



ACC Latin America Conference 2017



MEXICO CITY
JUNE 22 – 24, 2017

GLOBAL EXPERTS, LOCAL LEARNING



ACC Latin America
Conference 2017

Arrhythmias and Clinical EP

Atrial Fibrillation:

Contemporary Management Strategies

Samuel Asirvatham, MD & Enrique Melgarejo Rojas, MD

Saturday, June 24, 2017

2:40 to 3:25 p.m.





AF Ablation and The Impact on Clinical Practice



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Disclosures

Relevant financial relationship(s) with industry

- I receive royalties for work licensed through Mayo Clinic to a privately held company for contributions related to the use of nerve signal modulation to treat central, autonomic and peripheral nervous system disorders, including pain. Mayo Clinic receives royalties and owns equity in this company. The company does not currently license or manufacture any drug or device in the medical field.
- Co-patent holder for technique to minimize coagulum formation during radiofrequency ablation
- Products or techniques related to the above disclosures are not being discussed in this presentation
- Pertains to inventions/startup companies that include Nevro, Aegis and the Phoenix Corp

Honoraria/Speakers

- Abiomed, Atricure, Biotronik, Blackwell Futura, Boston Scientific, Medtronic, Medtelligence Sanofi-aventis, Spectranetics, St. Jude, Zoll

Consulting

- Aegis, ATP, Nevro, Sanovas, Sorin Medical, FocusStart

Impact of AFFIRM and Other Trials on Clinical Management

Rate control

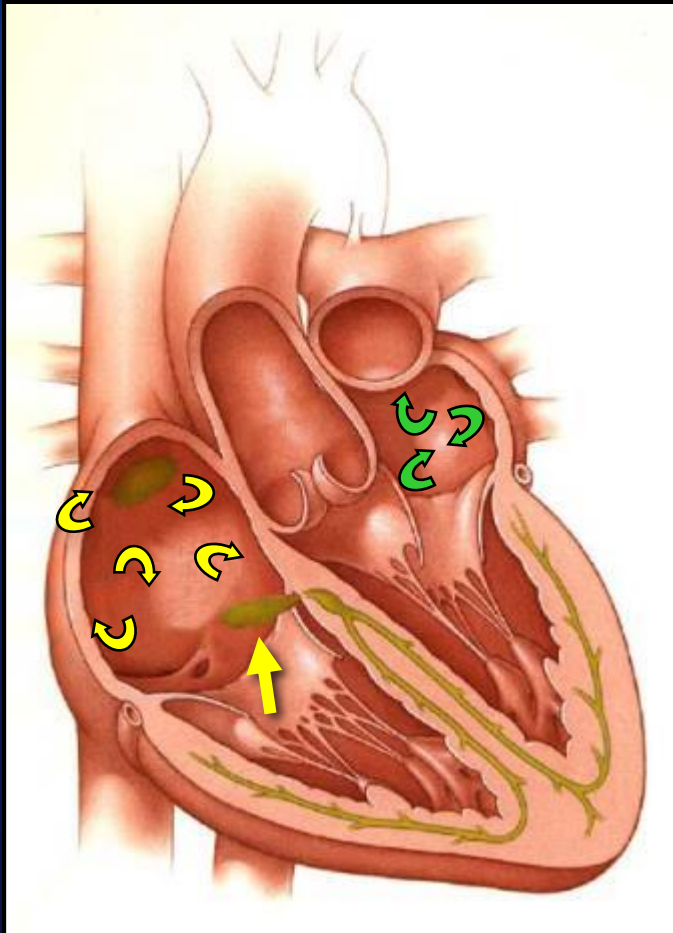
- Safe
- Effective
- Preferred method for majority
- Optimal control cannot be determined at rest

Maintenance of sinus rhythm

- Symptom driven

Atrial Fibrillation: Rate Control

Atrial fibrillation



Medications

- Ca++ blockers
- Beta blockers
- Digitalis
- AVN ablation

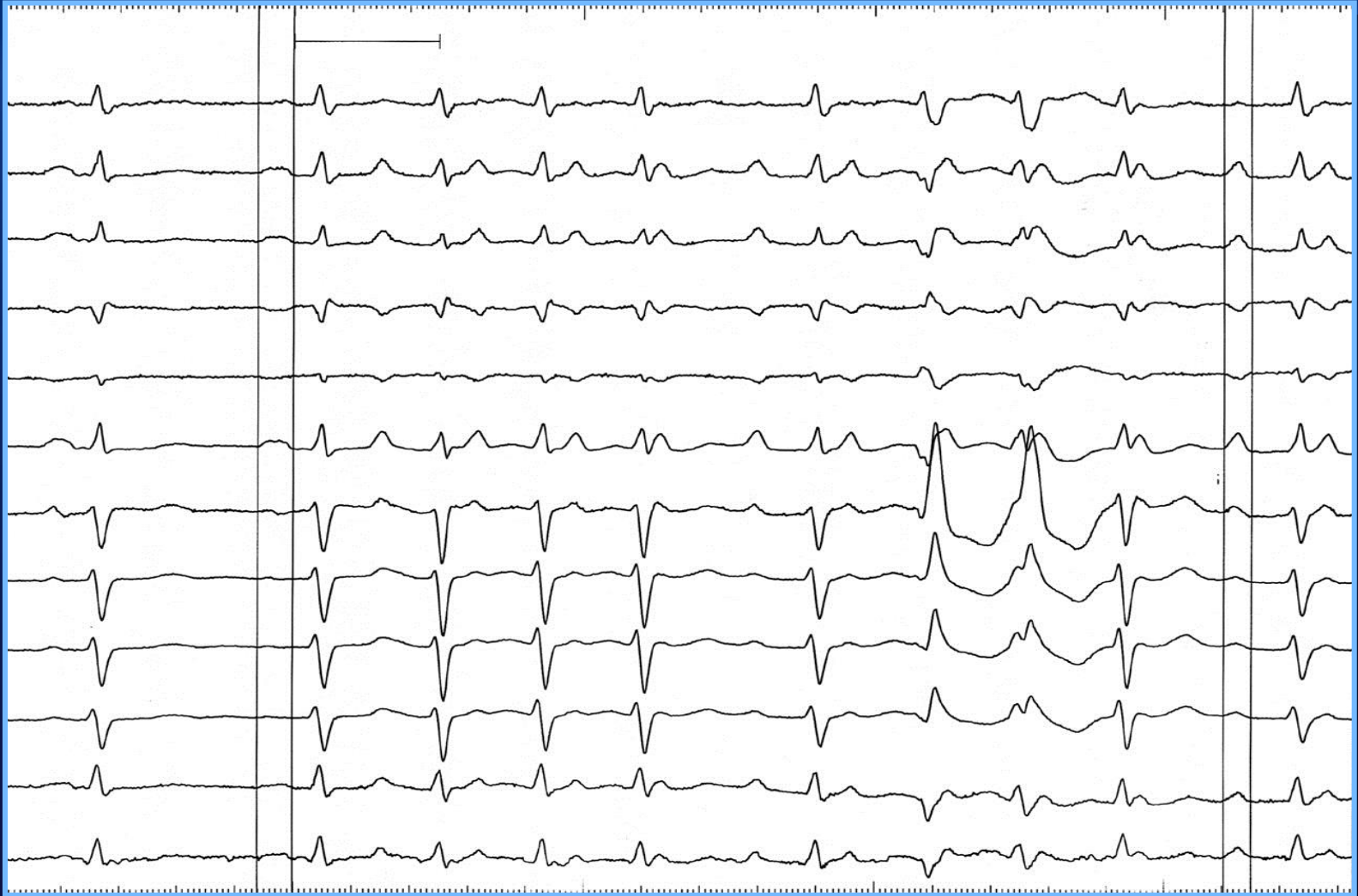
AV junction ablation

- 99%+ success rate
- Regular and controlled HR-PPM required
- Freedom from medications

For both: AF persists in the atria

- Stroke prophylaxis needed

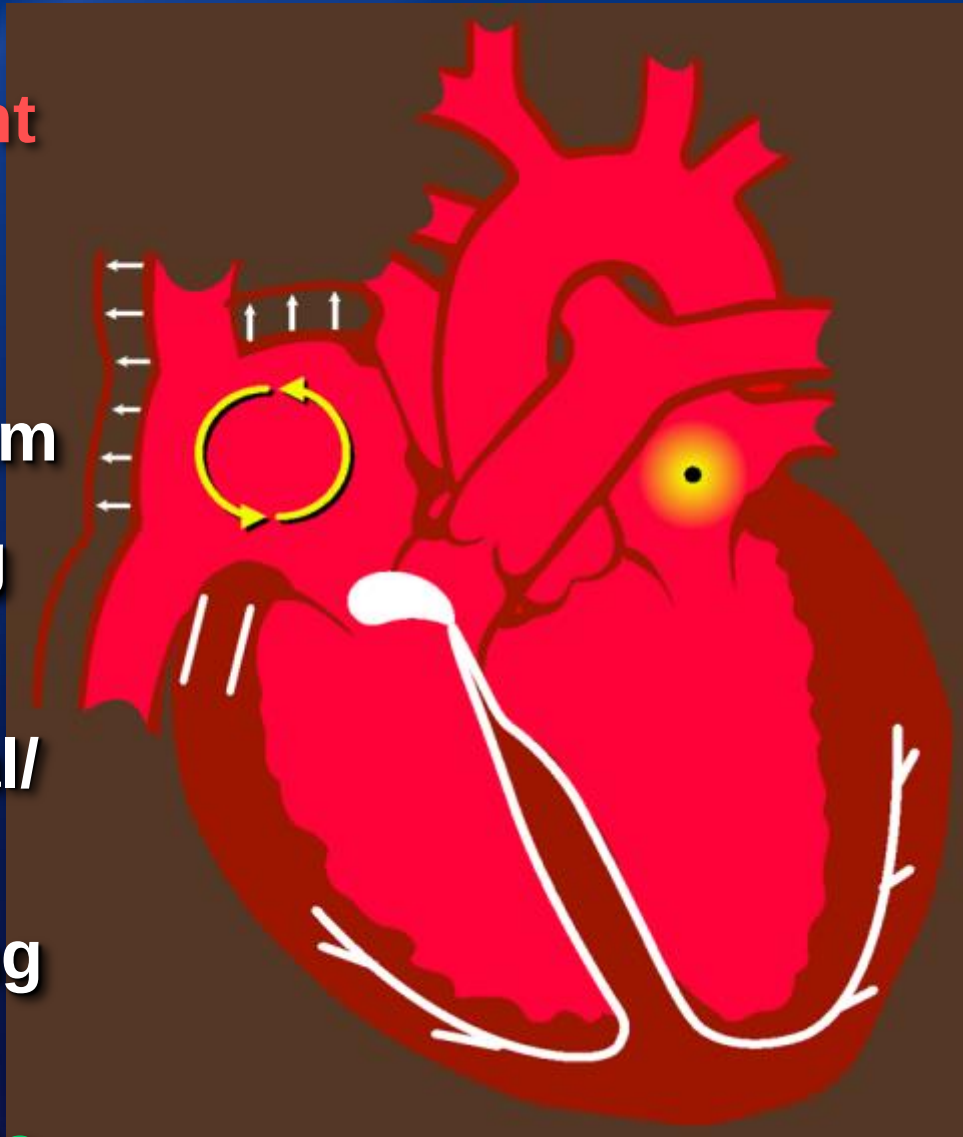
47yrs female with paroxysmal palpitations and fatigue



Mechanisms of AF

Persistent

- **All atrial myocardium**
- **Underlying disease**
- **Anatomical/ electrical**
- **Remodeling**



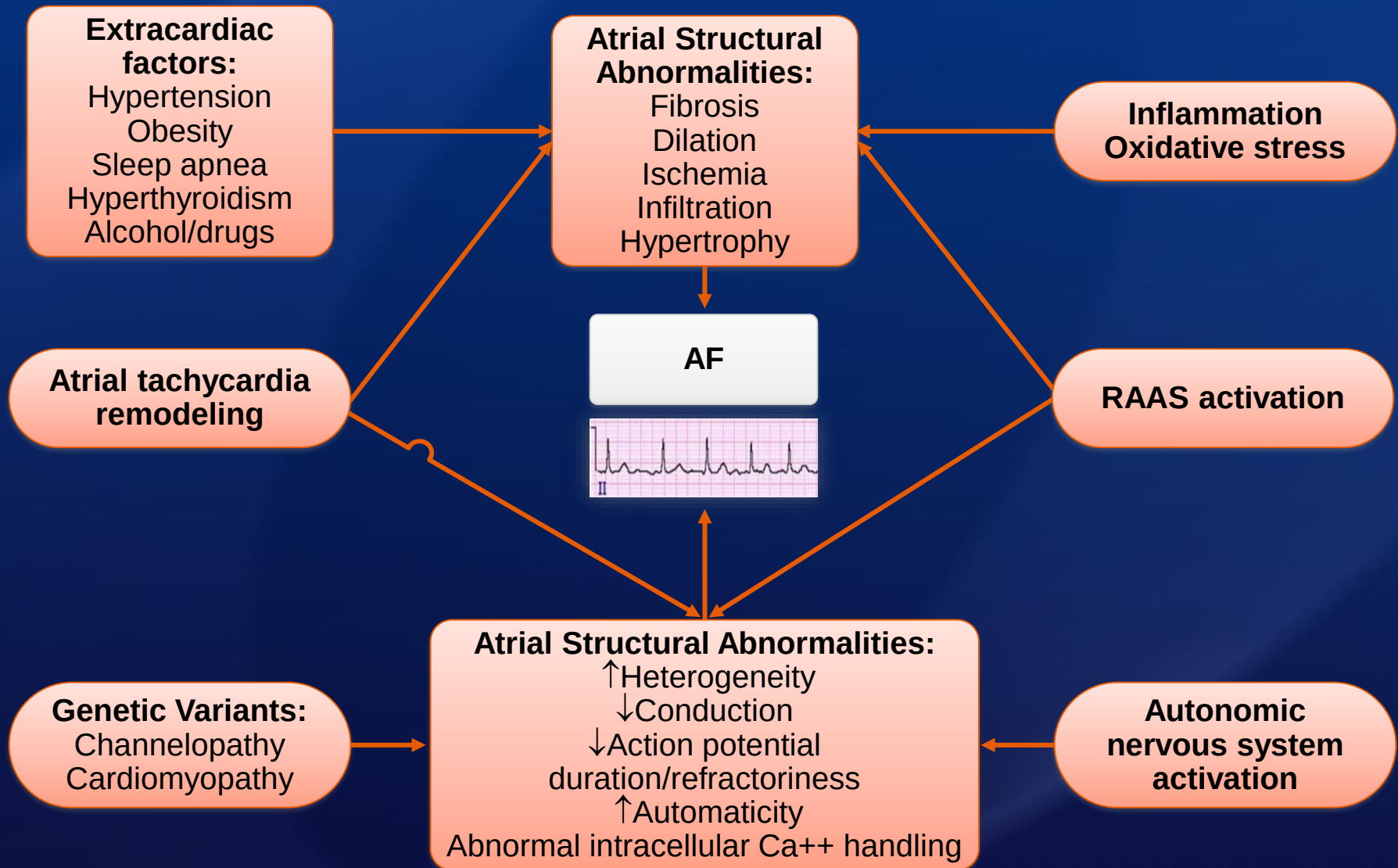
Paroxysmal

- **Autonomic modulation**
- **Atrial stretch → channels**
- **Other tachycardia**

