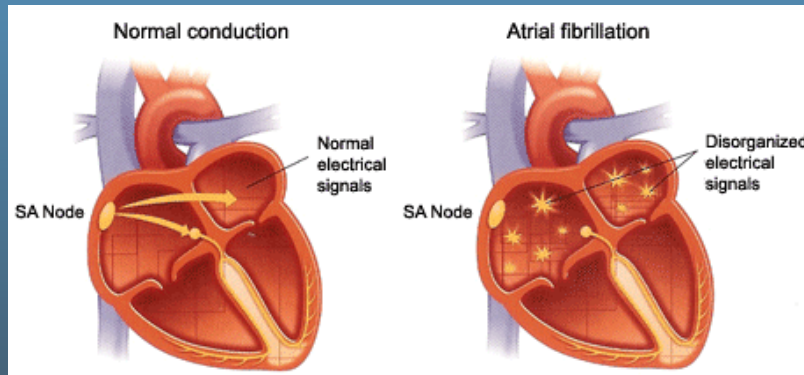


Wolf et al. Stroke 1991;22:983-988.



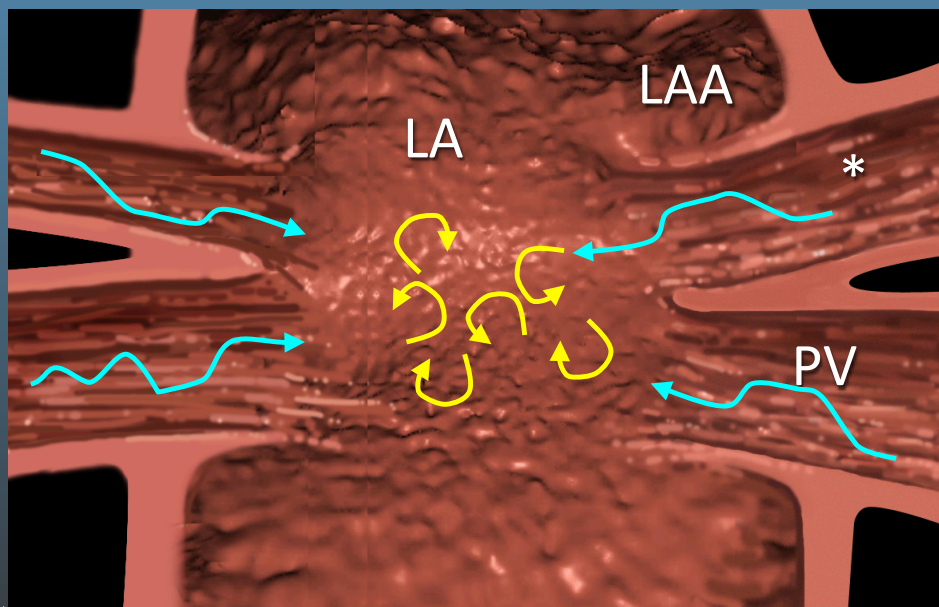
What is AF?

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AF = Substrate + Trigger

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Treating AF

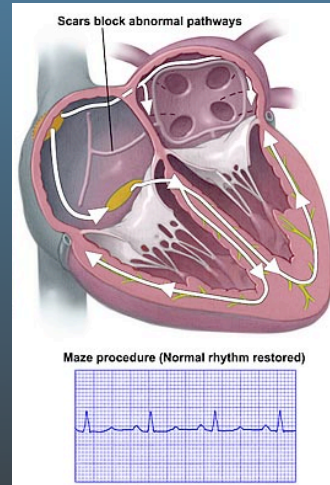
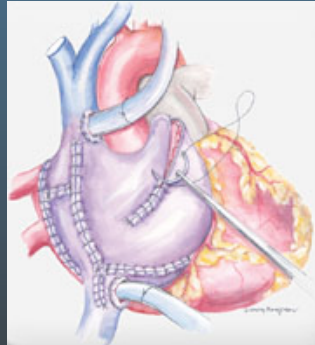
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Drugs + Defibrillation

