Techniques spécifiques au traitement de la fibrillation auriculaire

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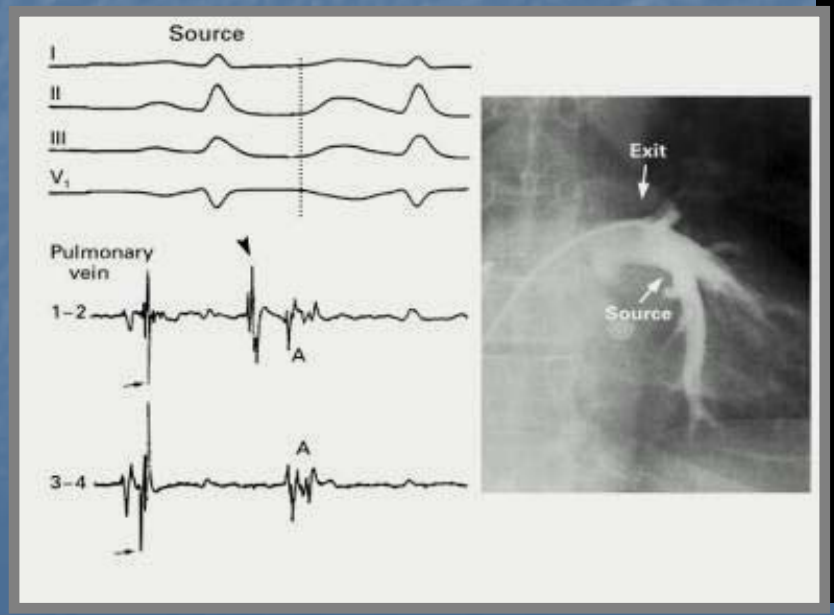
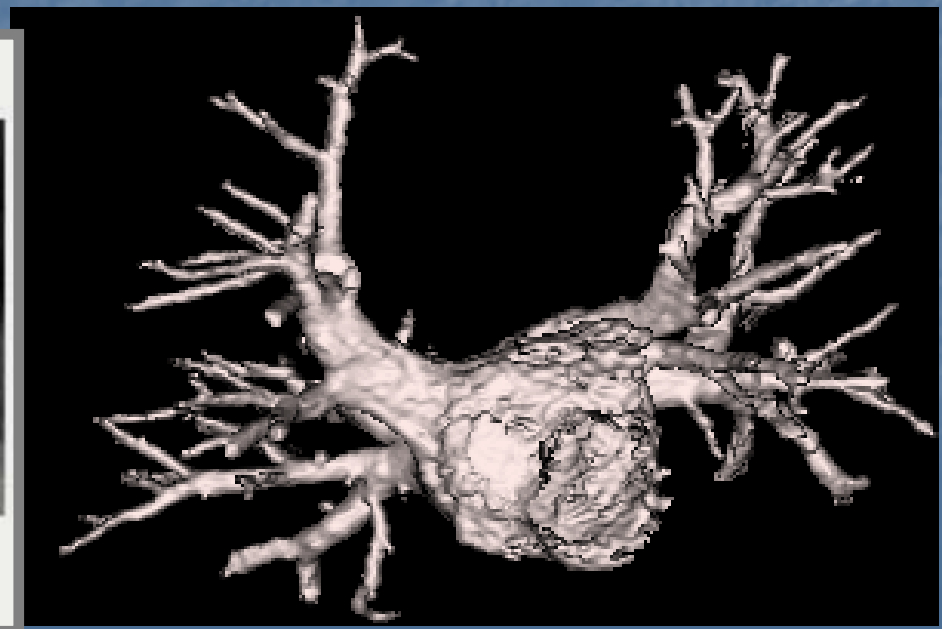
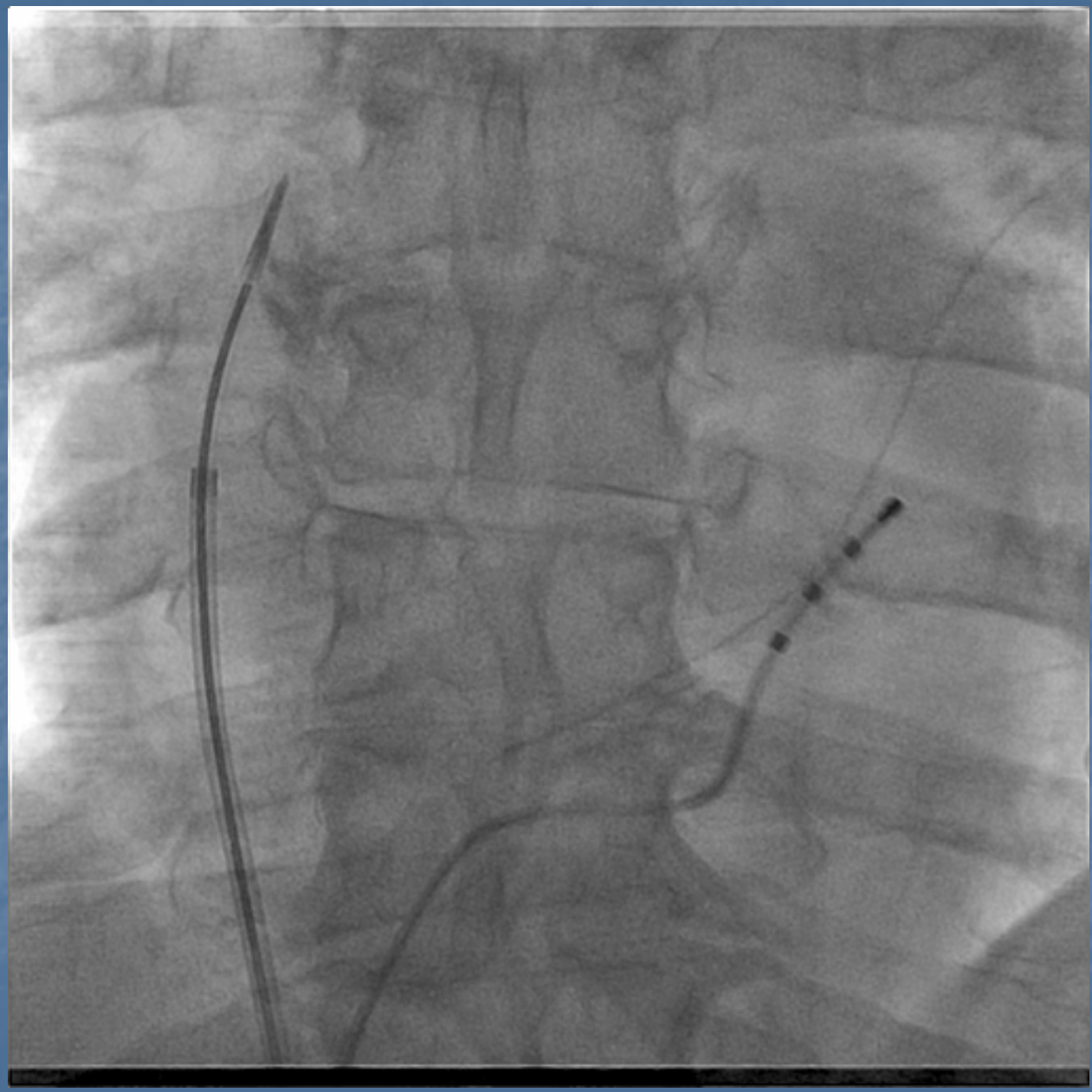
1 µSievert for 40 min Fluoro
No lead apron or thyroid shield