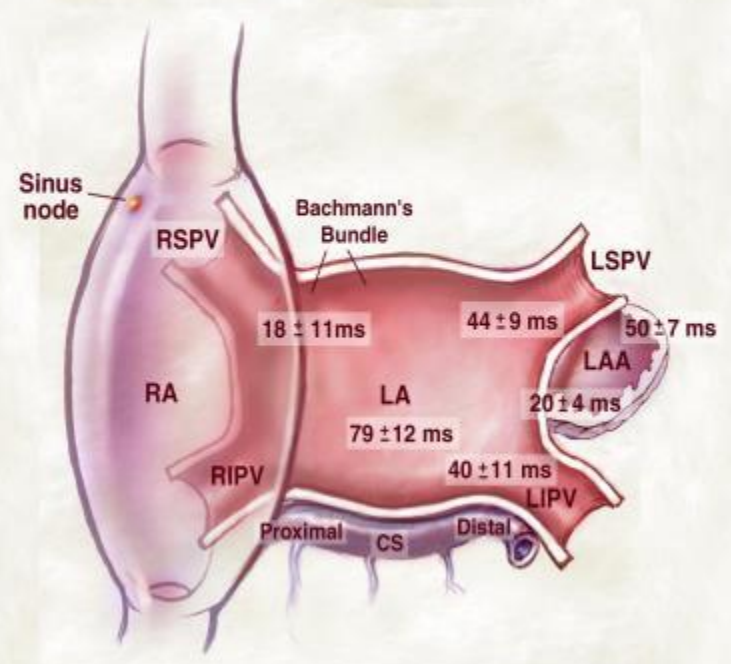
Substrate

Trigger

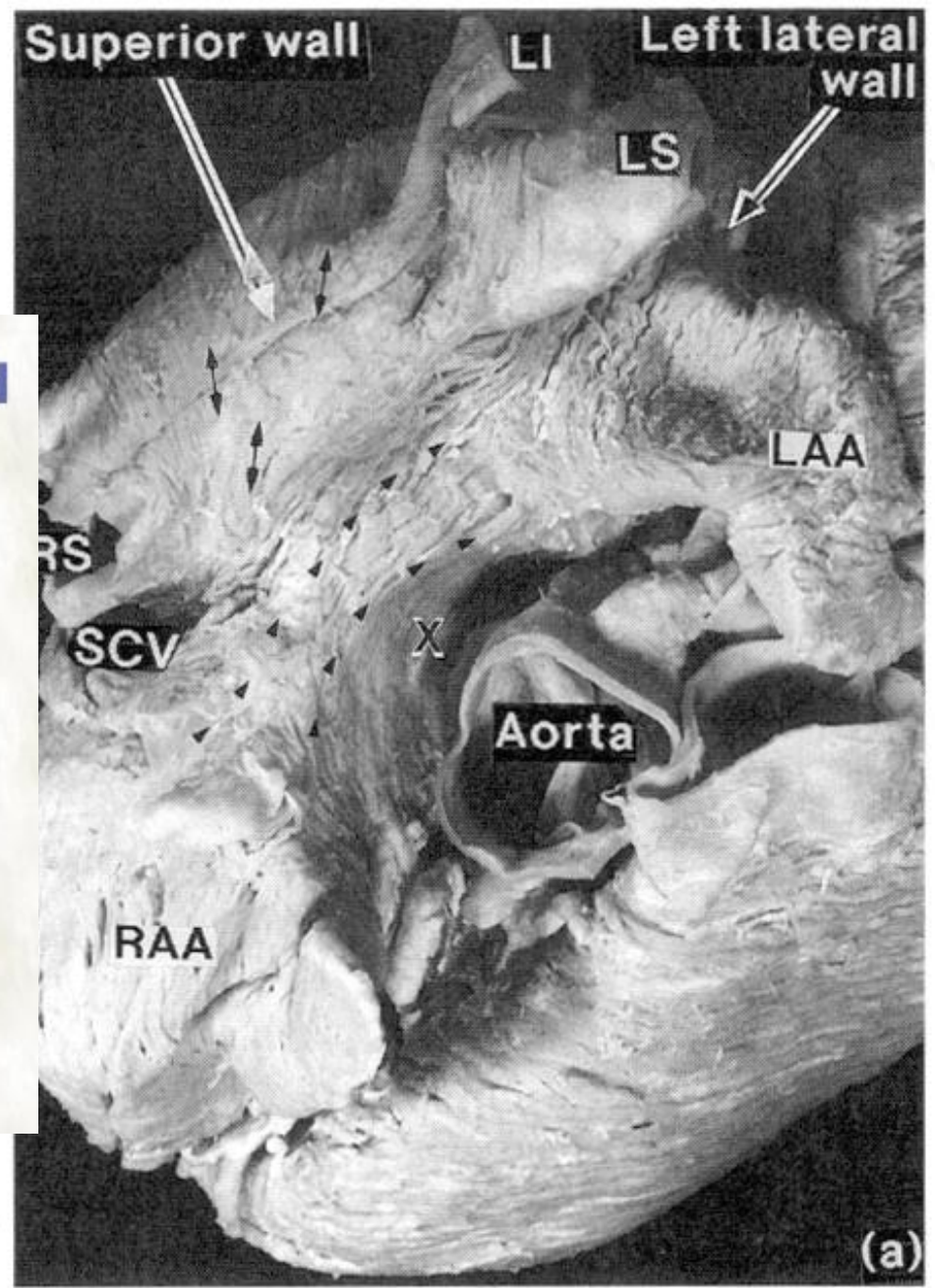
Mechanisms of AF



ACTIVATION OF THE LEFT ATRIUM IN SINUS RHYTHM

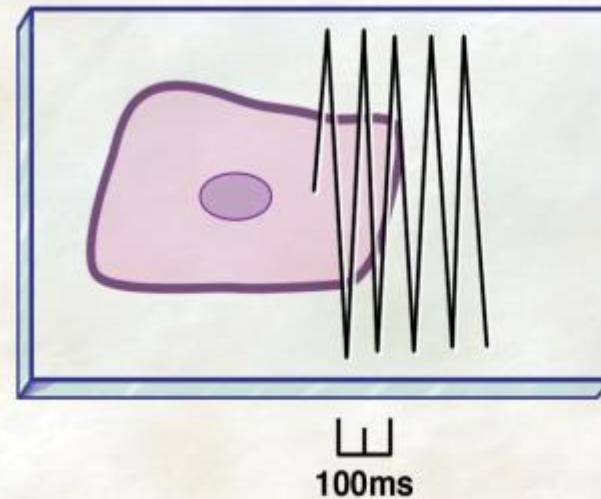
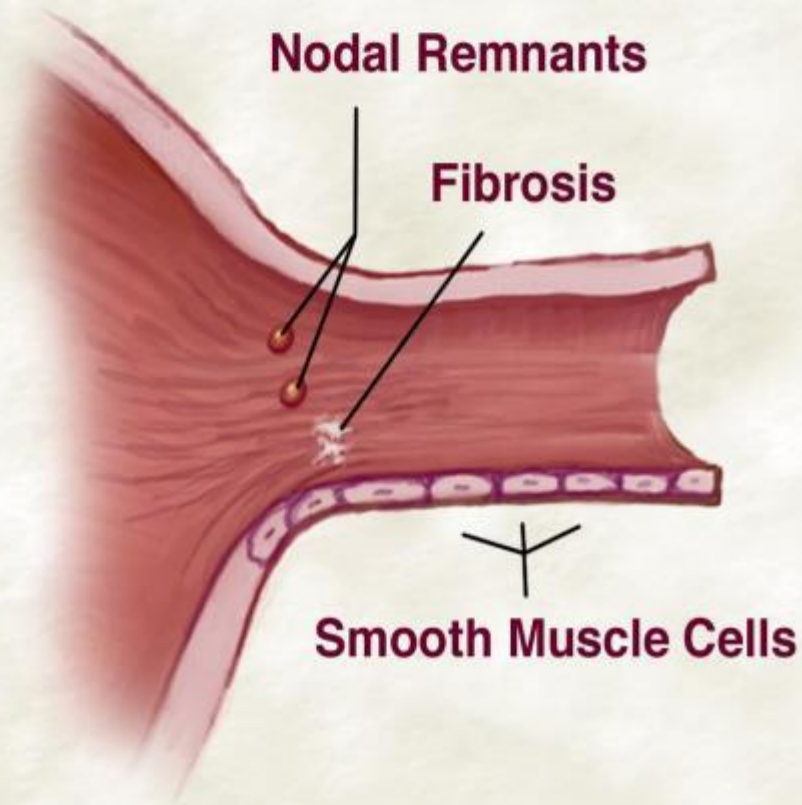


* CS + RSPV activation variable - see below

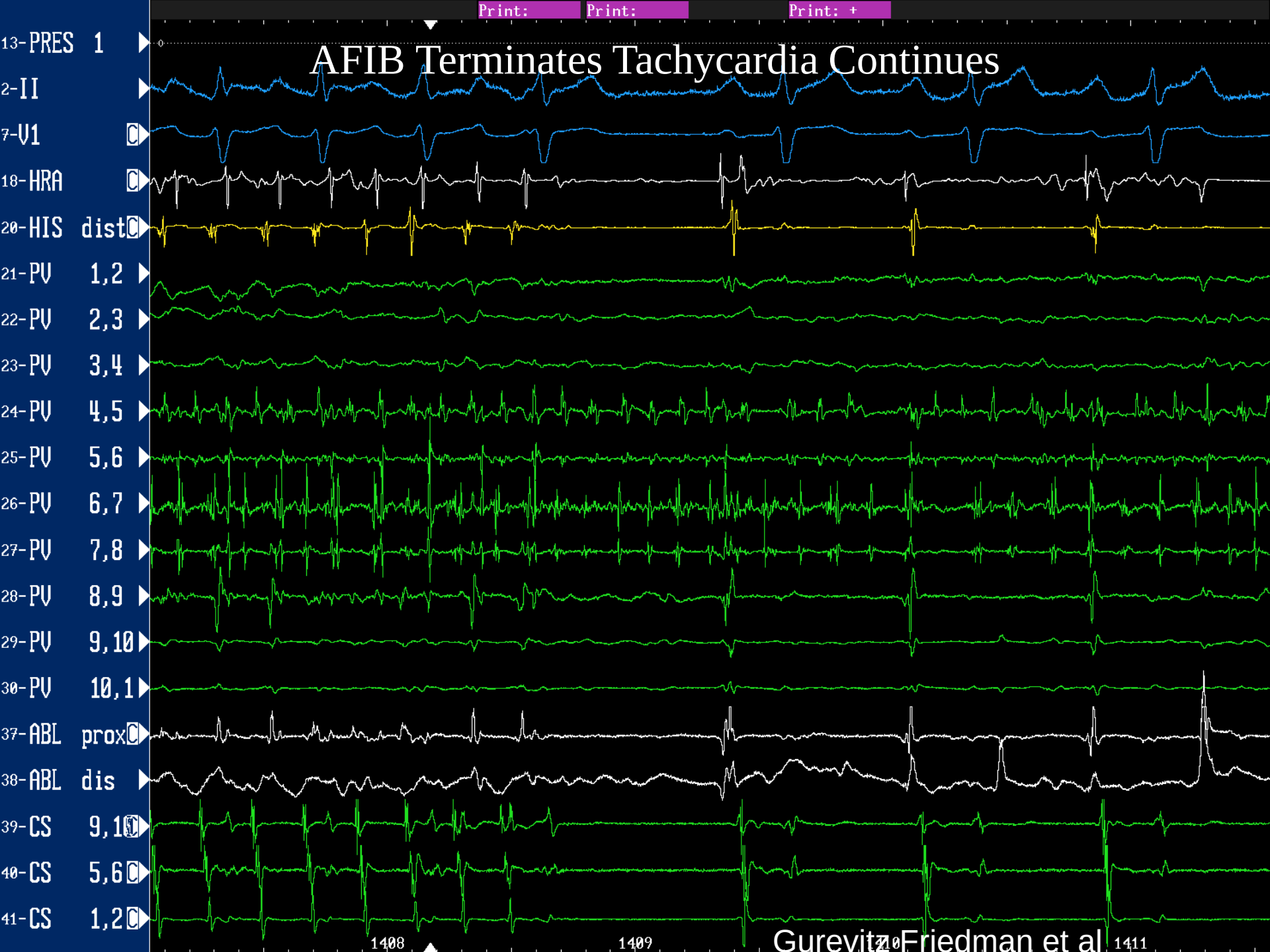




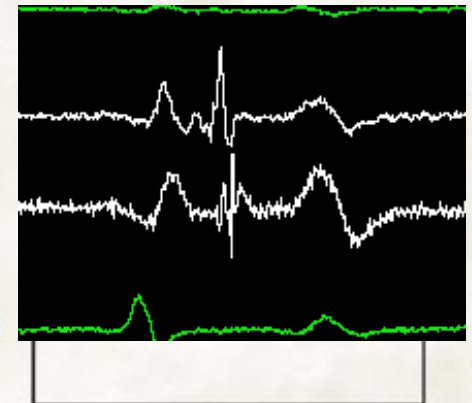
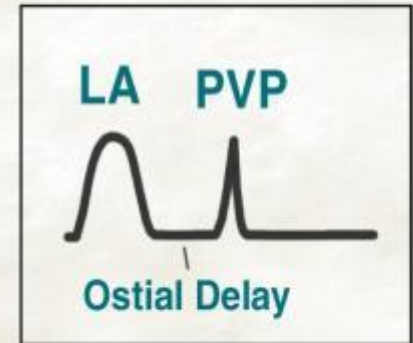
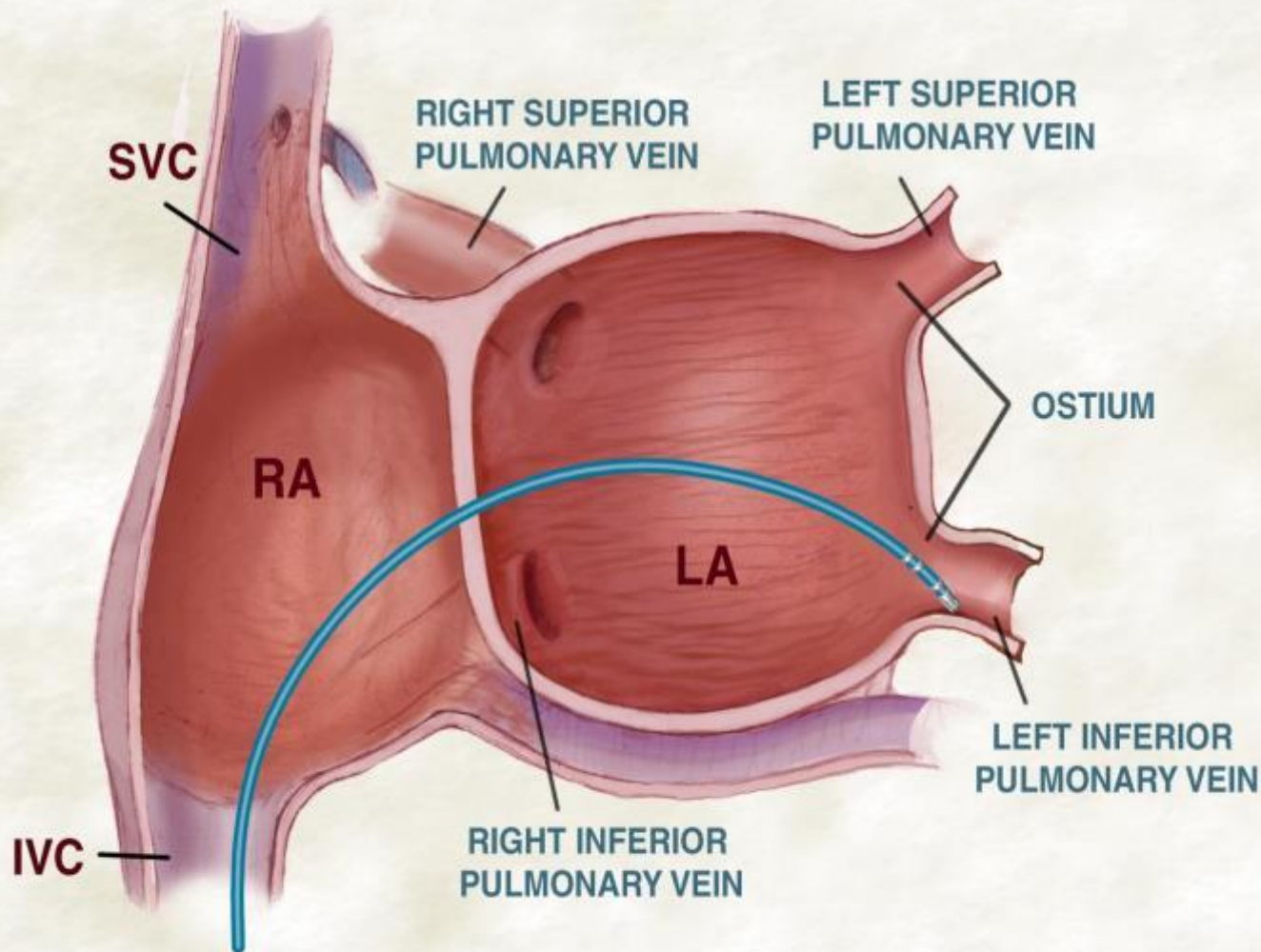
Pulmonary Vein Ostial Histology