- Antiarrhythmics
- Anticoagulants
- Side effects
- Life long burden

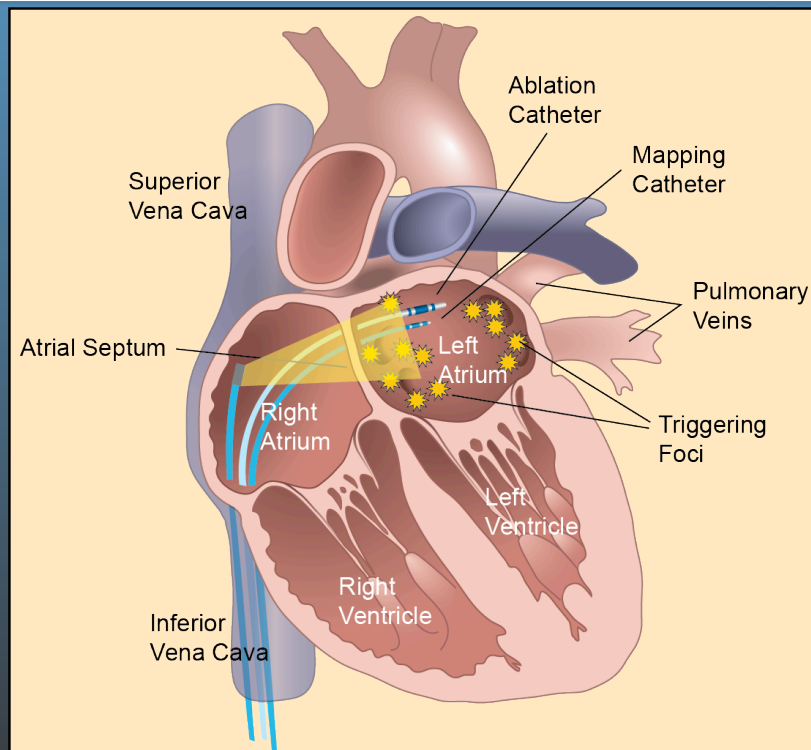
Intervention

- Maze procedure
- Ablation



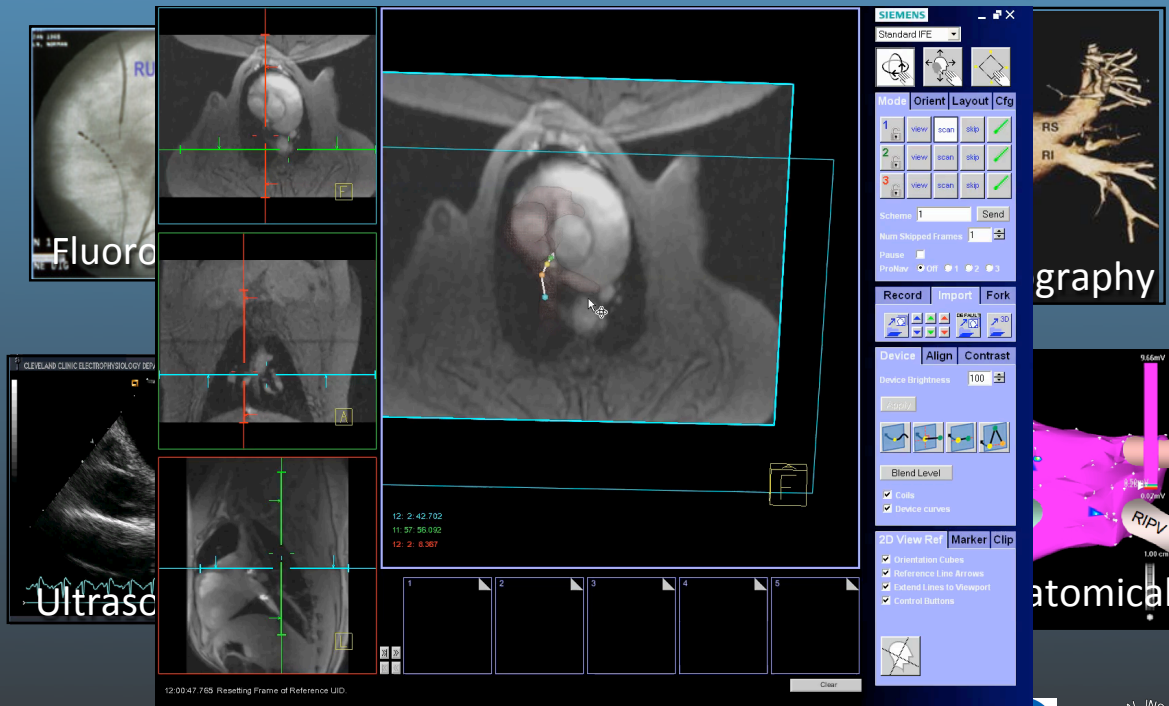
Ablation of AFib

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Imaging Modalities in AF