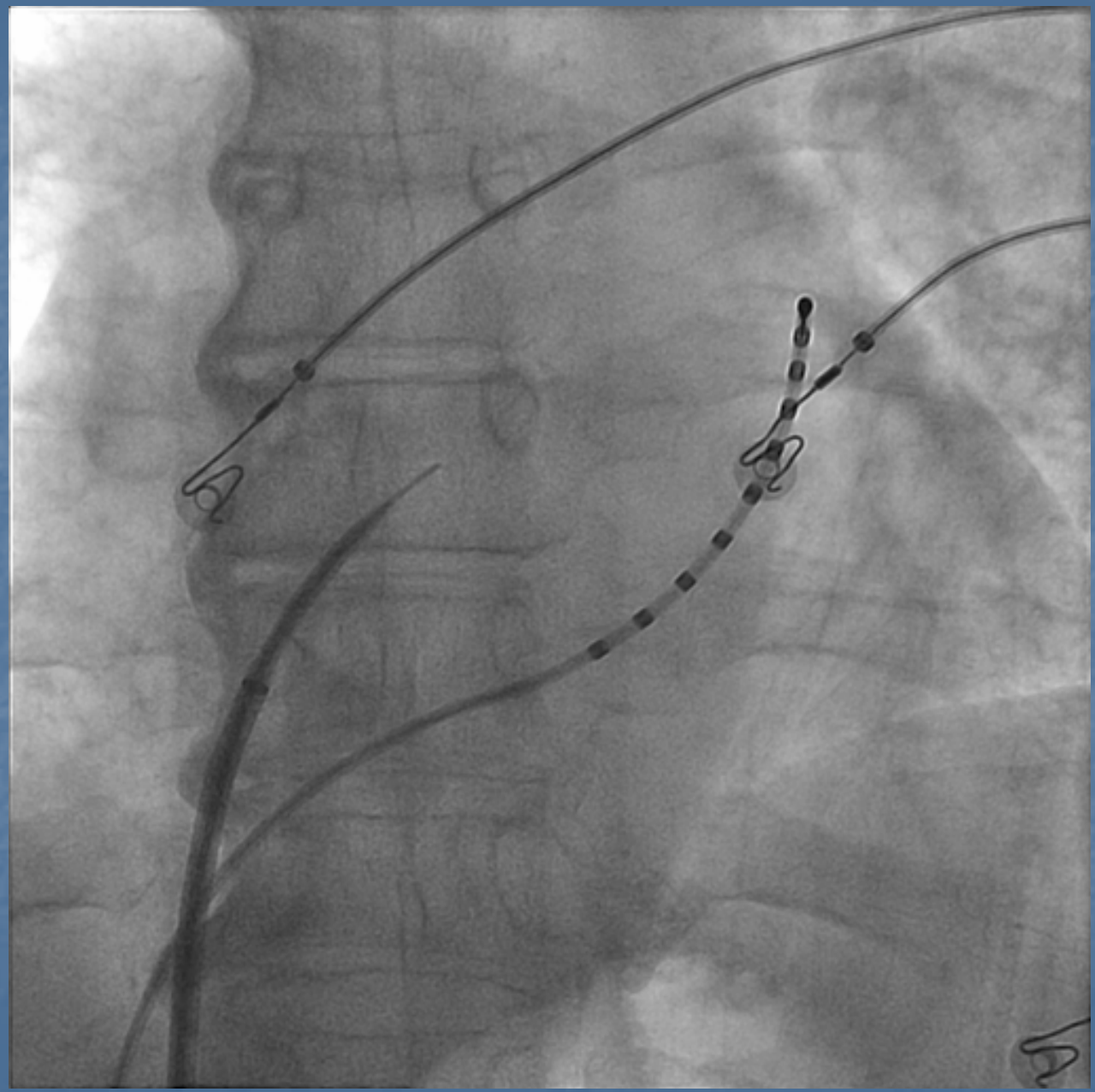
Paroxysmal AF initiation

- Haissaguerre, et al, *N Eng J Med* 339:659 (1998)
- 45 patients with frequent episodes of AF
- Resistant to at least 2 antiarrhythmic drugs