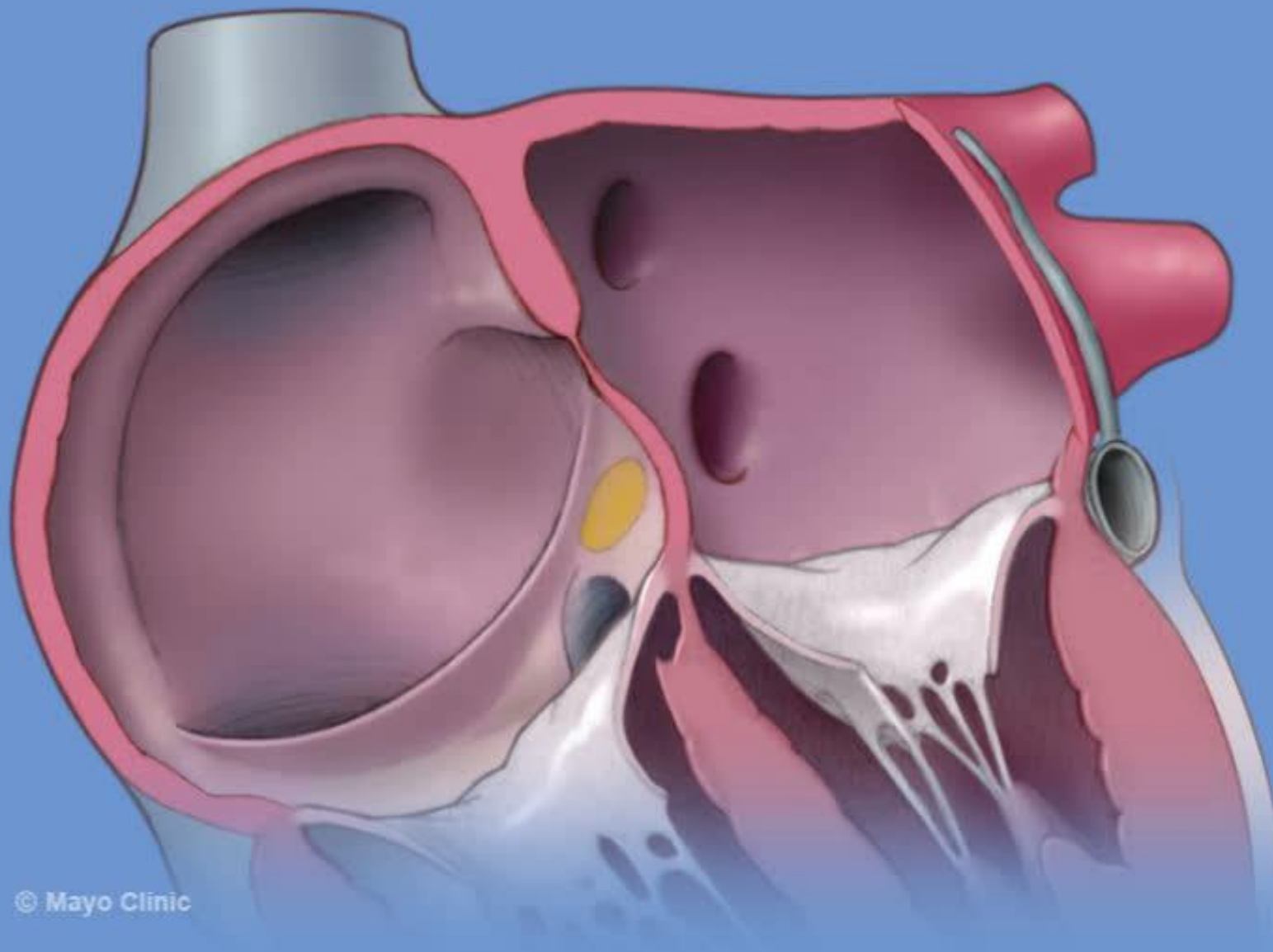


- Pyloric Spasm
- Acalculous Cholecystitis



THE PULMONARY VEIN POTENTIAL





© Mayo Clinic

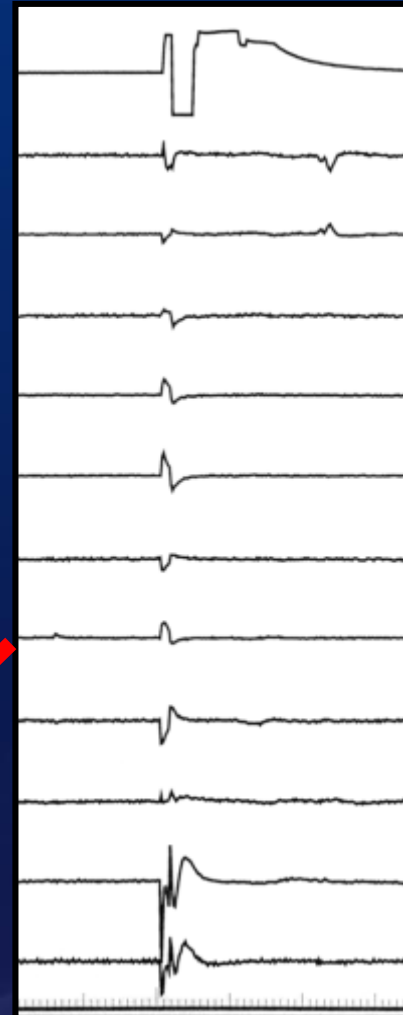
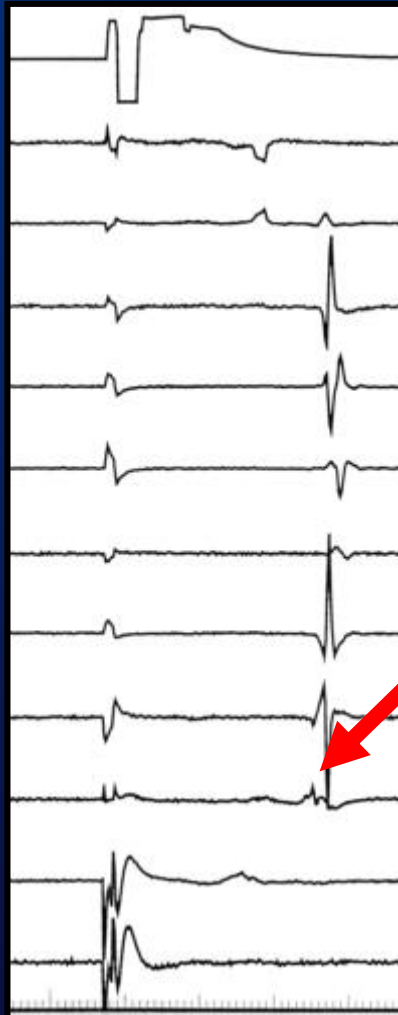
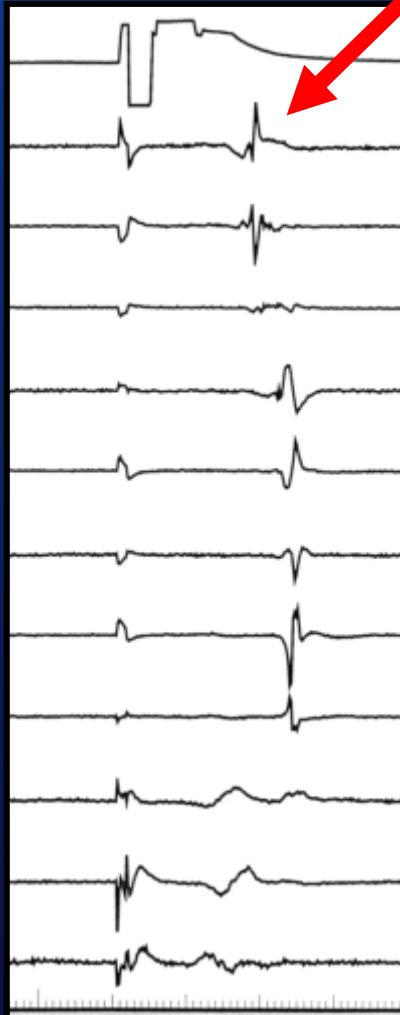
PV Potentials Modification and Elimination