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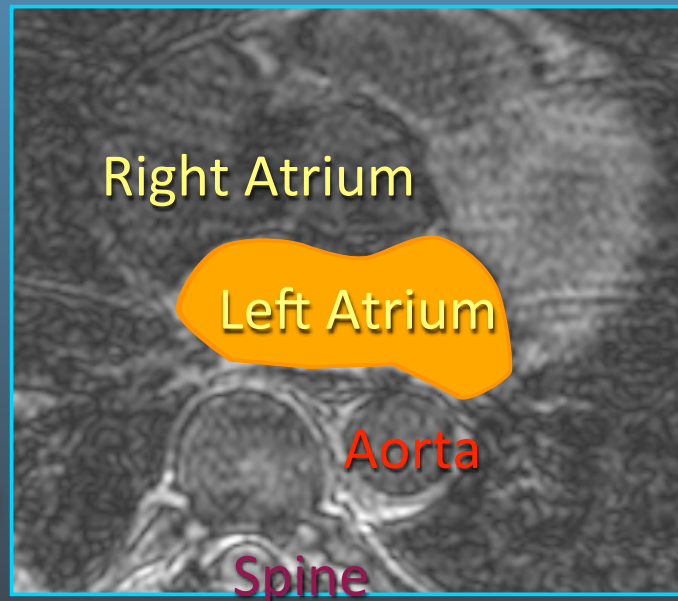
Real Time MRI



What is Image Analysis in AF?

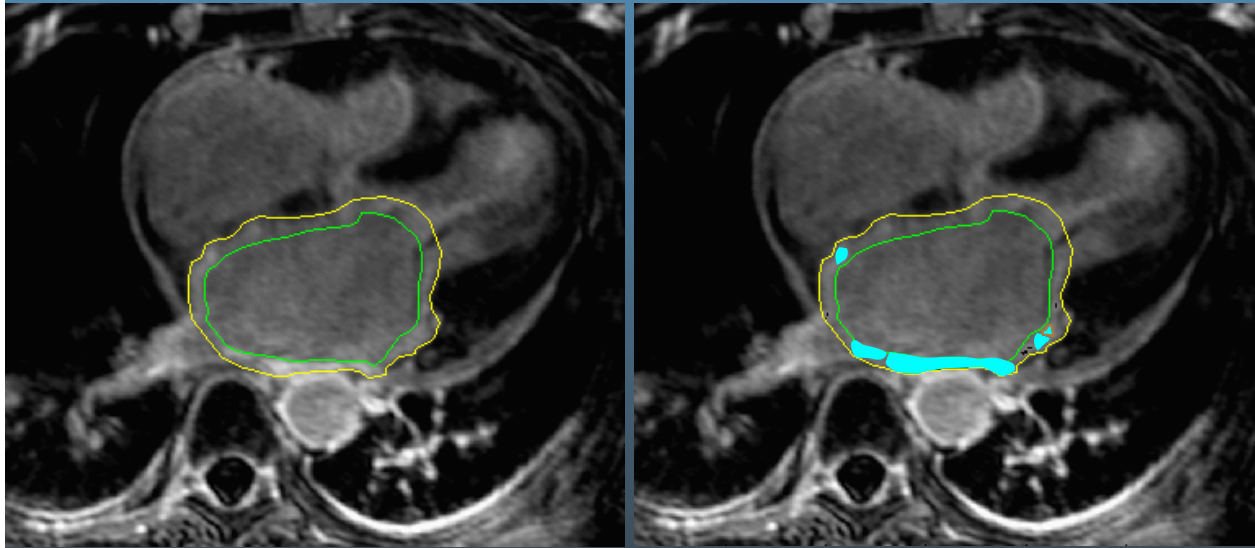
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- Identifying structures
- Marking structures (segmentation)
- Measuring structures
- Quantifying changes in structure (and function)