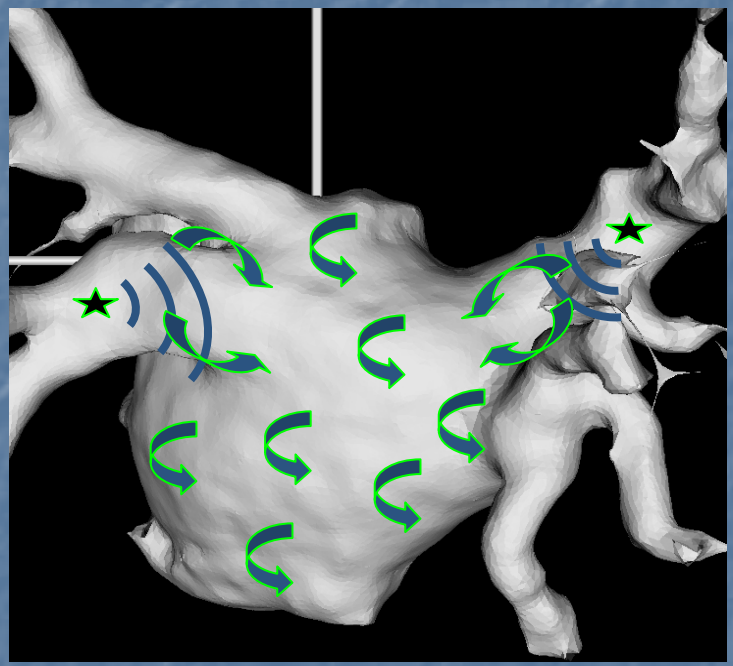




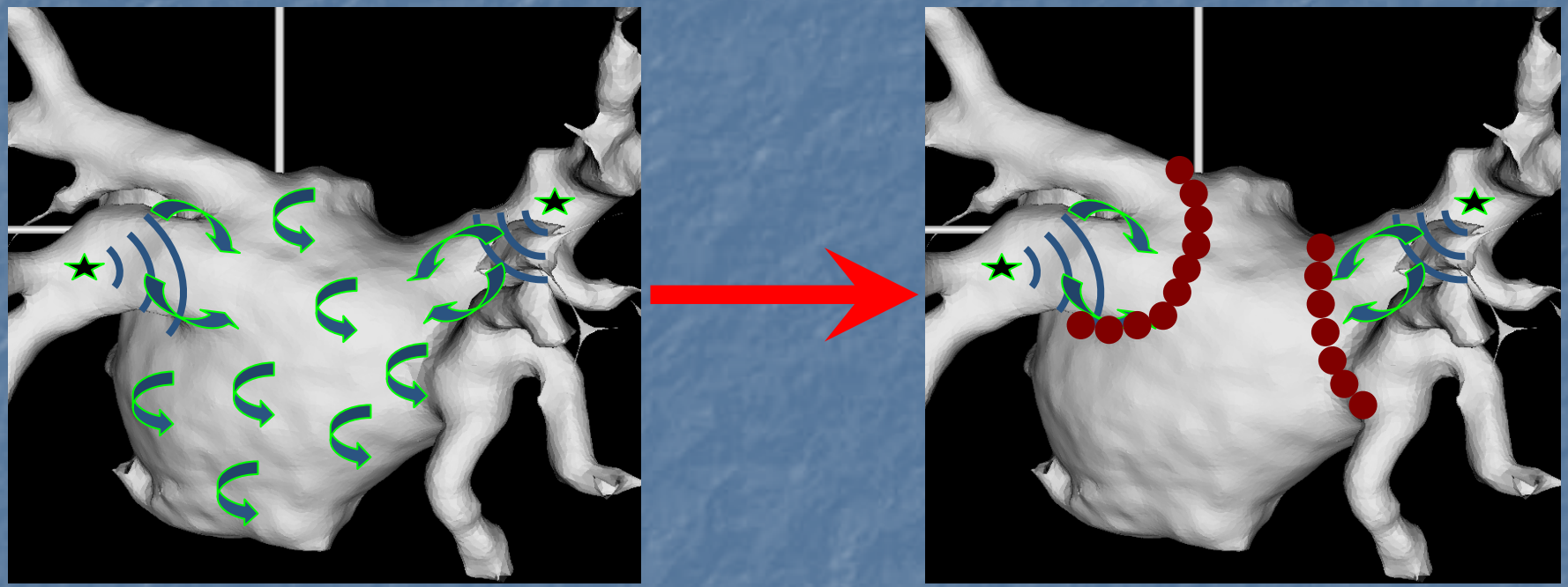


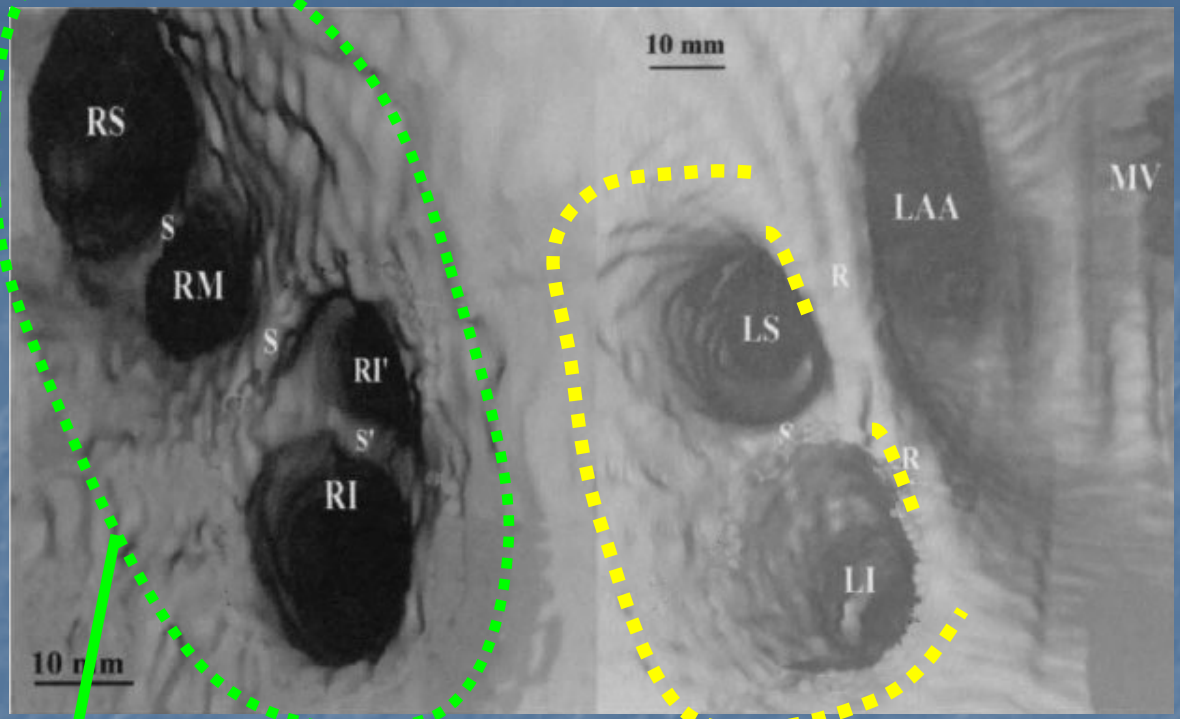


Paroxysmal AF



Paroxysmal AF

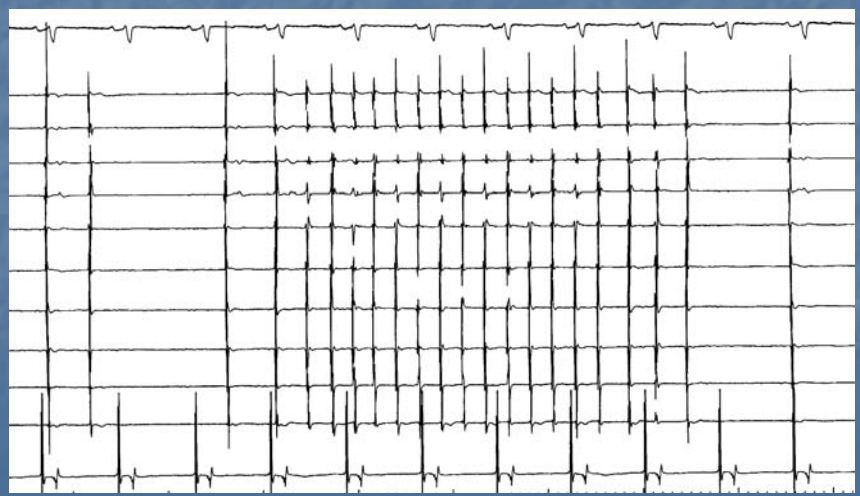




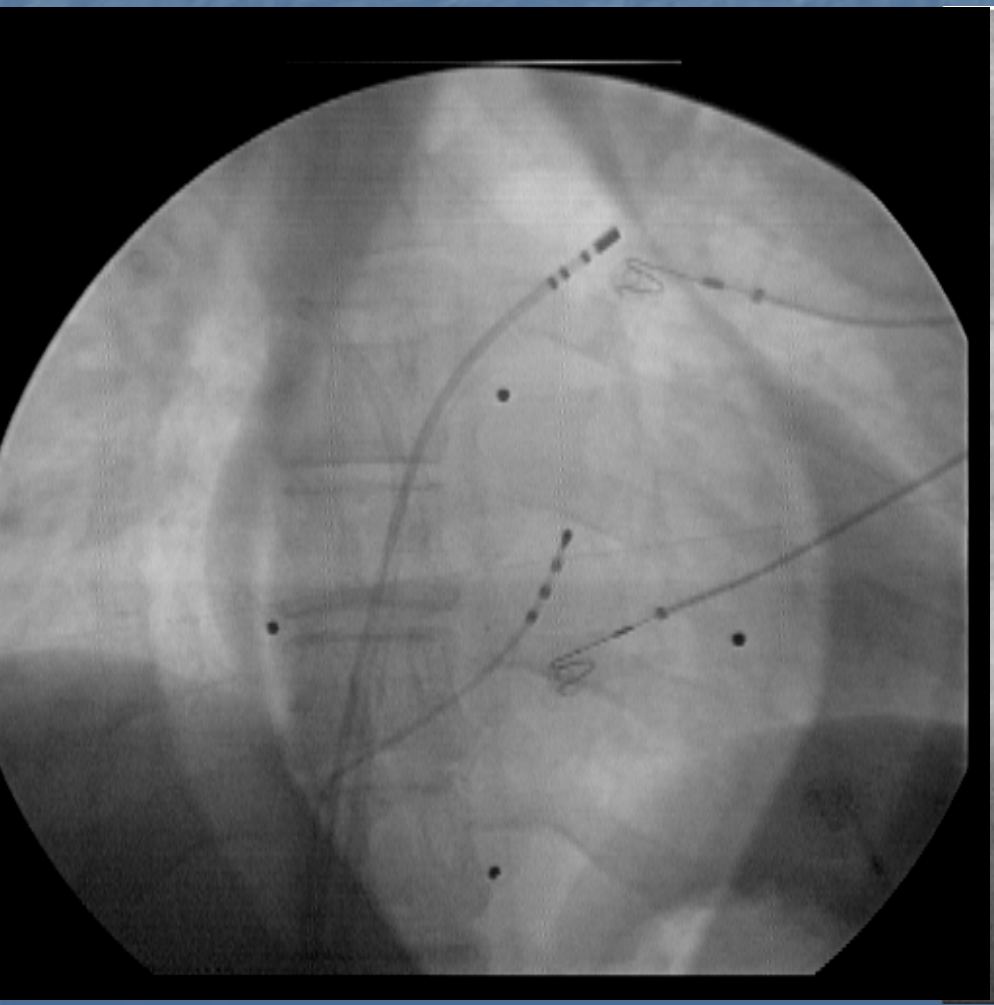
V1

Lasso RIPV