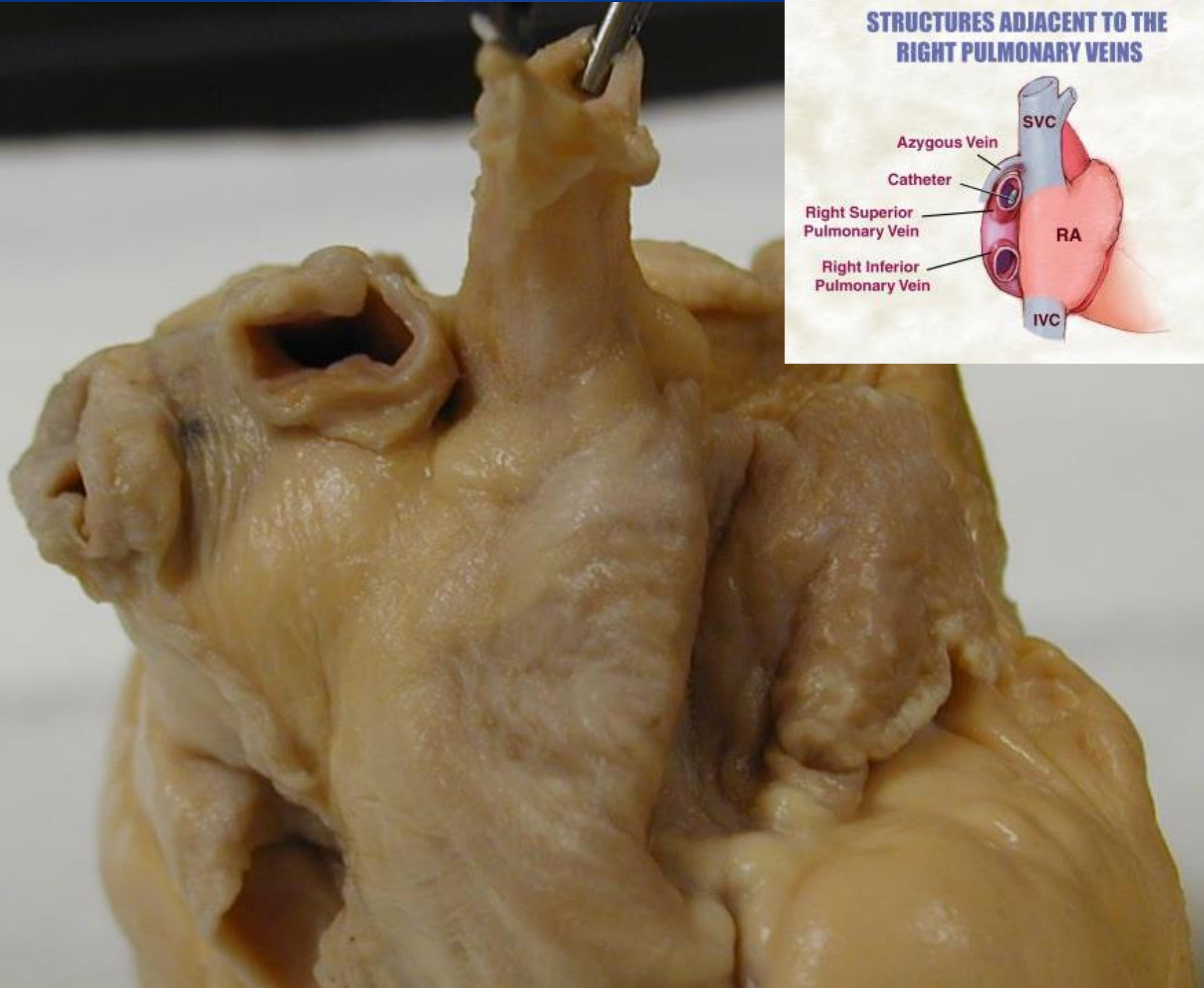
After Abl 1

After Abl 6

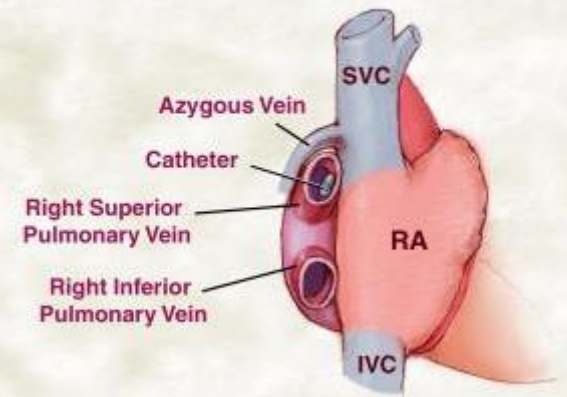
End Abl

HRA
PV 1, 2
PV 2, 3
PV 3, 4
PV 4, 5
PV 5, 6
PV 6, 7
PV 7, 8
PV 8, 9
PV 9, 10
PV 10, 1
ABL dis

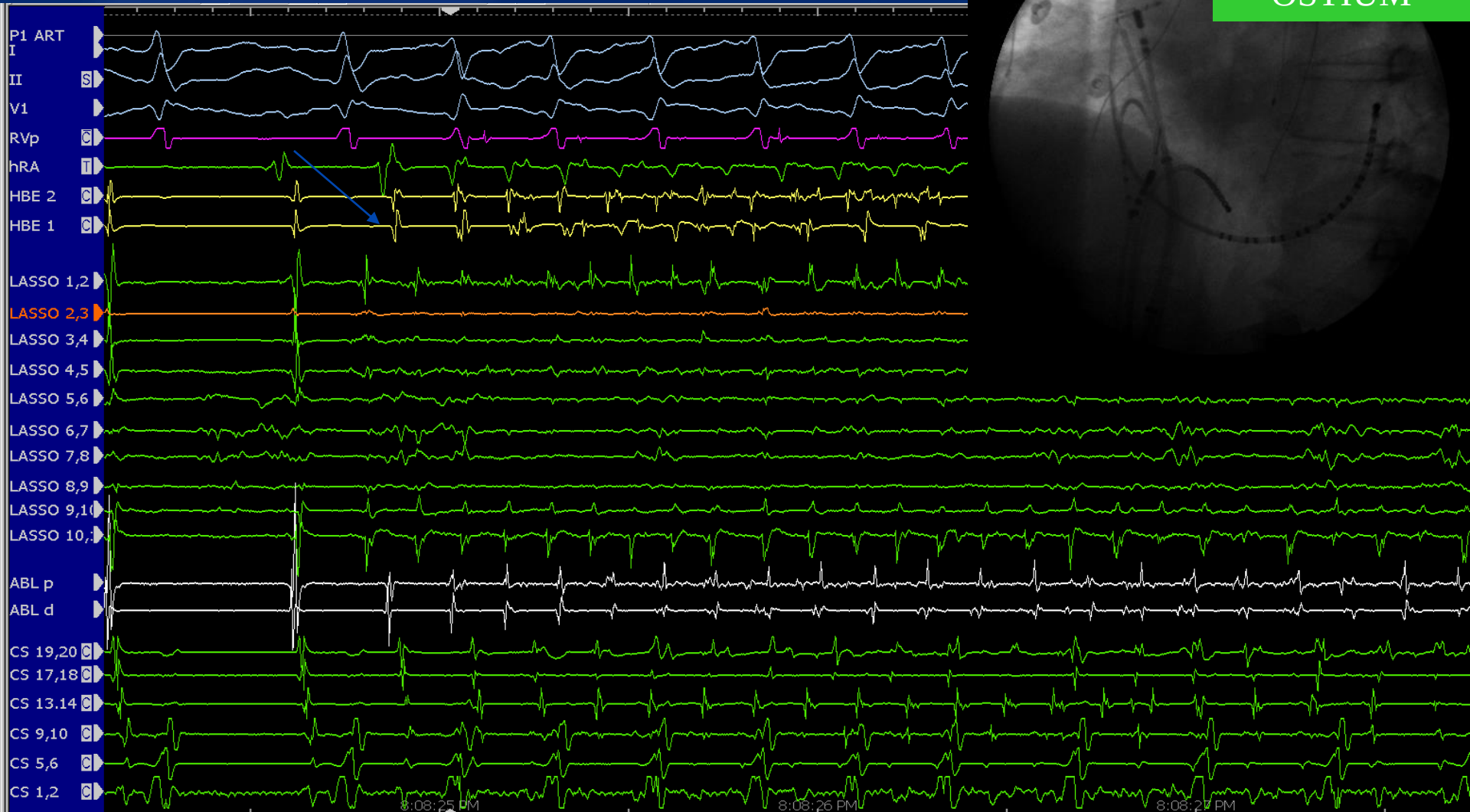




STRUCTURES ADJACENT TO THE RIGHT PULMONARY VEINS



Lasso in SVC: ERAF



Endocardial Ridge Location

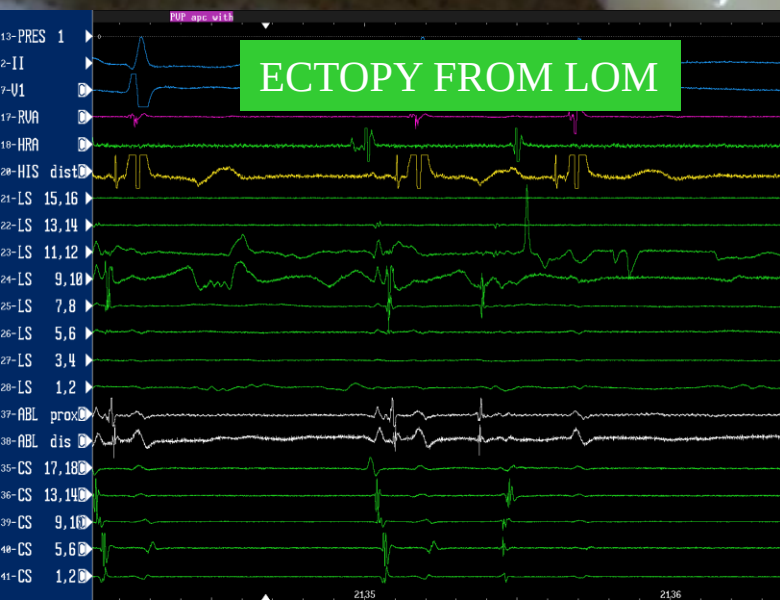
Left Pulmonary Veins

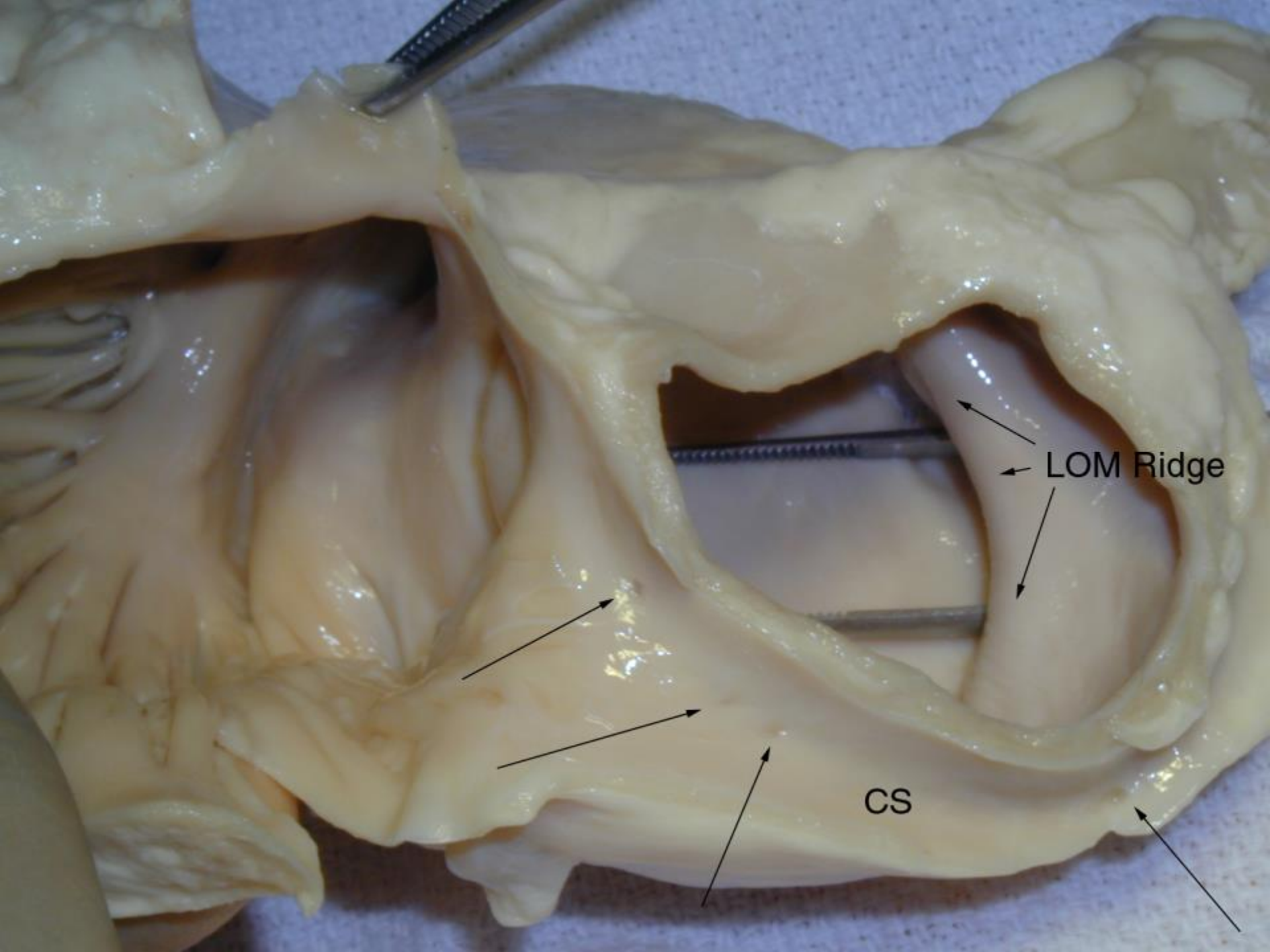
LAA

Ligament/Vein of Marshall

Probe

ECTOPY FROM LOM



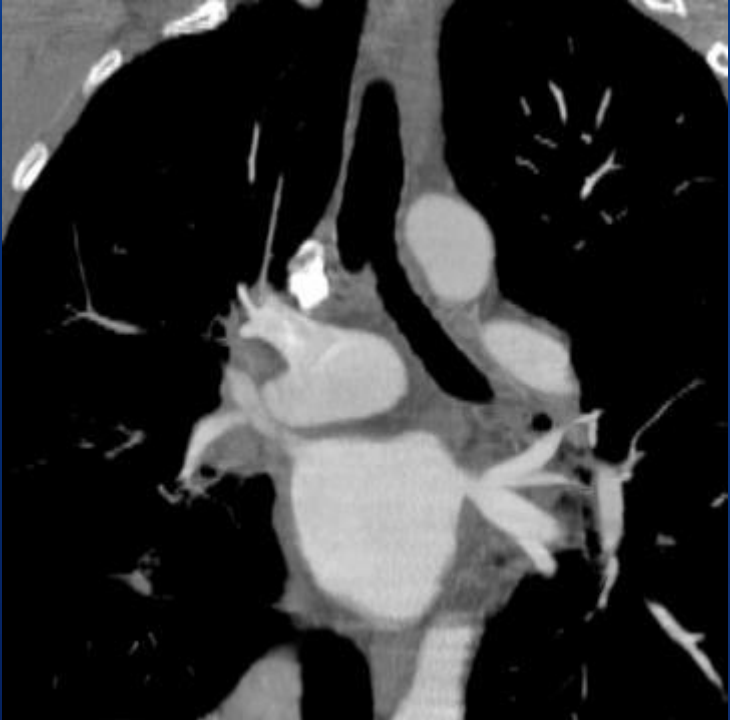


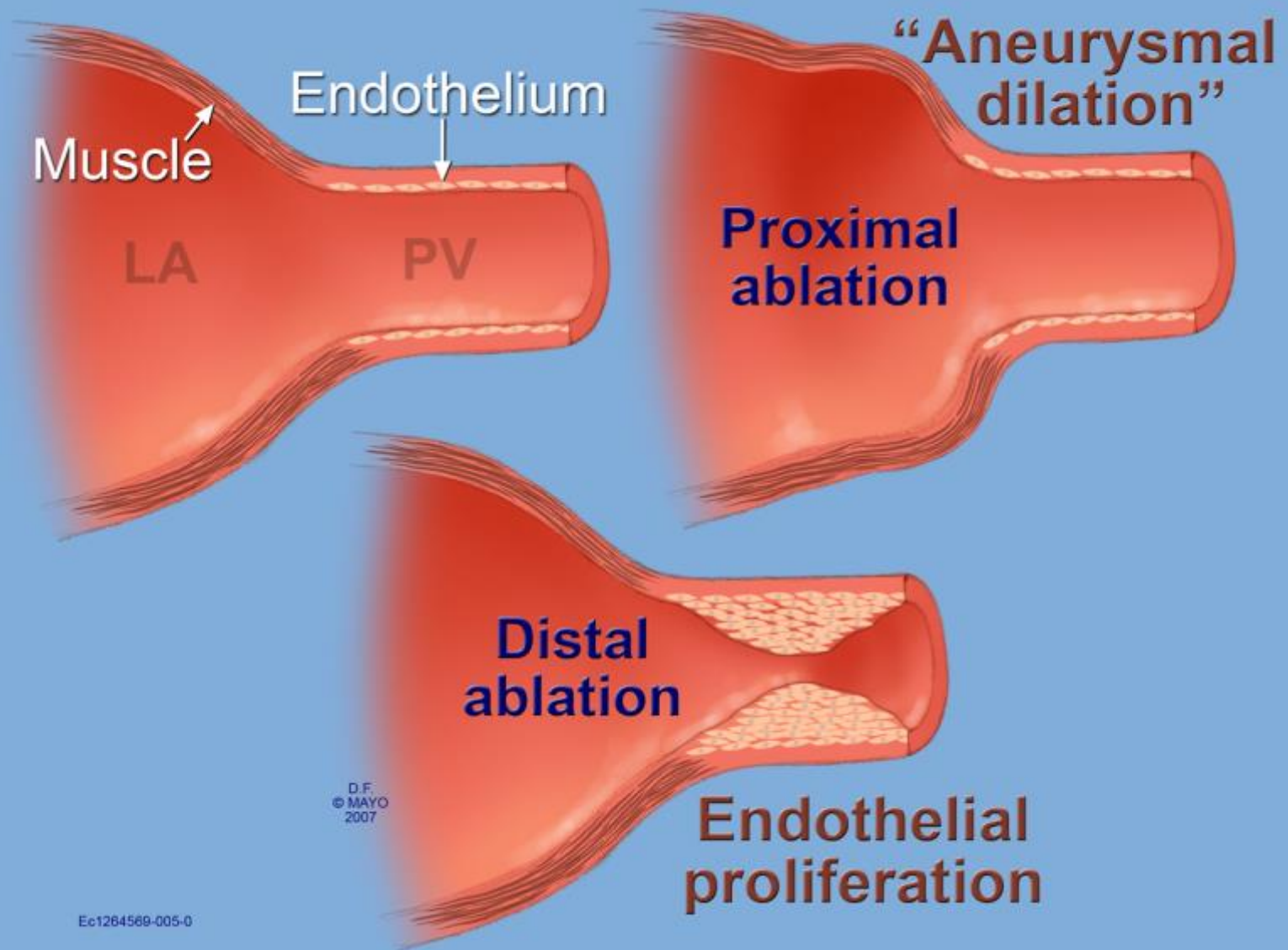
LOM Ridge

CS

Anatomy of Complications of Atrial Fibrillation Ablation: Ablation, Understanding the Anatomy

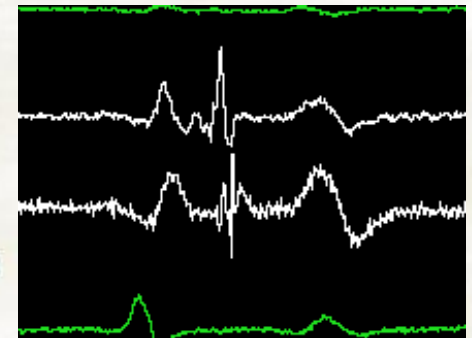
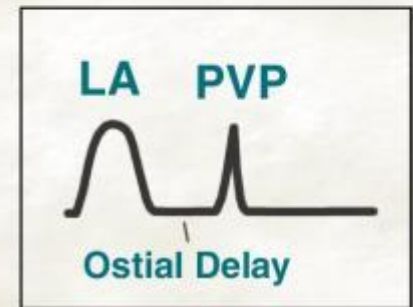
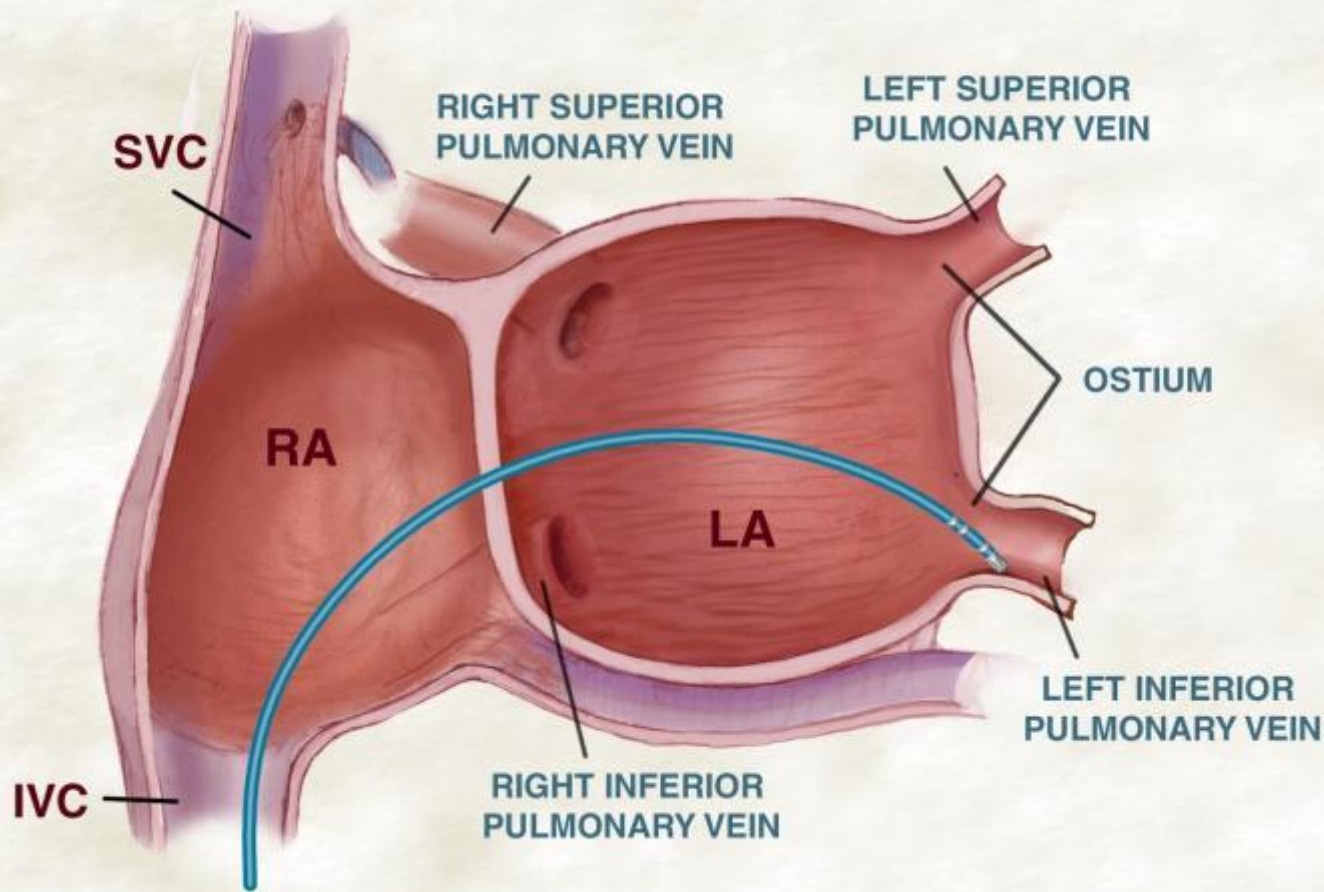
- Pulmonary vein stenosis
- Coronary arterial damage
- Pulmonary artery damage
- Aorta
- Esophagus
- Phrenic nerve
- Mitral valve
- Thrombus formation
- Sequela of autonomic ganglia ablation





Ec1264569-005-0

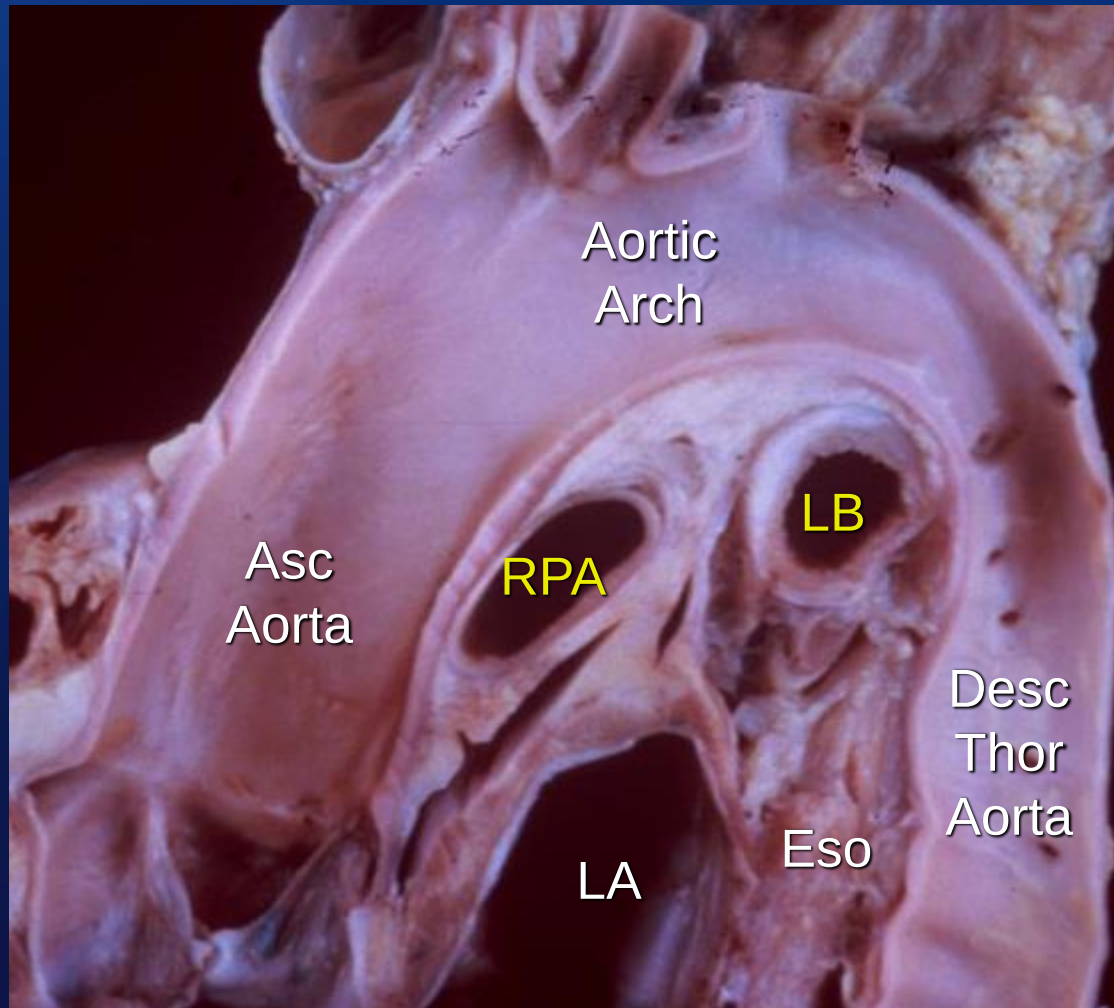
THE PULMONARY VEIN POTENTIAL



Anatomy of Complications of Atrial Fibrillation Ablation: Esophagus

- Immediate posterior relation of the left atrium/posterior wall of pulmonary vein
- Posterior relation of the mid coronary sinus
- Esophageal arterial supply, mostly on the anterior wall
- Pericardial esophageal arteriovenous drainage
- Azygous vein and posterior mediastinal tissue anchors esophagus limiting lateral mobility