Quantifying Enhancement in Patients

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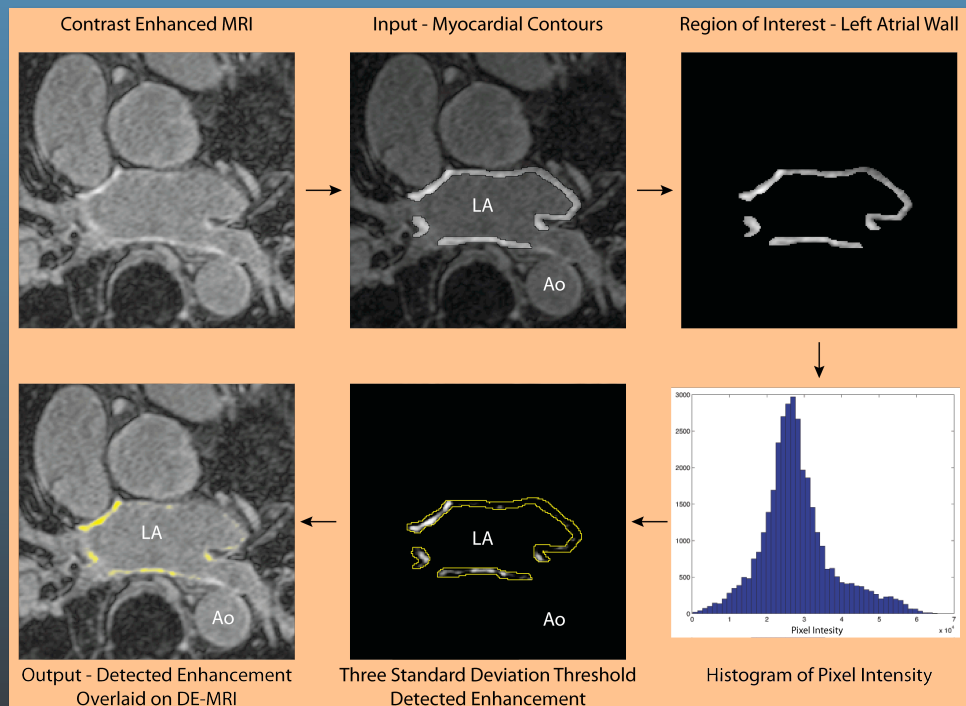
DE-MRI with Segmented Epicardial and Endocardial Borders