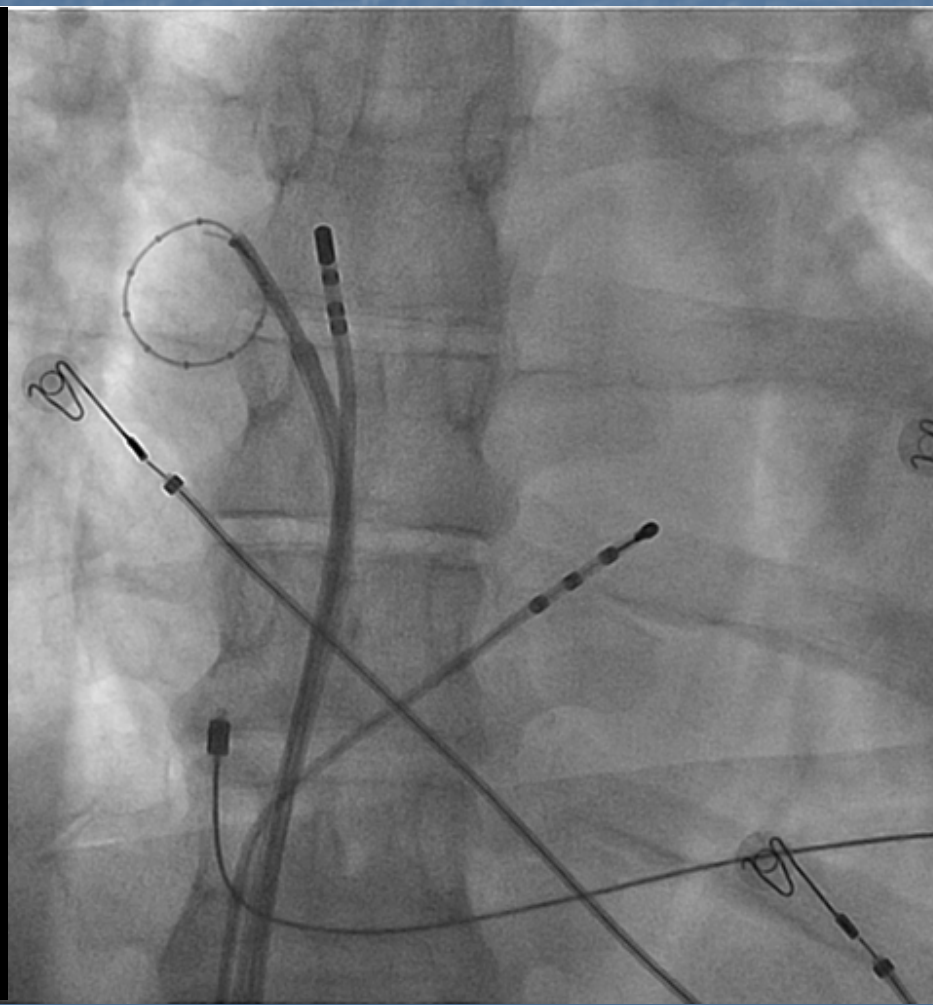
CS



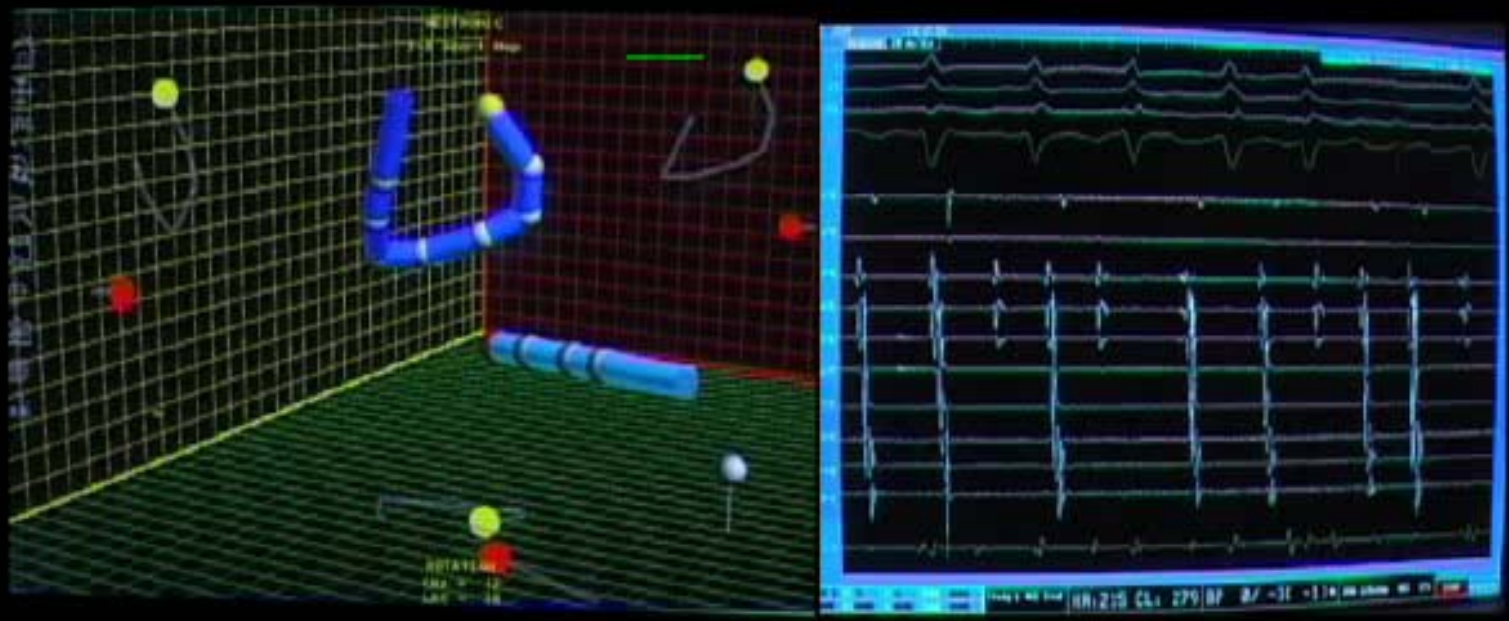
RPV Angio and Isolation



AP view



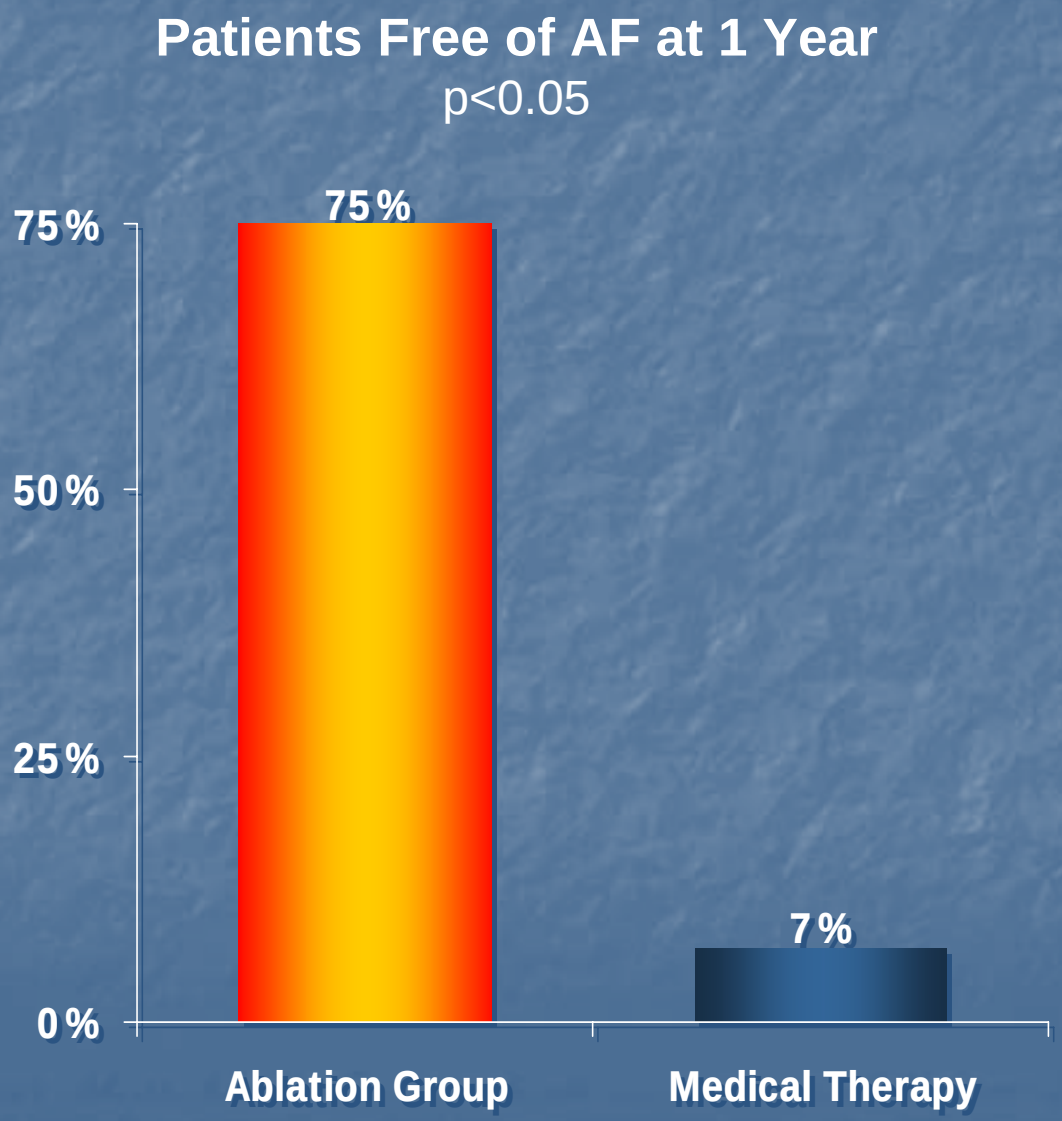
AP view



Atrial Fibrillation Ablation vs Antiarrhythmic Drugs Trial (*A-4* Trial)

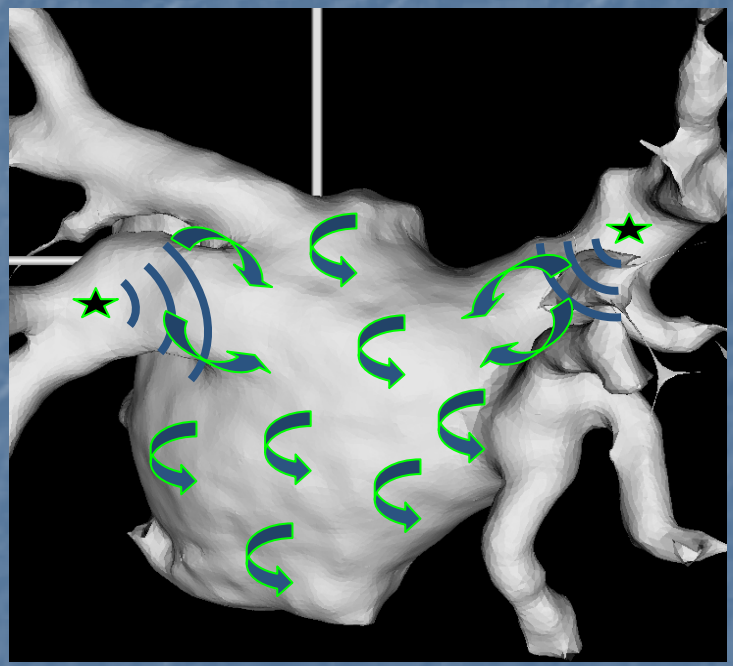
- **Multicenter, Unblinded, Randomized Trial**
  - Presented at the 2006 HRS Sessions: Pierre Jais
  - A comparison of catheter ablation with AADs in AF patients who failed at least one AAD
- **Primary Endpoint: Absence of AF (> 3 min)**
- **Enrolled patients:**
  - 112 pts with symptomatic Paroxysmal AF > 6 months
  - Resistant to ≥1 AADs (Class I or III)
  - At least 2 episodes of AF per month
- **Protocol:**
  - Randomization: Ablation (53 pts) or AADs (59 pts)
  - Crossover from AADs to Ablation at 3 months