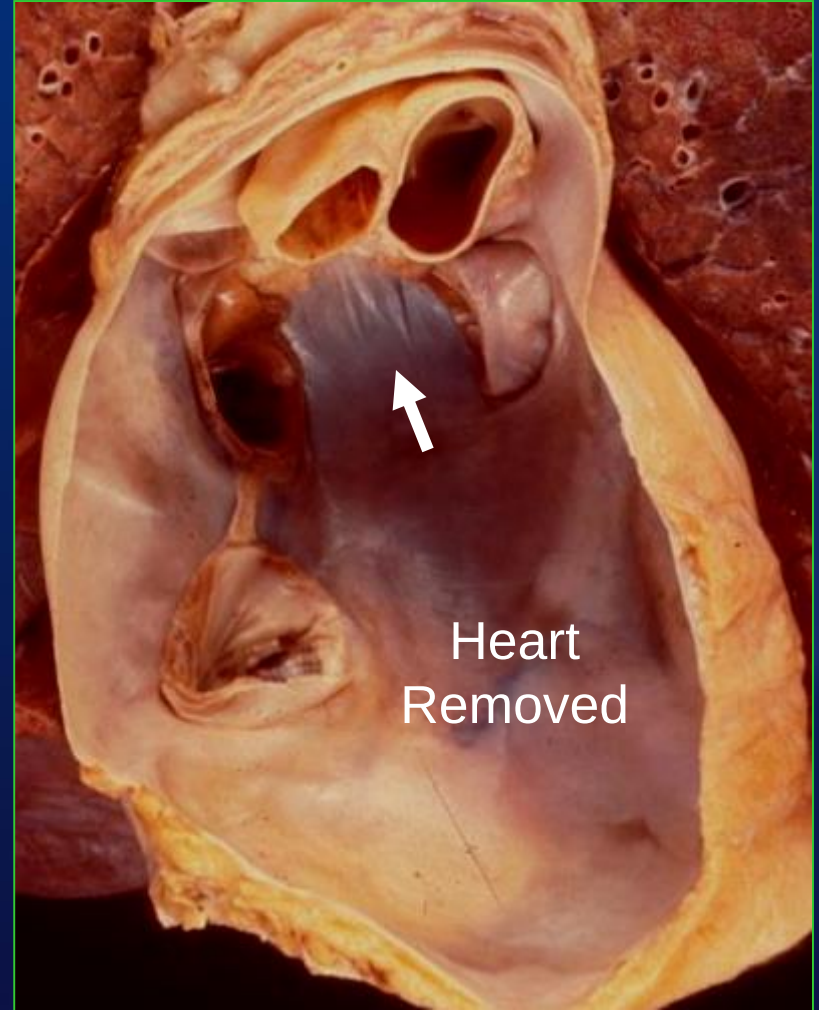
Atrio-Esophageal fistula



Left Lateral View

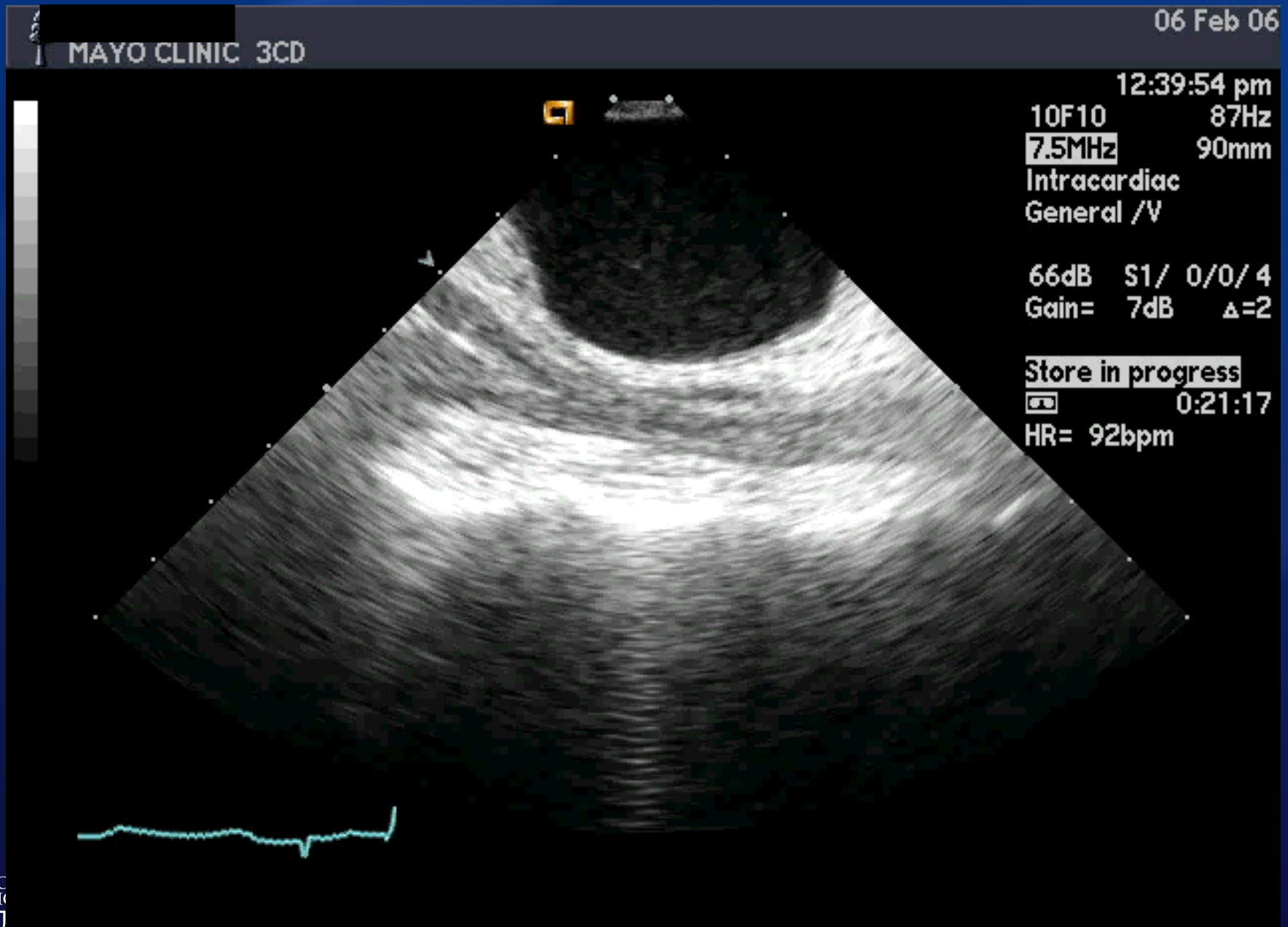
External Cardiac Anatomy

Pericardium

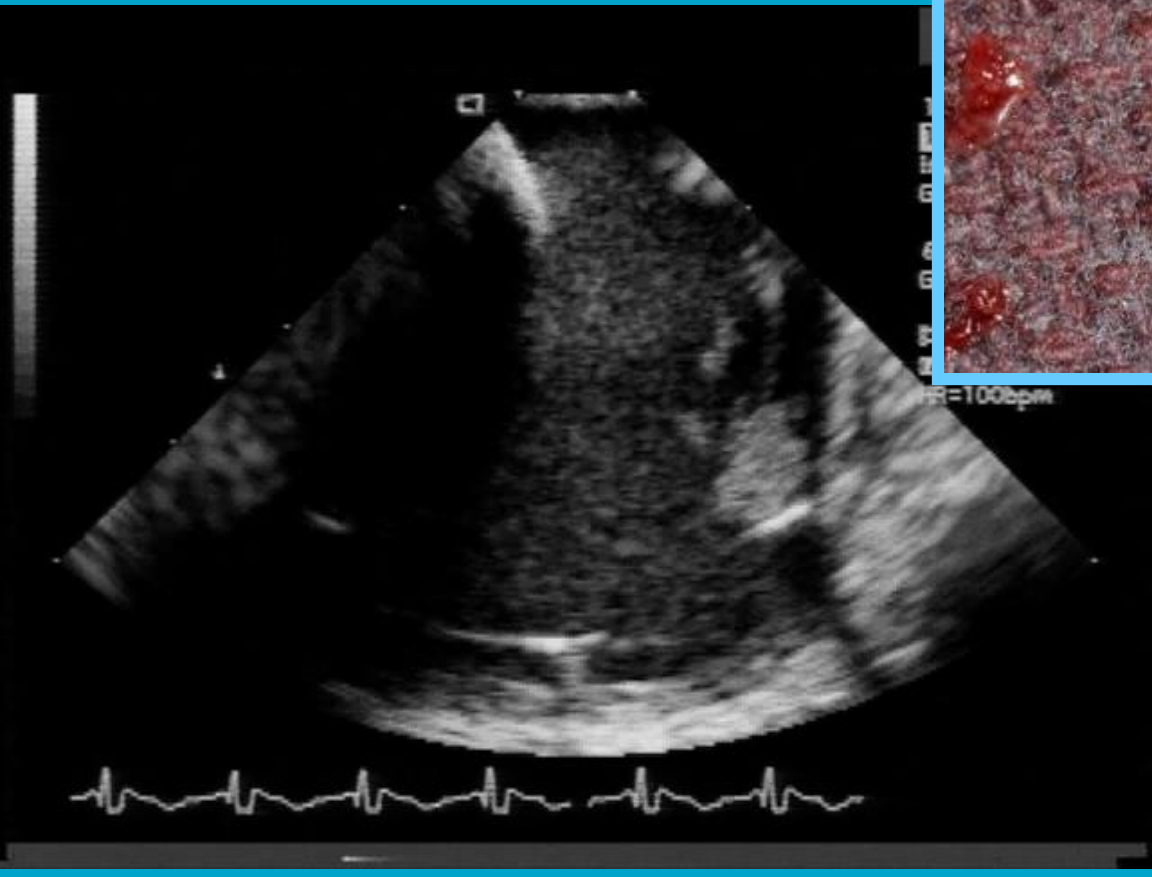


Oblique Sinus (Anterior View)

Esophageal-LA interface Identification

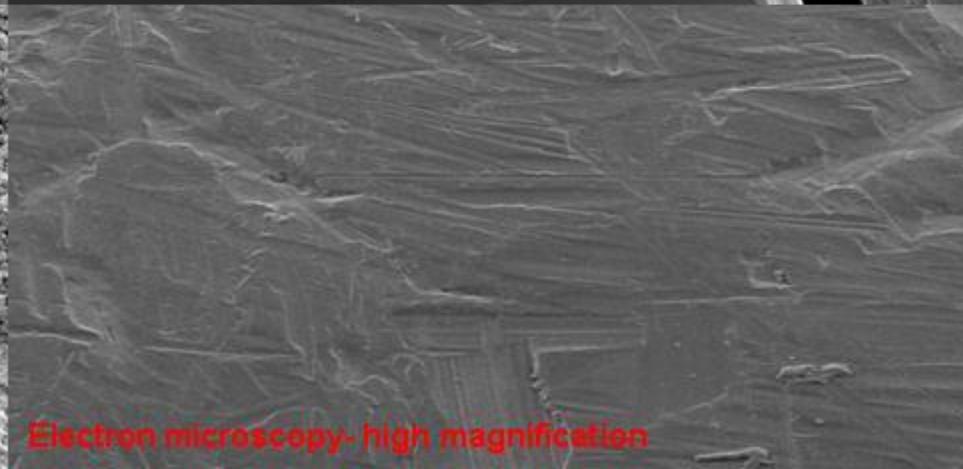
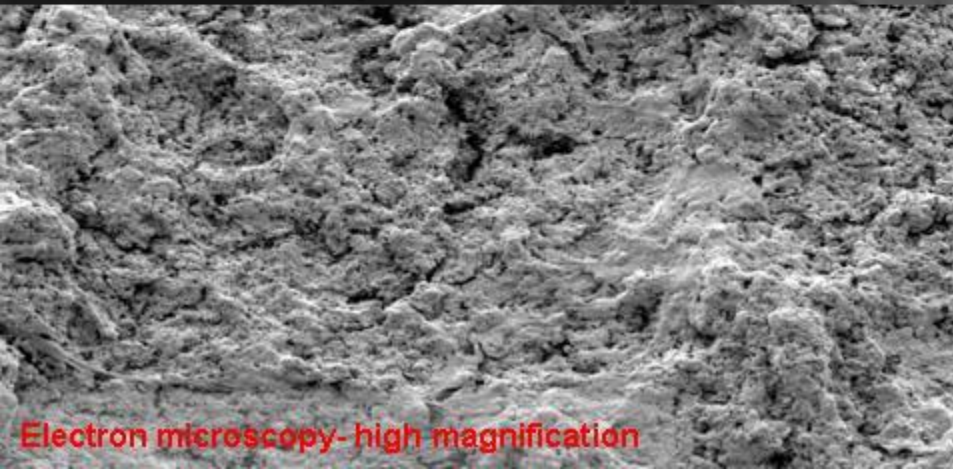
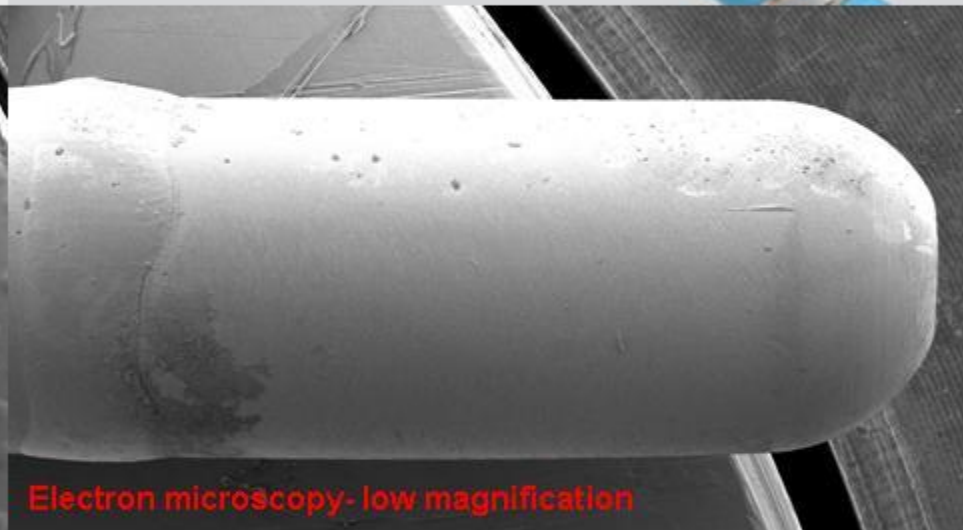
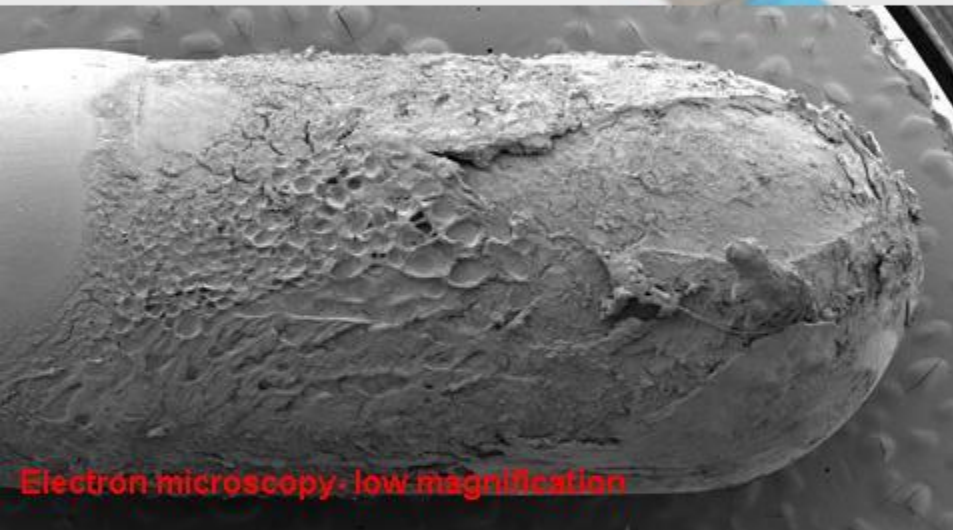
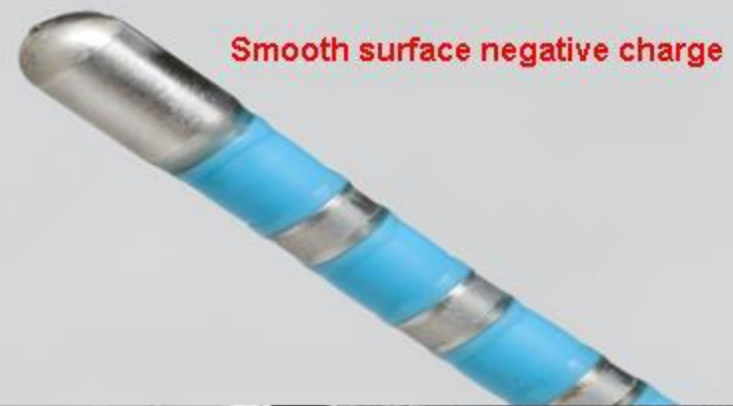