Enhancement Detection



Pre-Ablation Imaging

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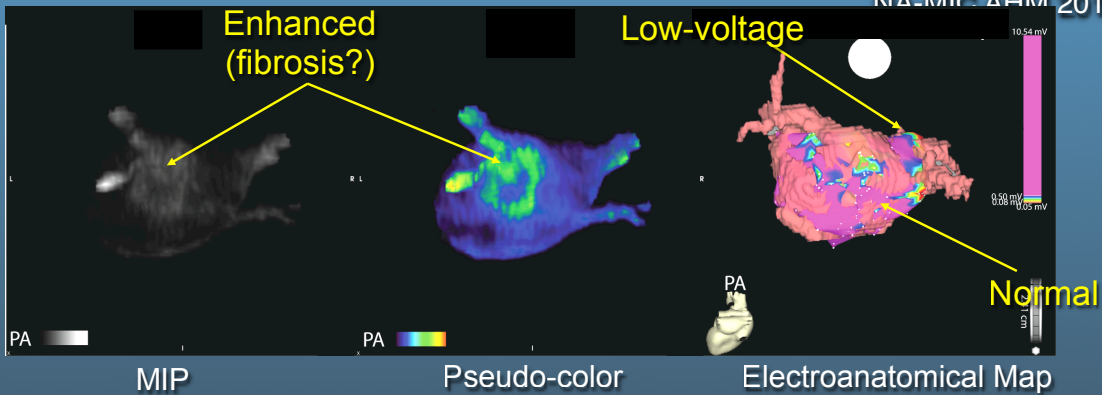