A-4 Trial: Outcome

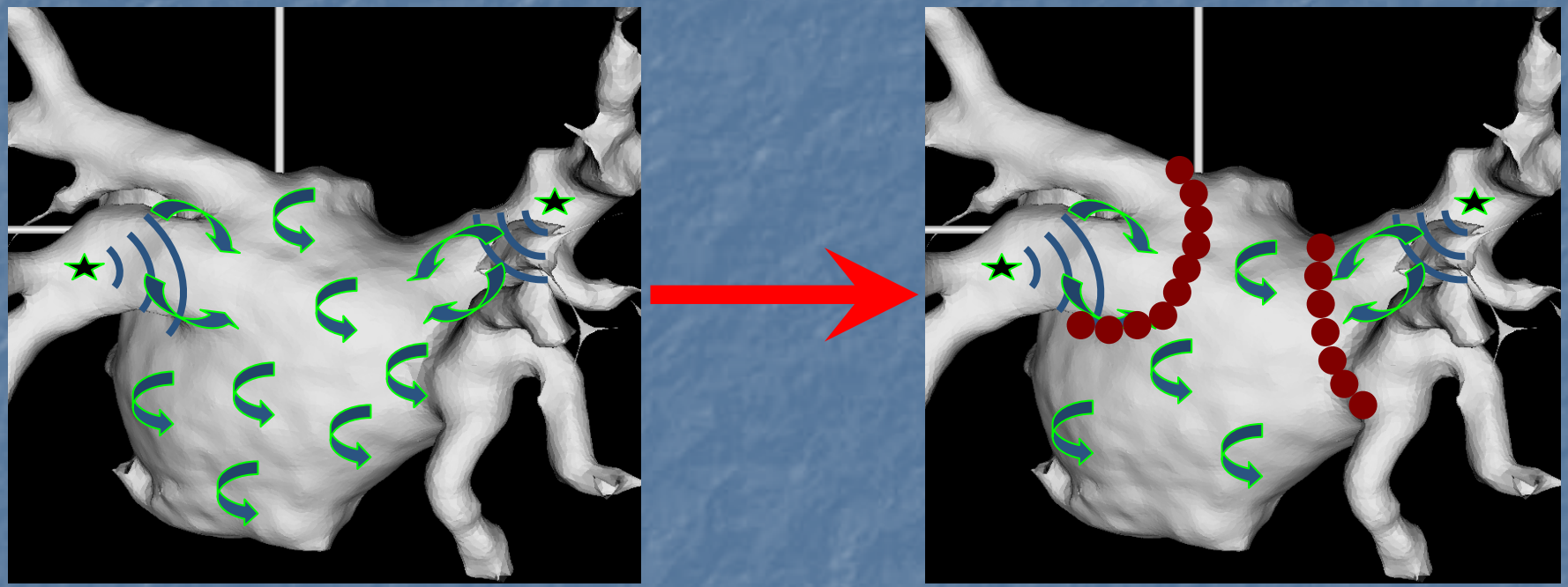


- **Anticoagulation therapy was interrupted in:**
  - Ablation group → 60%
  - AAD group → 25%
- **Quality of life:**
  - 6 of 8 parameters improved in the ablation group
- **Complications:**
  - Ablations in 90 pts
  - 155 procedures
    → 2 cases of tamponade