Complications

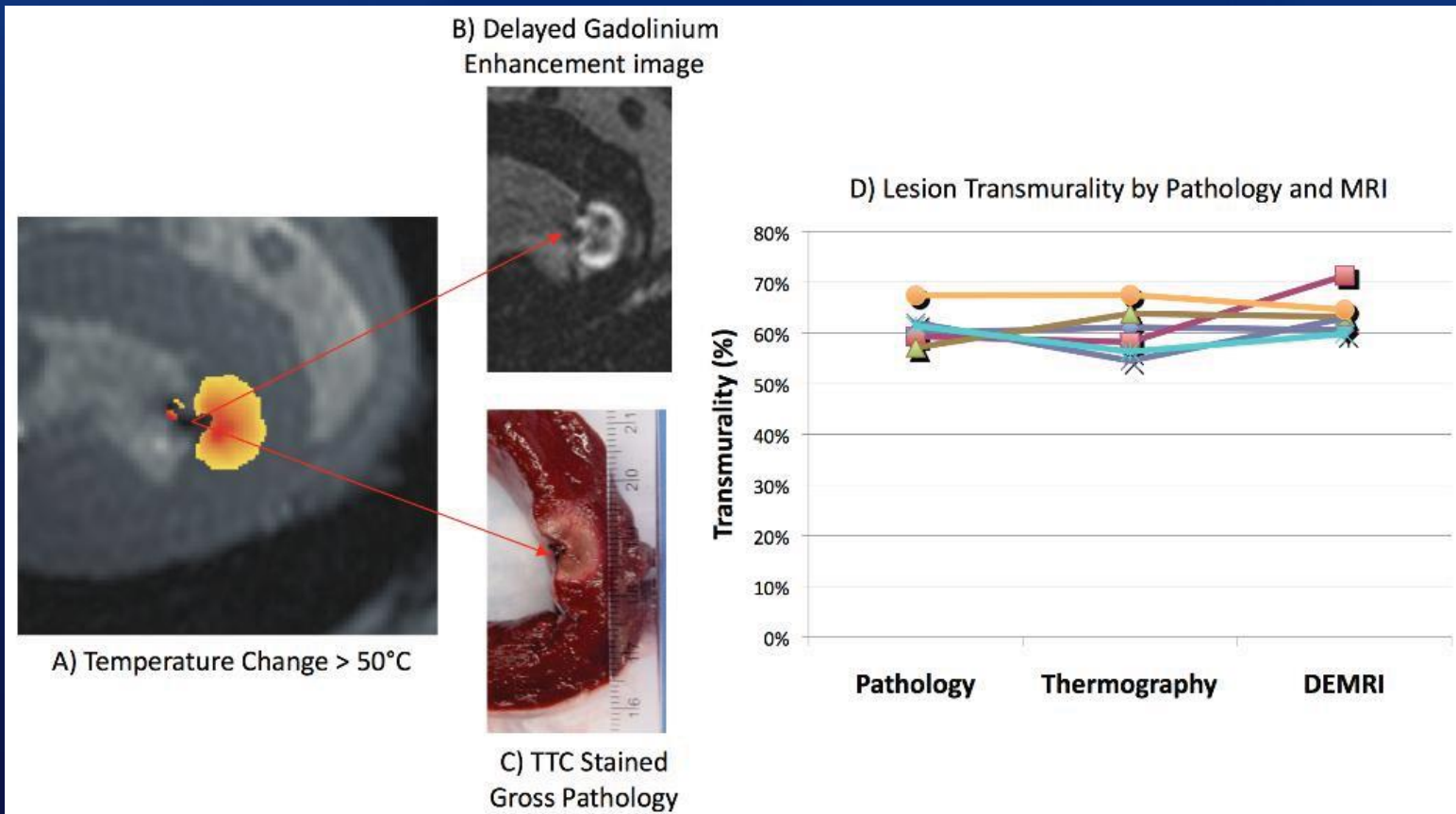




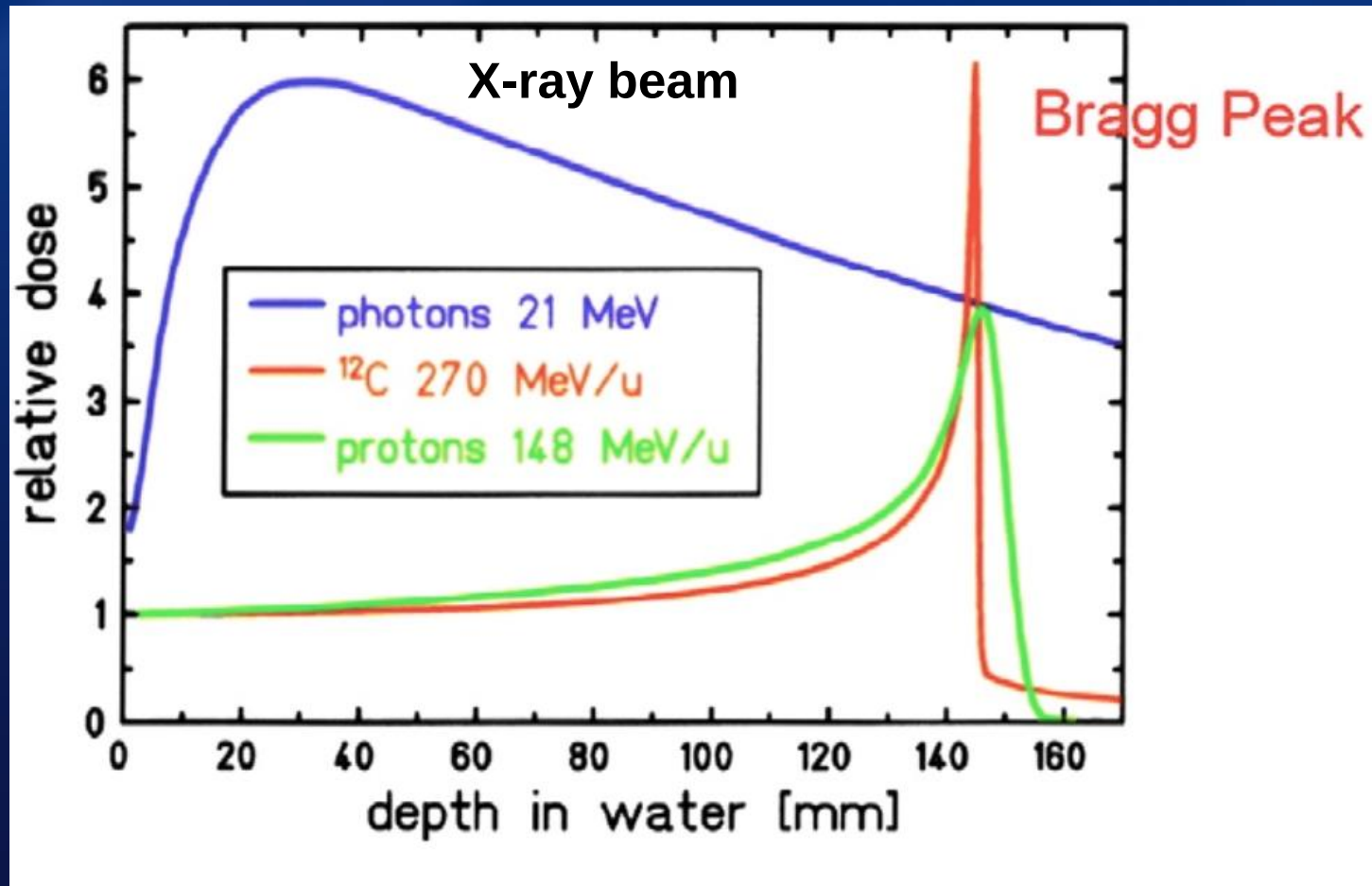
© Mayo Clinic



Non-invasive Assessment of Tissue Heating During Cardiac Radiofrequency Ablation Using MRI Thermography



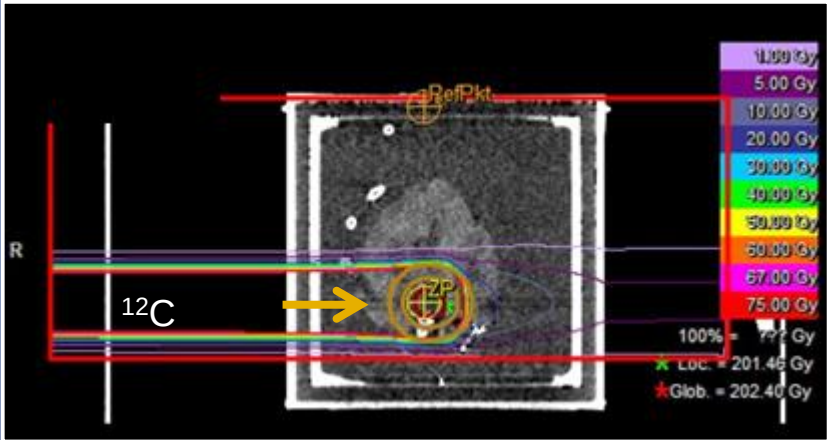
Bragg Peak



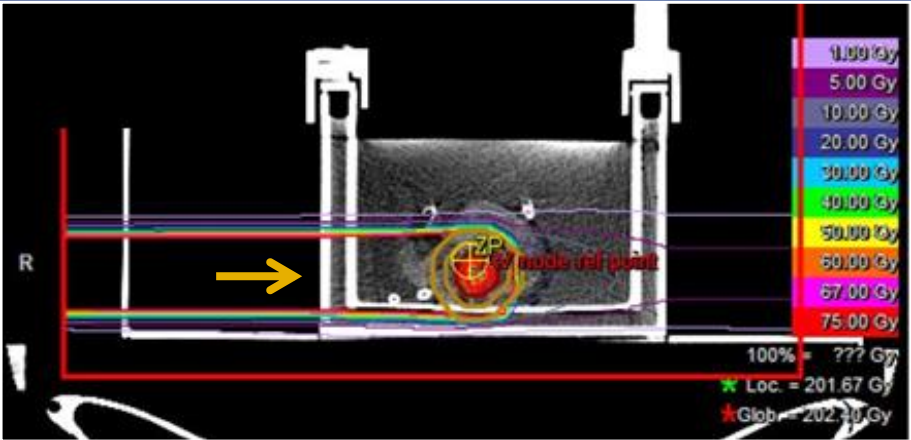
Bert et al. Medical Phys. 2012 Apr;39(4):1716-27

Contouring and Carbon Ion Beam Treatment Planning Outcome

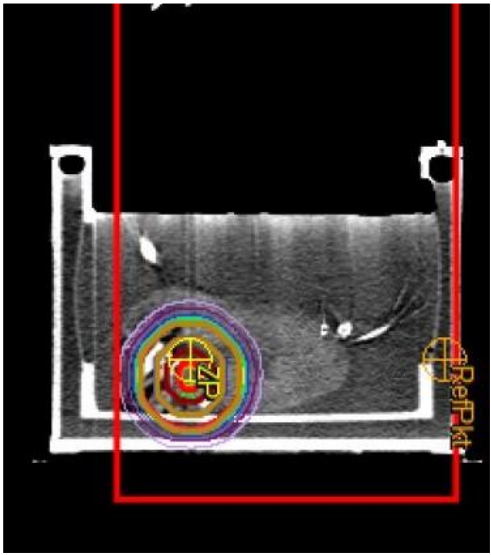
Transverse view



Coronal view



Sagittal view



Treatment planning: contoured volume dissected into its voxels, optimal amount of accelerator energies, scanning in x- and y- dimension are determined

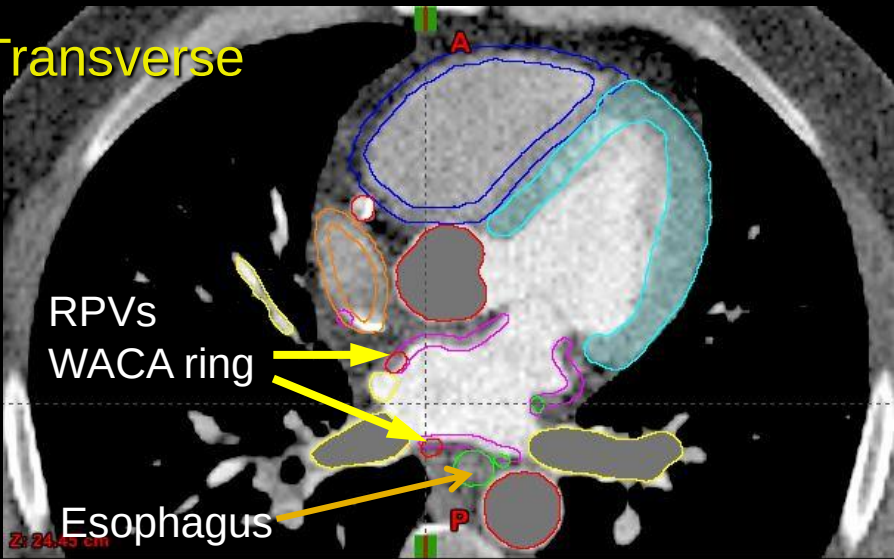
Target volume outcomes:

AV node contour (cm ³)	Treated volume (cm ³)	Volume Coverage
1.0 ± 0.3	25 ± 2	100%

WACA Contouring Outcome

Lesion Dimension = 6x6 mm

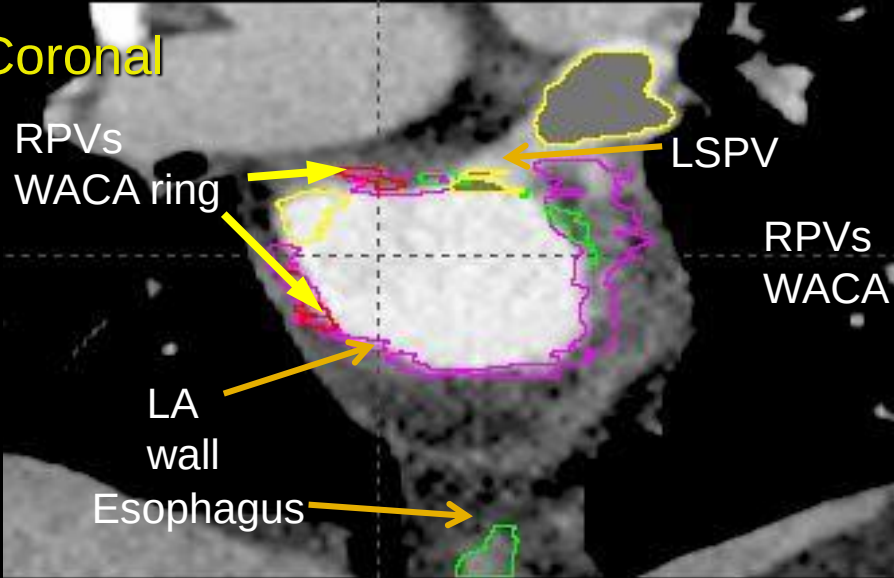
Transverse



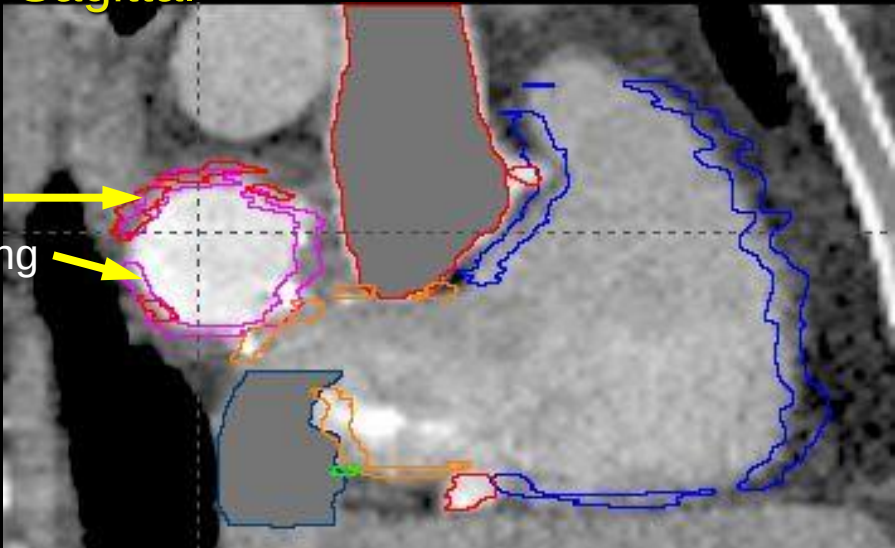
WACA-ring metrics (0% RR)