Diagnostic Analysis

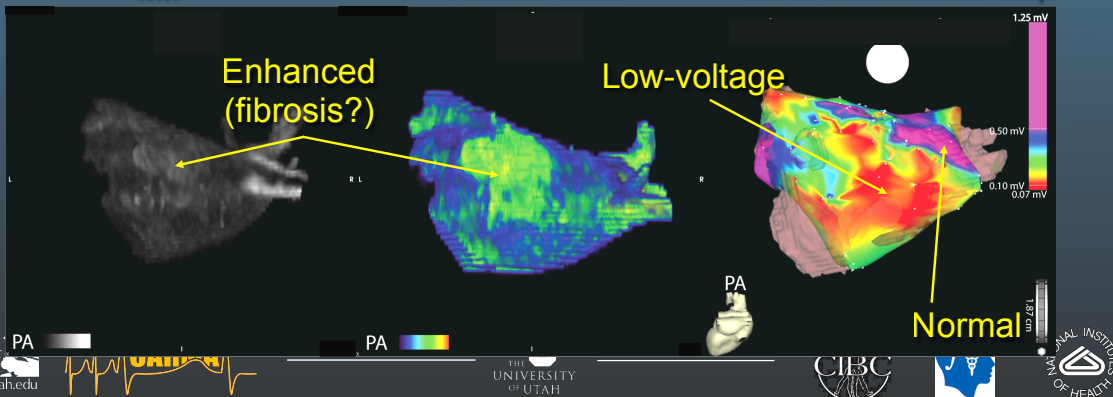


Successful vs. Unsuccessful Ablation

Success



Failure

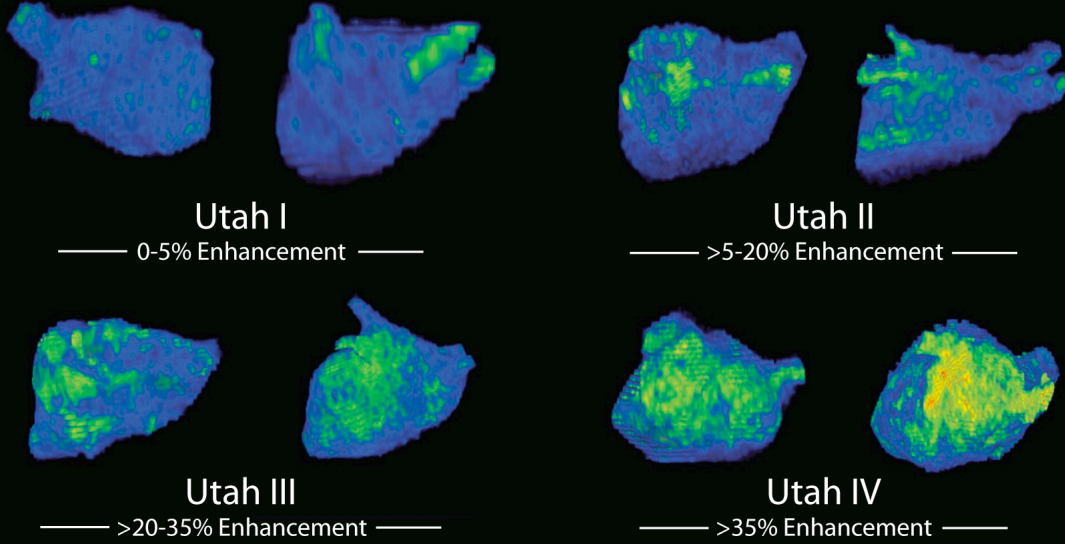


Utah AFib Staging

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The University of Utah
Comprehensive Arrhythmia
Research & Management Center



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Post Ablation Analysis



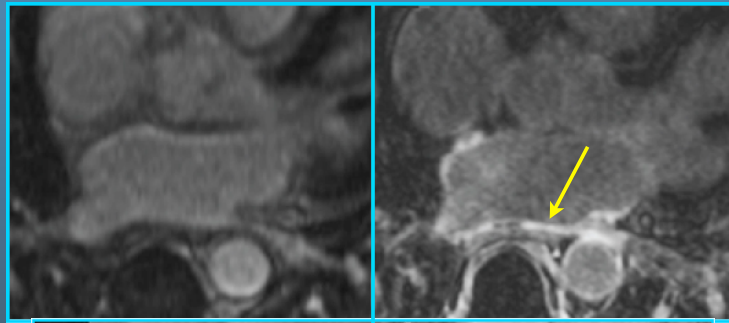
Scar Mapping

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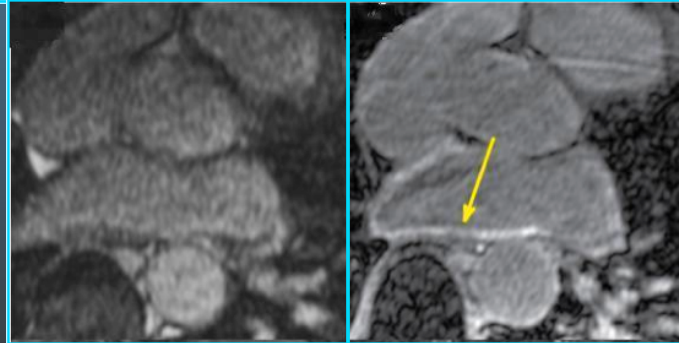
Pre

Post

Patient #1

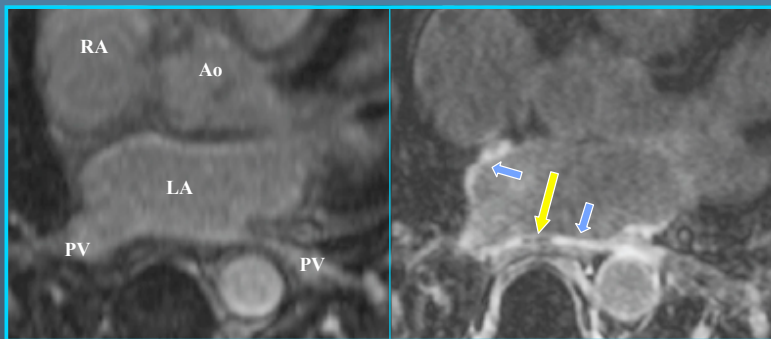


Patient #2



Quantifying Scar

011



PRE

POST (3 mo)

Pre-procedural MRI Scan

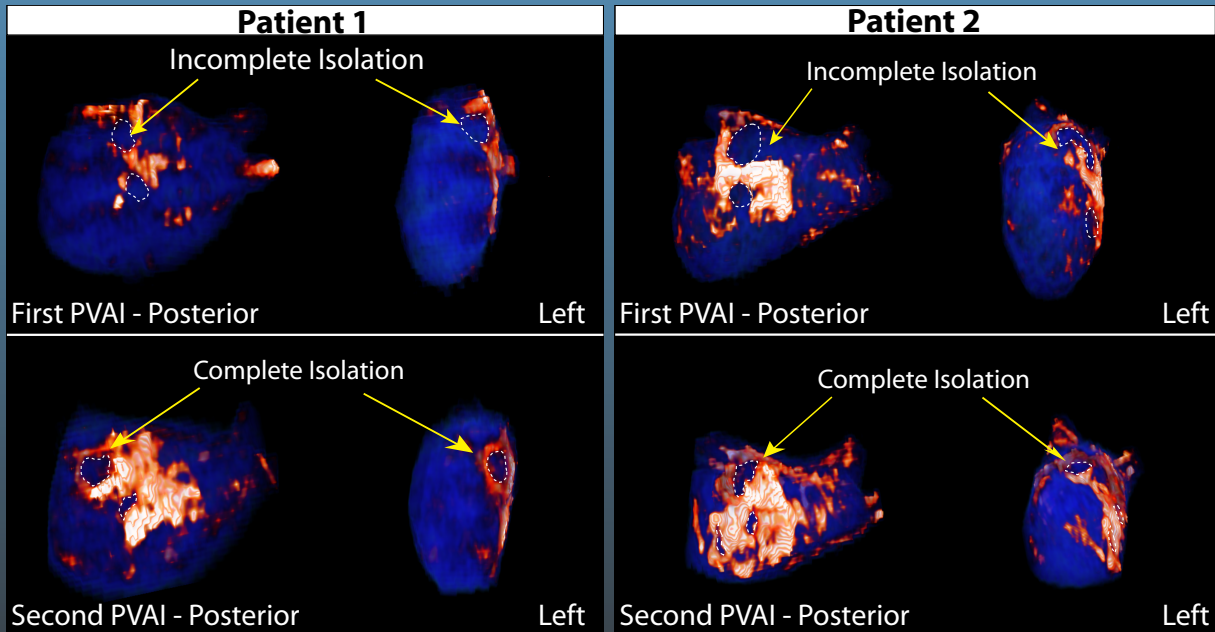
Follow-Up: <24 h

Follow-Up: 3 Months



Post Treatment Evaluation

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McGann et al. JACC 52(15): 1263-1272, 2008
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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