Dimension	Mean $\pm$ SD (mm)
• RPVs ant.-post.	34.6 $\pm$ 4.2
• RPVs sup.-inf.	33.8 $\pm$ 5.8
• LPVs ant.-post.	28.4 $\pm$ 4.3
• LPVs sup.-inf.	29.1 $\pm$ 5.7

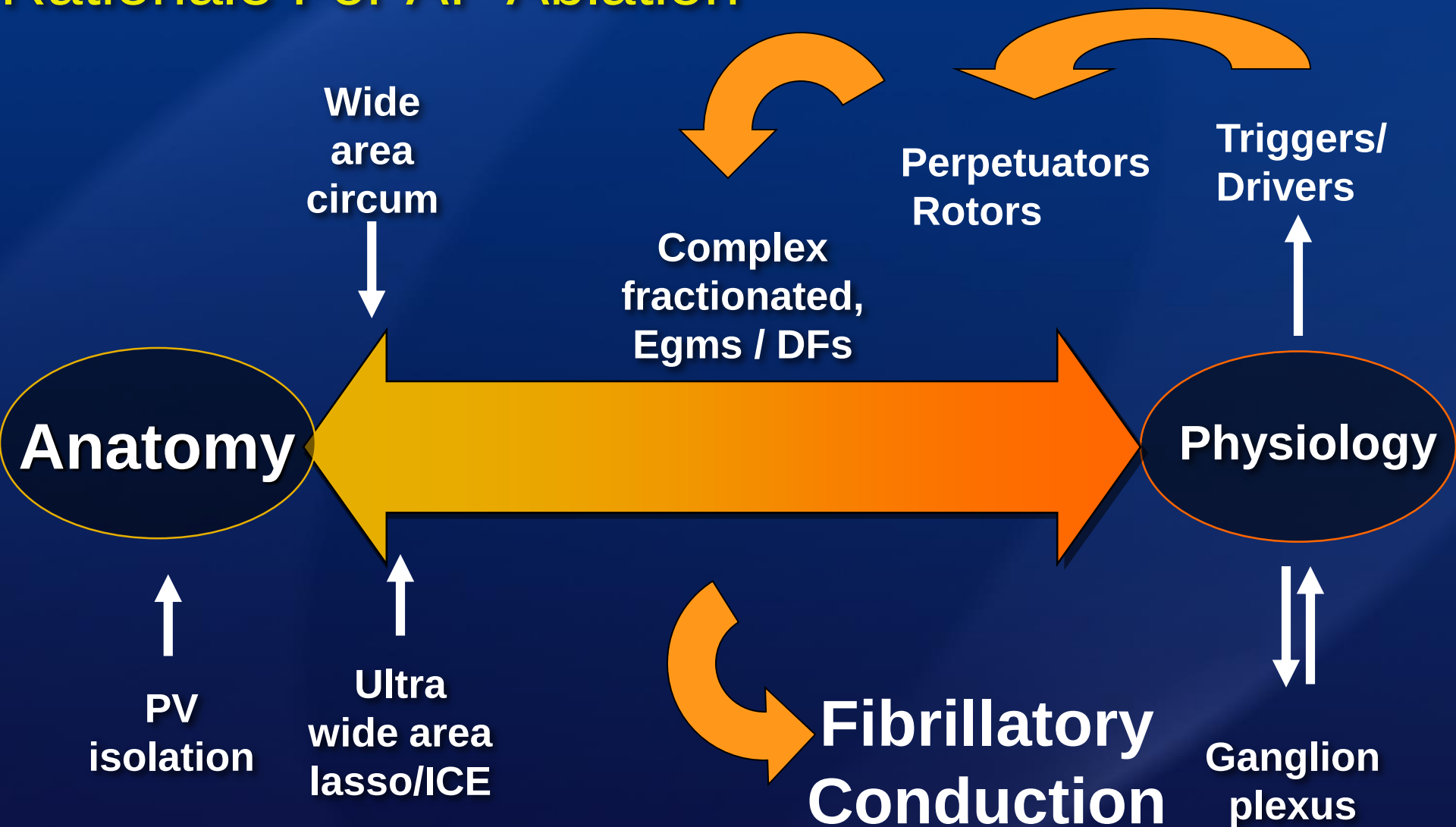
Coronal



Sagittal

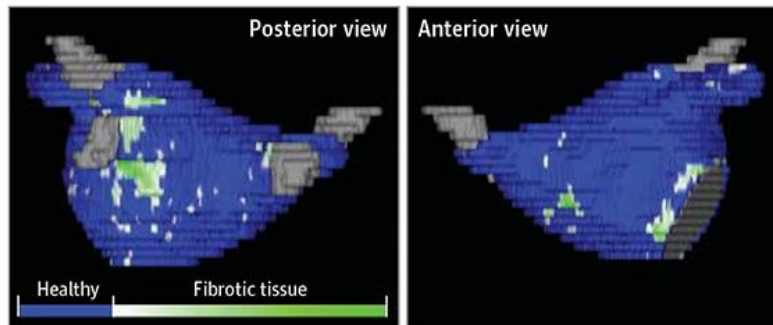


Rationale For AF Ablation

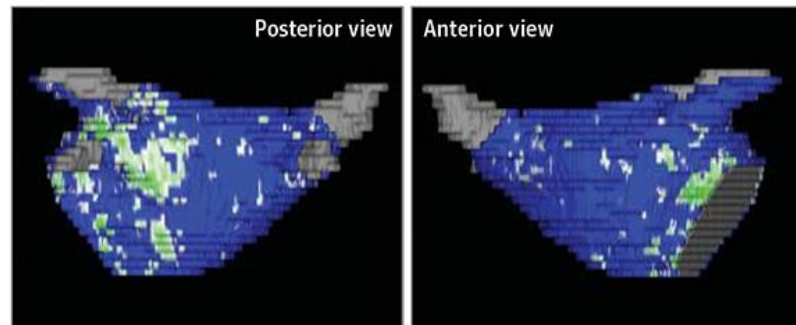


Four Stages of Left Atrial Tissue Fibrosis Based on 3D Delayed Enhancement MRI Scans

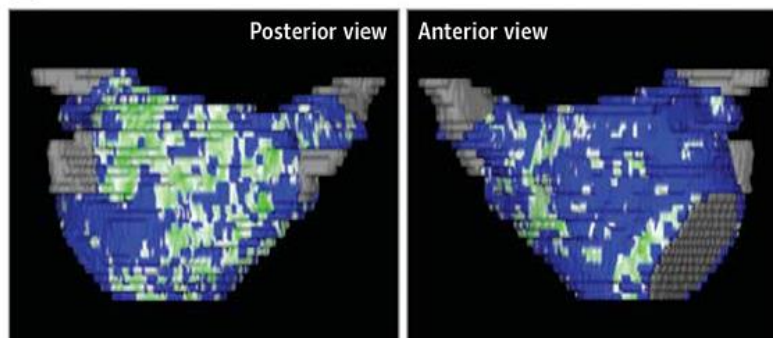
A Stage 1 (<10% of atrial wall)



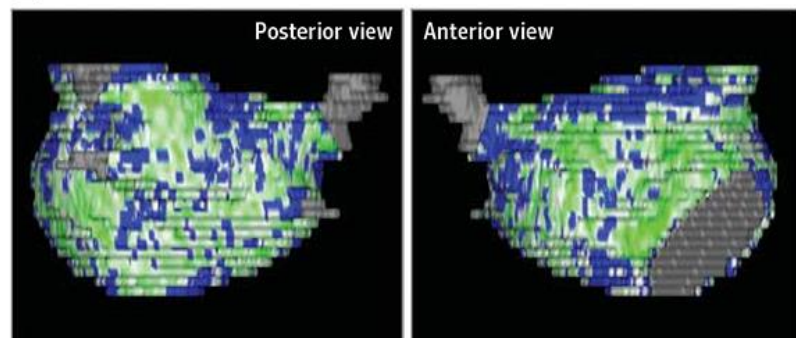
B Stage 2 ($\geq 10\%$ -<20% of atrial wall)



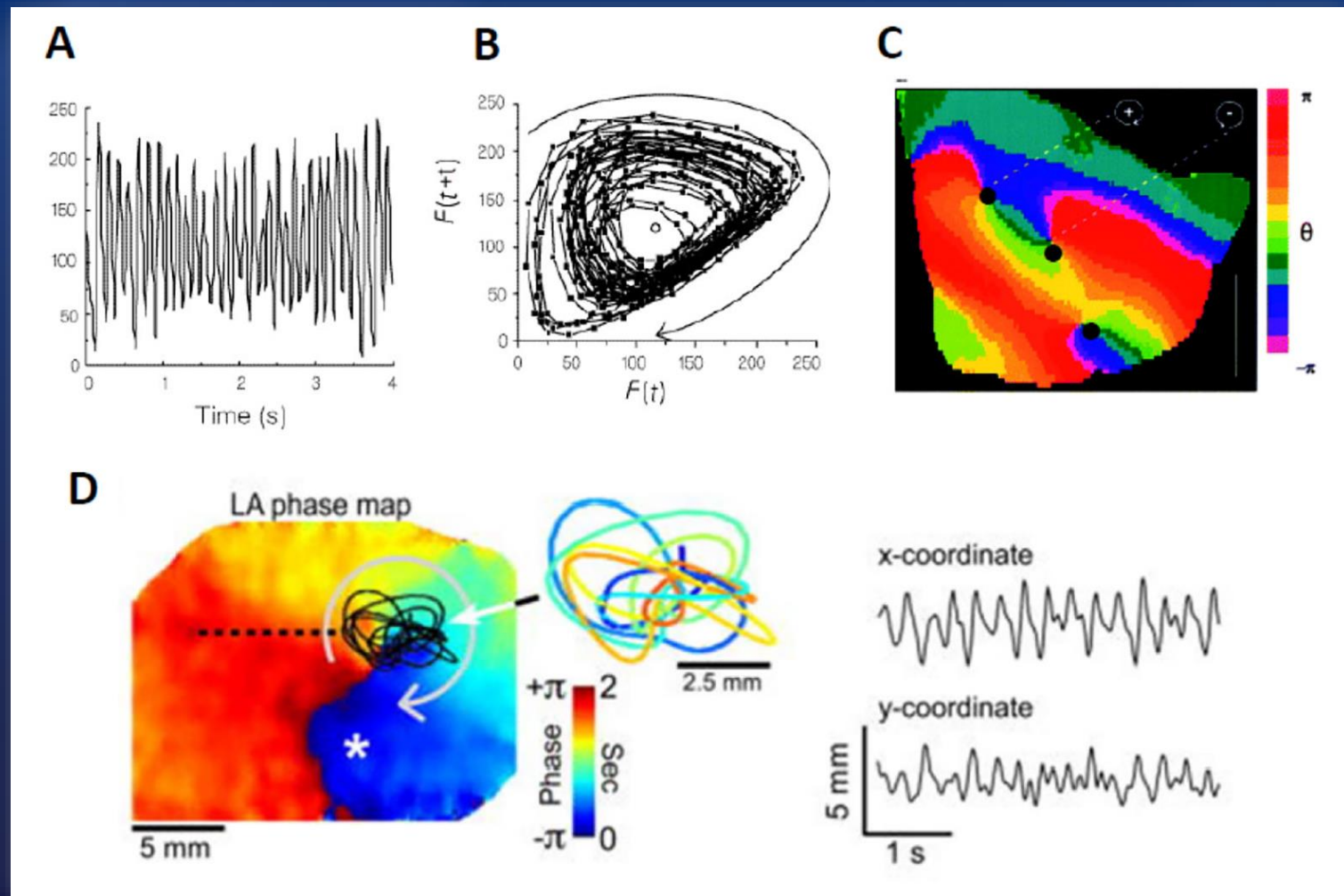
C Stage 3 ($\geq 20\%$ -<30% of atrial wall)



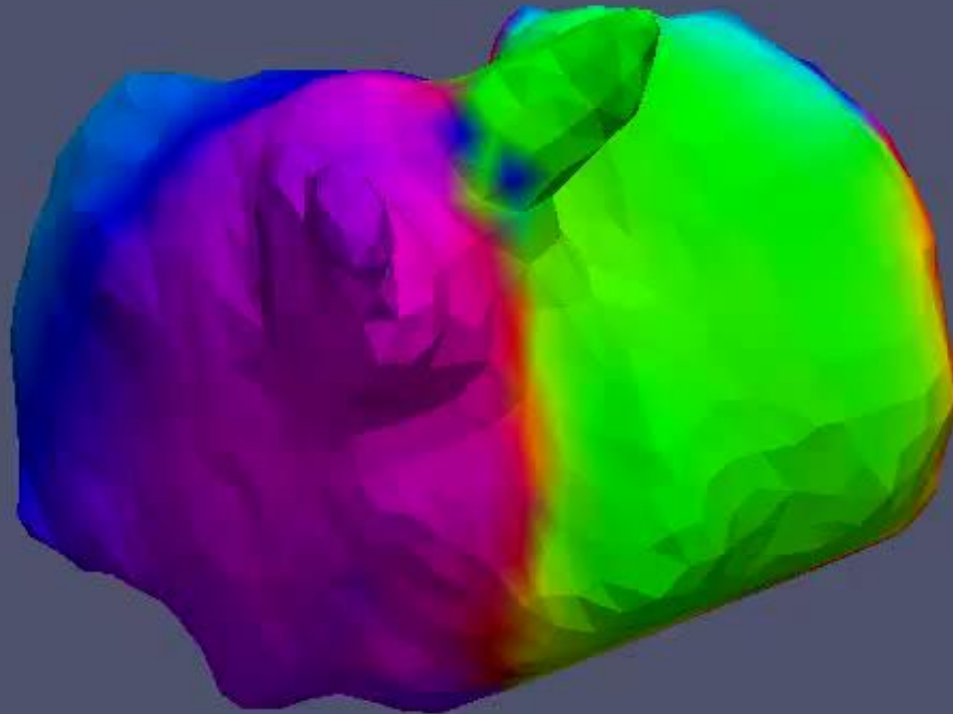
D Stage 4 ($\geq 30\%$ of atrial wall)