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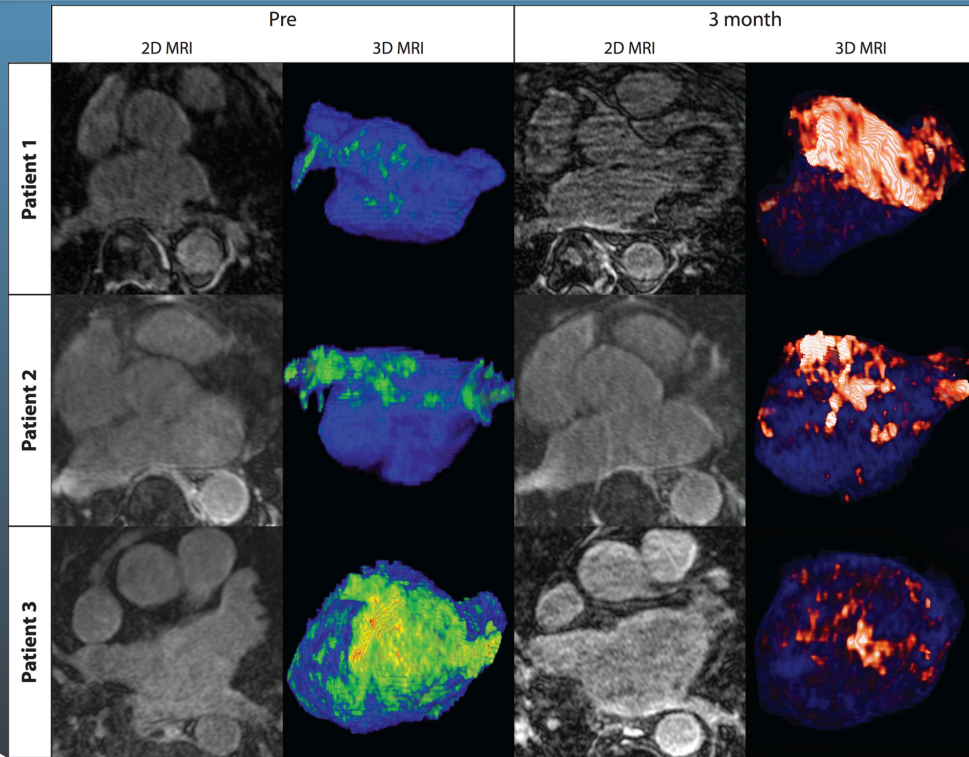


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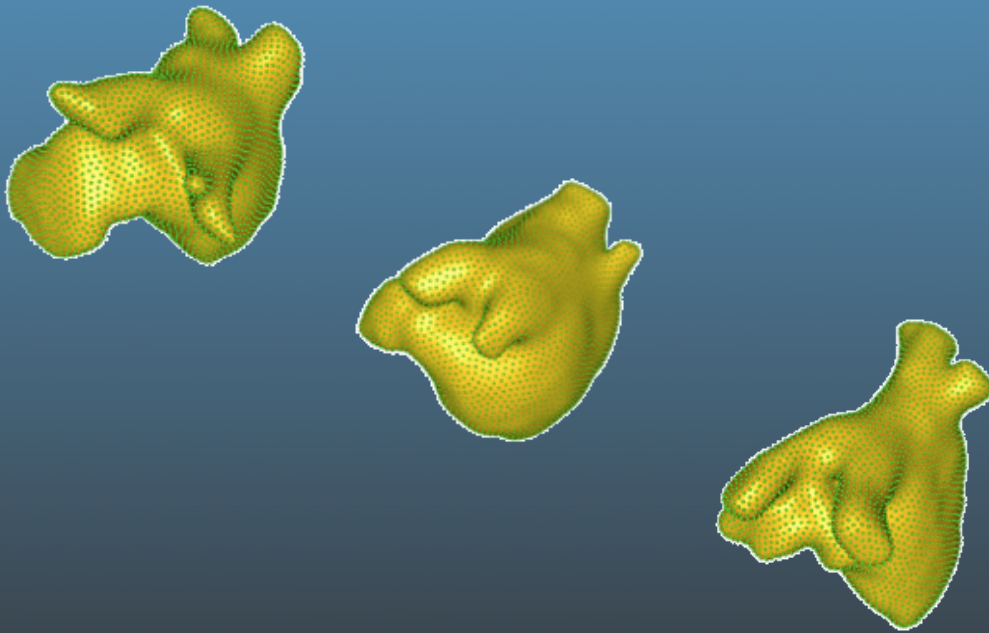
The Data

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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- Novel Imaging Technique Holds Promise for Cardiac

National Alliance for Medical Image Computing

NA-MIC Wiki

ATRIAL FIBRILLATION

PI: Rob MacLeod, University of Utah

Approximately 0.5% of patients have AF in the 50 to 59 year age group, and up to 9% have AF in the 60 to 69 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 dyssynchrony 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.

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 create small regions of tissue. B CT of LA and pulmonary veins (PV). C Biacrossed 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.

www.carmacenter.org

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



Enjoy Utah!!