Singularity Points Revealed by Phase Plane Analysis

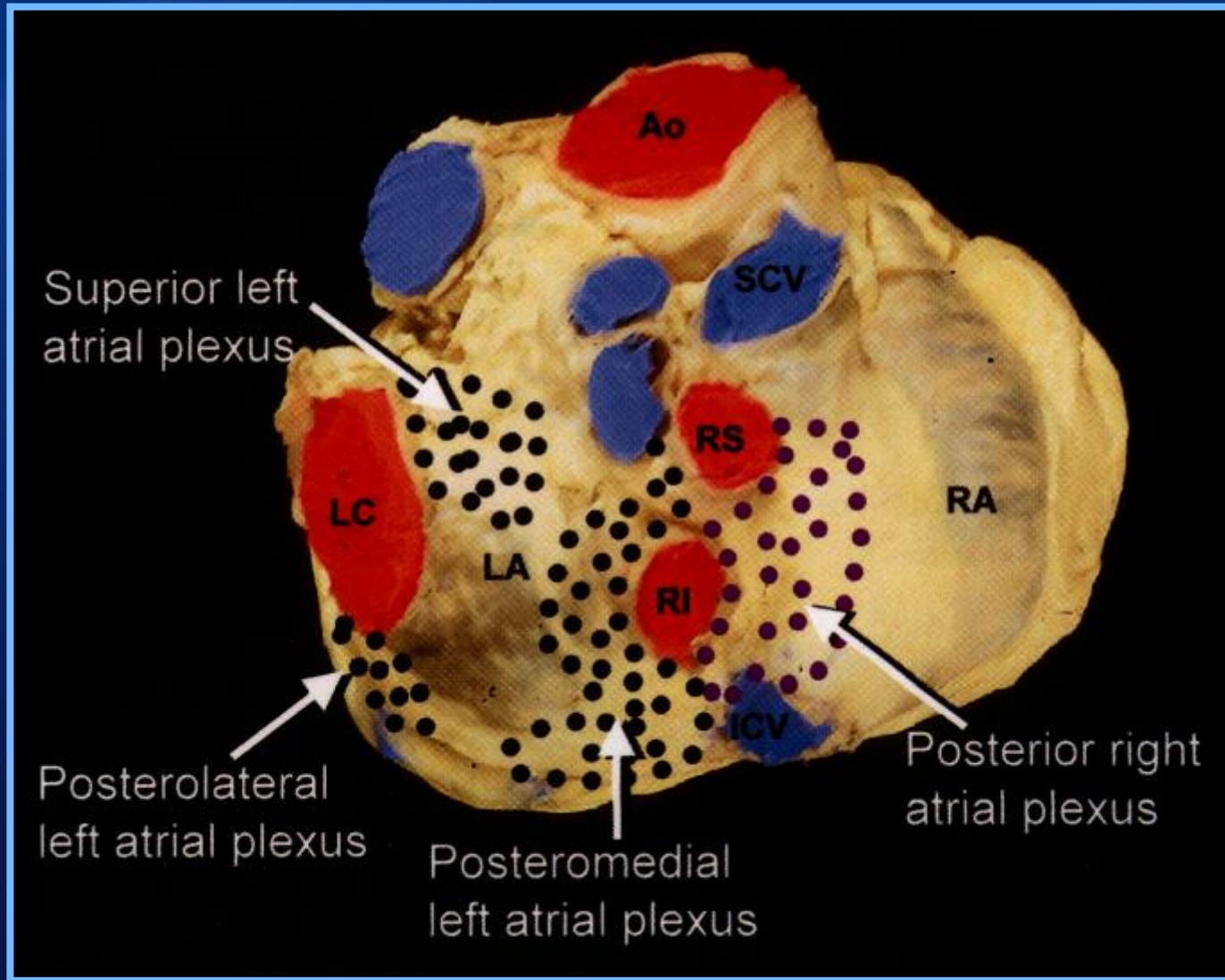


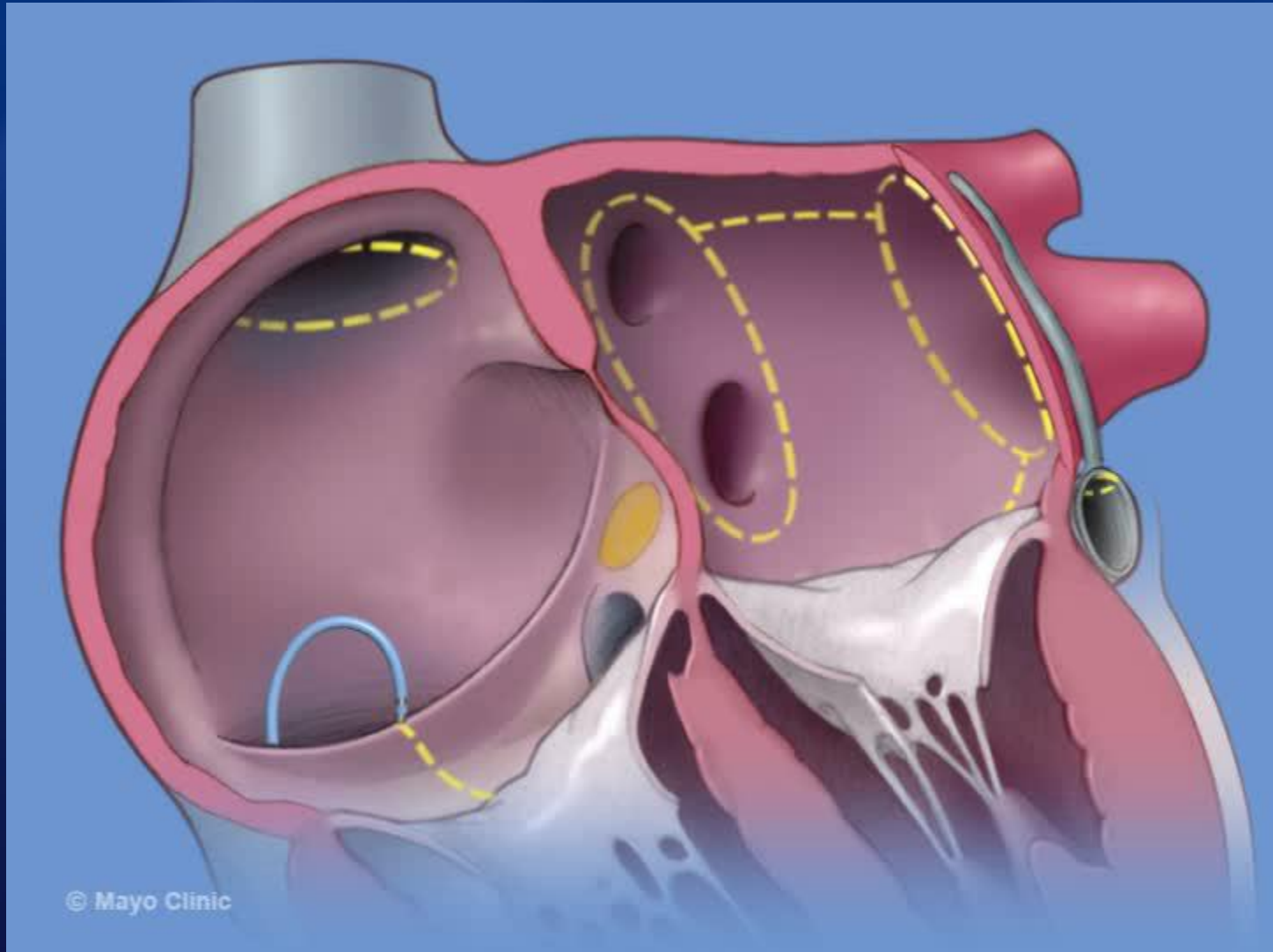
Peter Locations

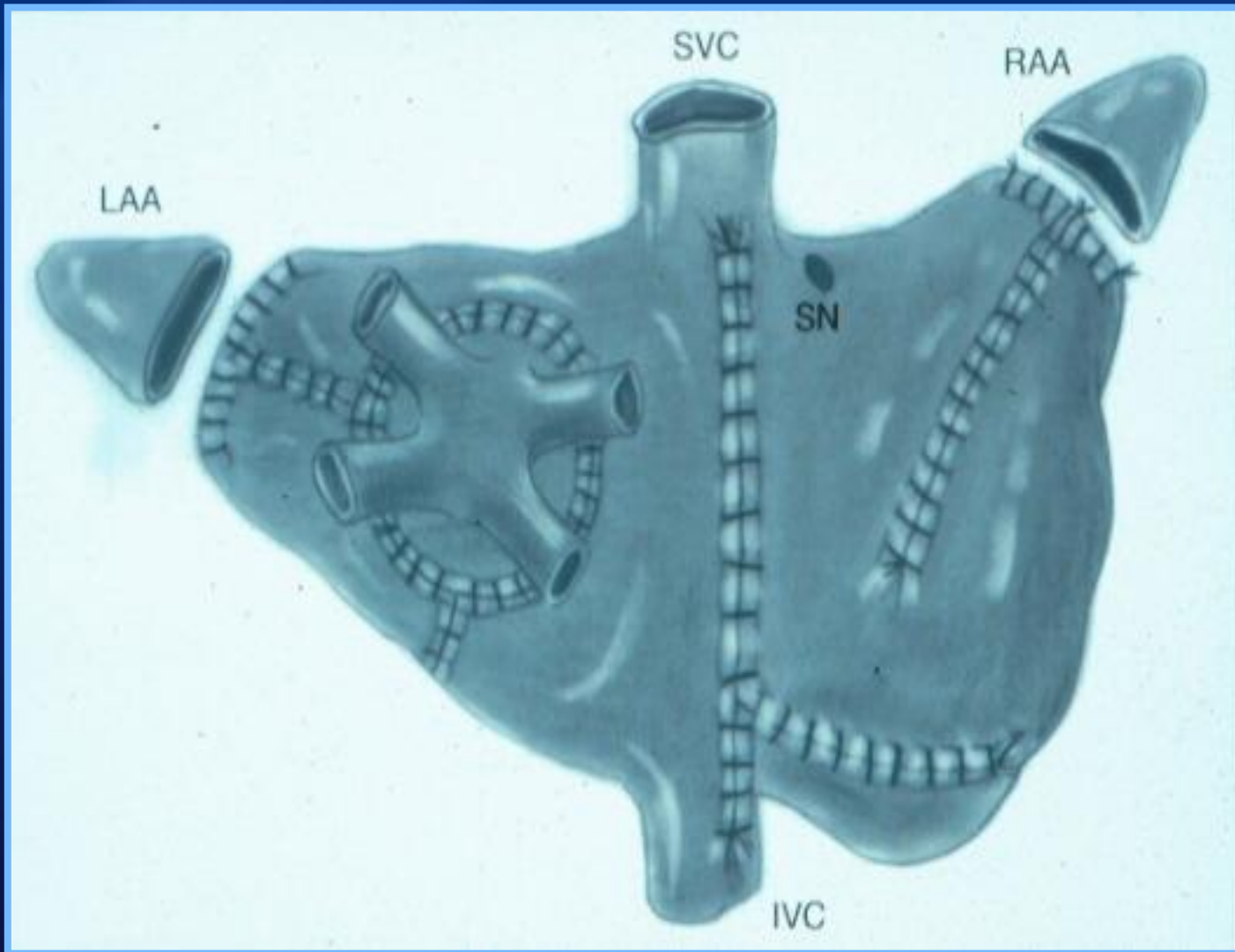


Time: 117ms

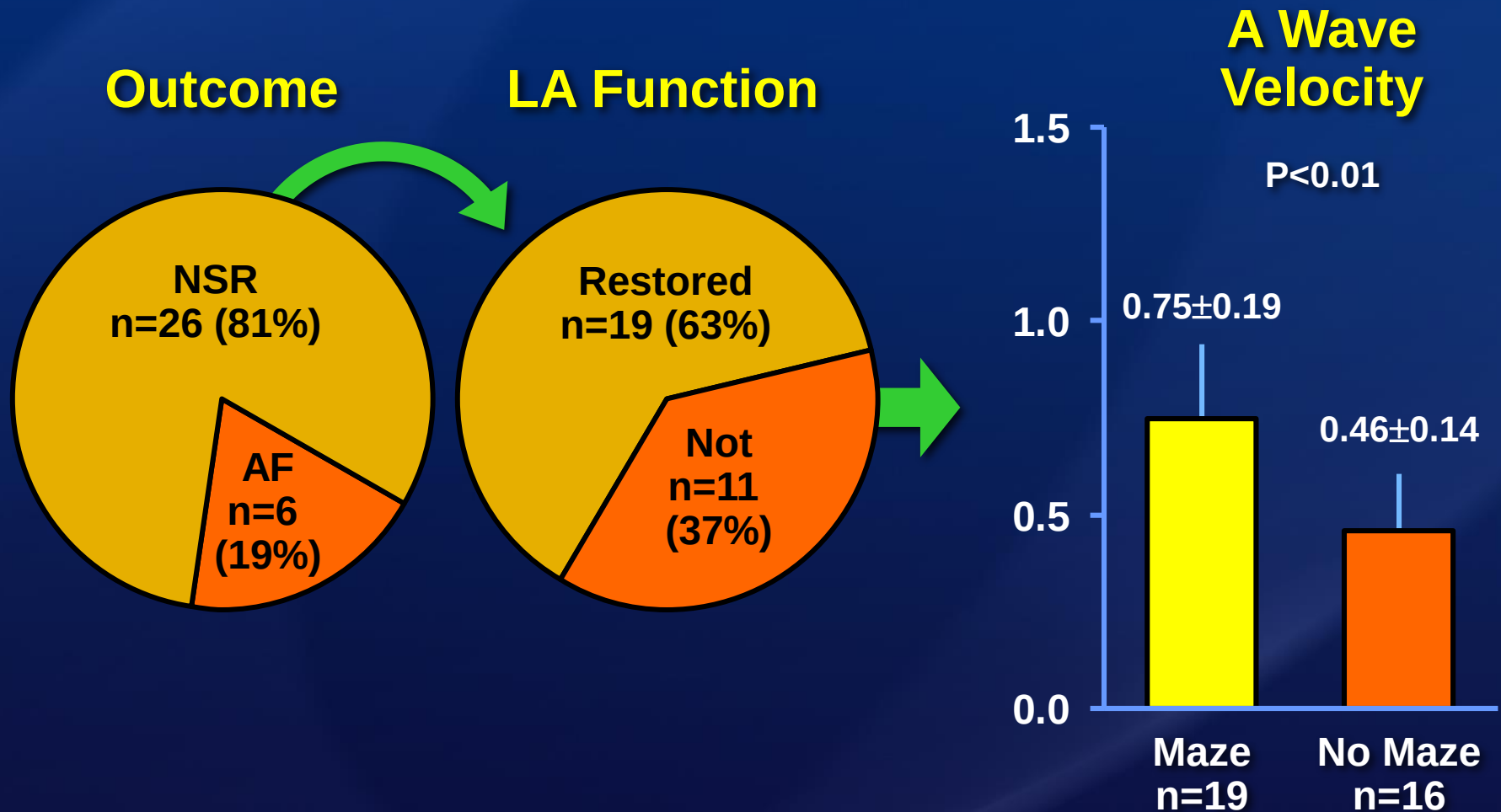
Distribution of Atrial Ganglionated Plexuses



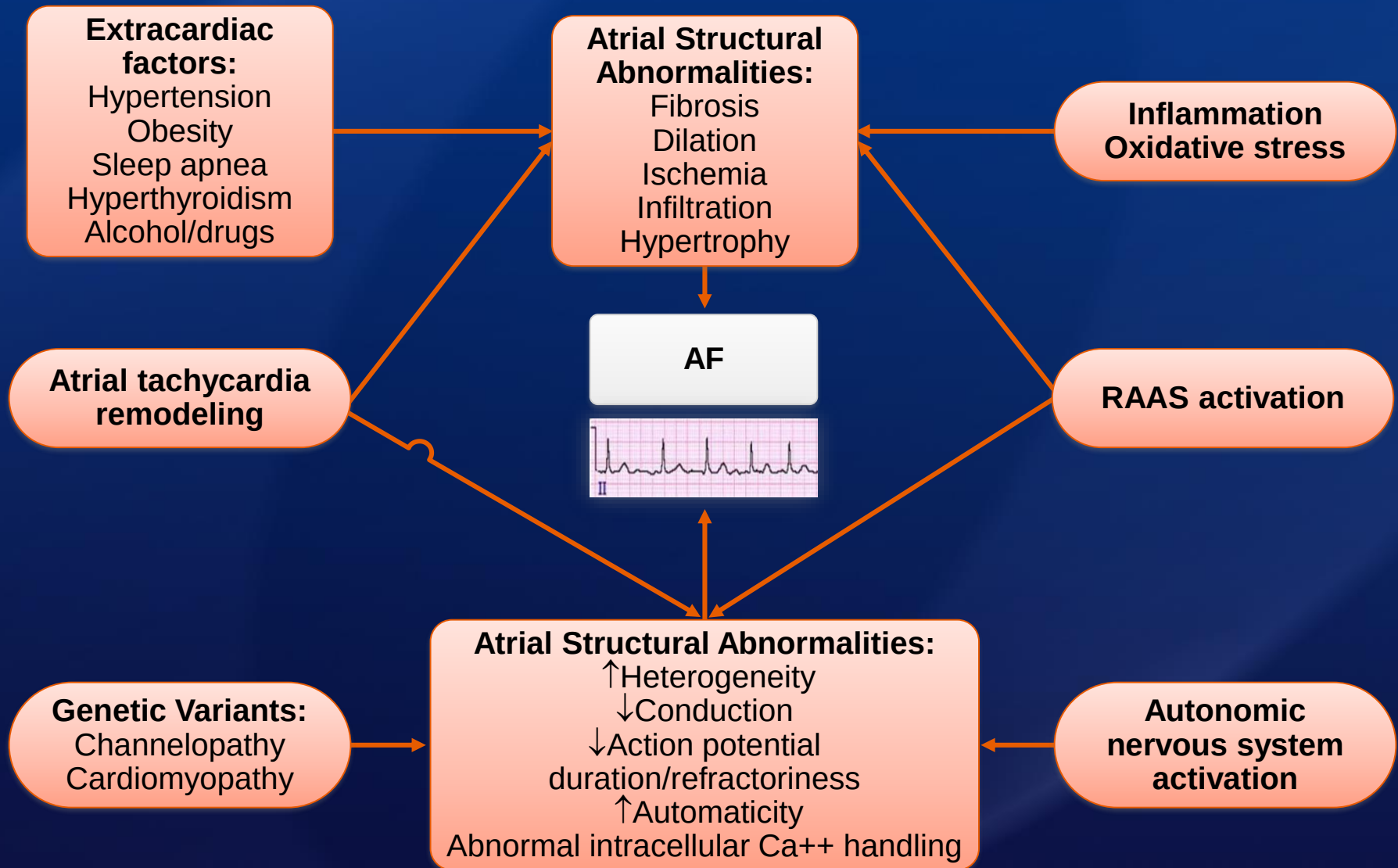




Restoration of Atrial Mechanical Function After the Surgical Maze Procedure



Mechanisms of AF





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