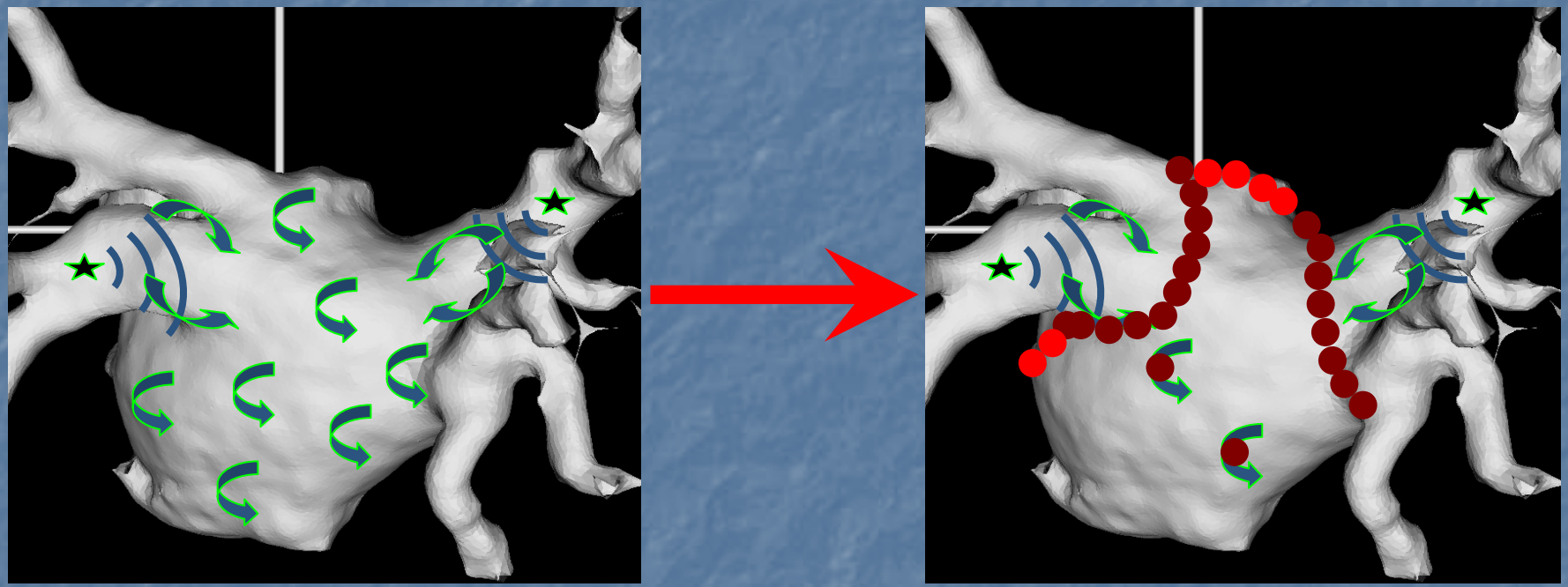
Chronic AF



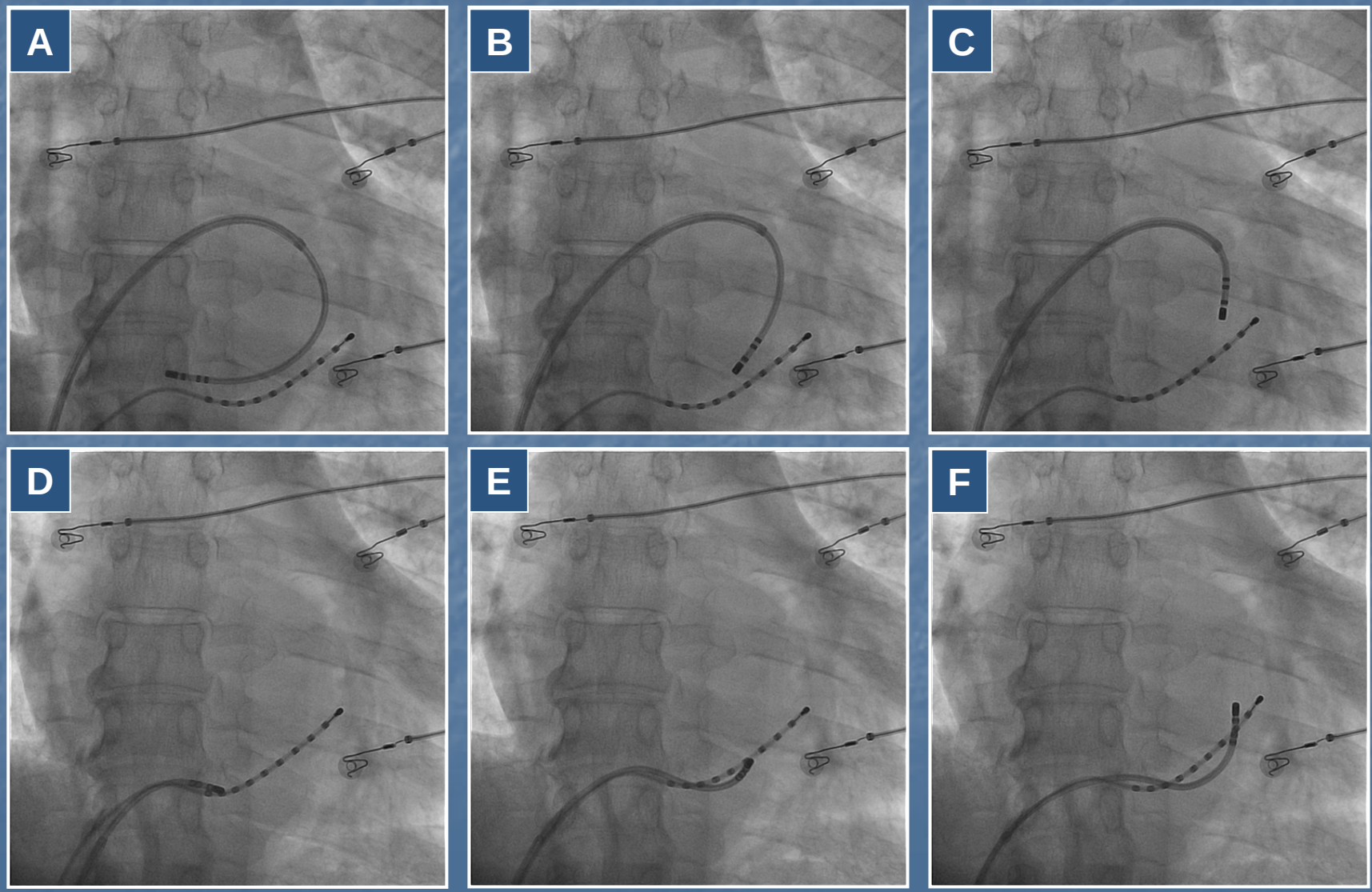
Chronic AF



Chronic AF

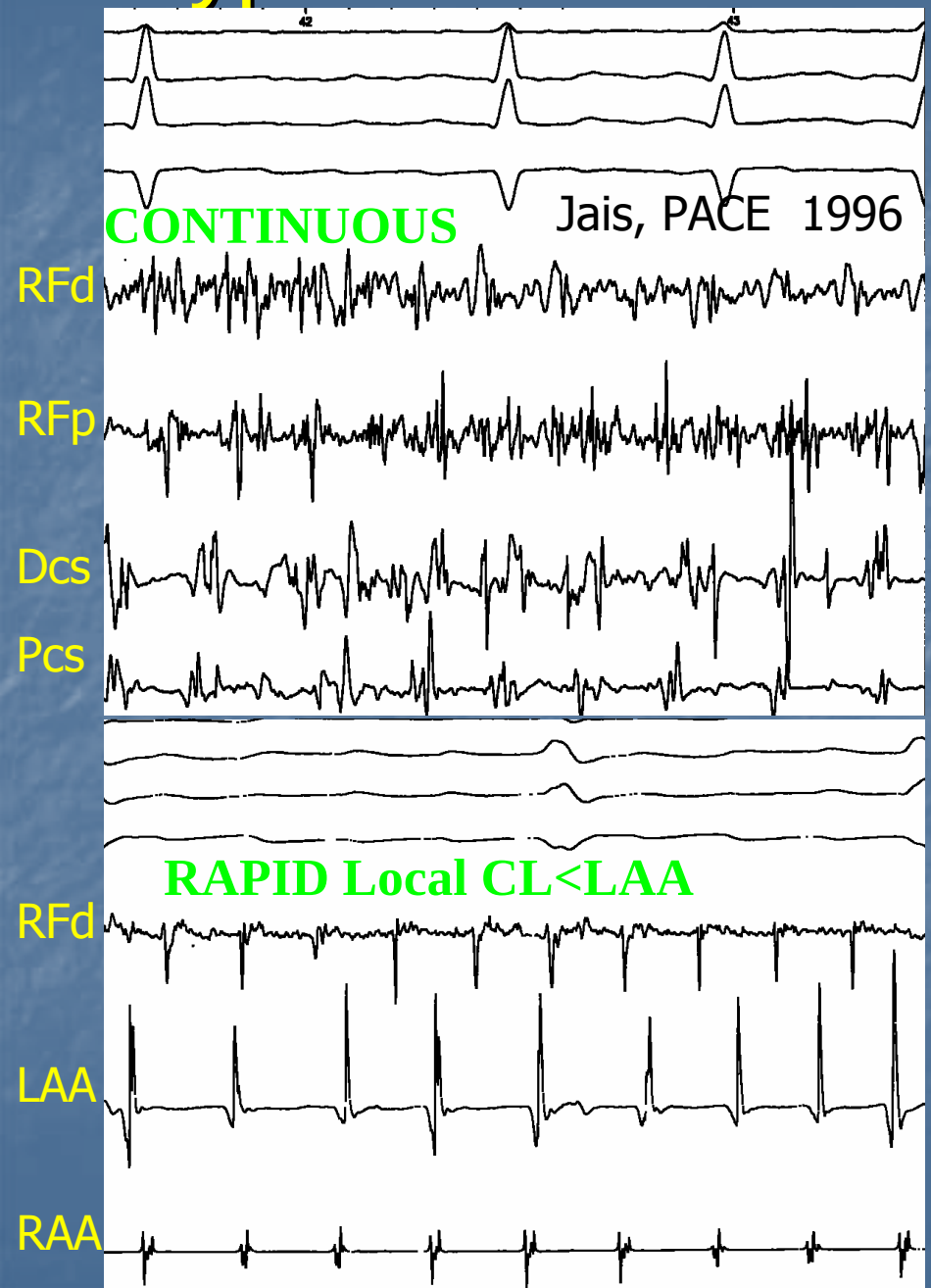


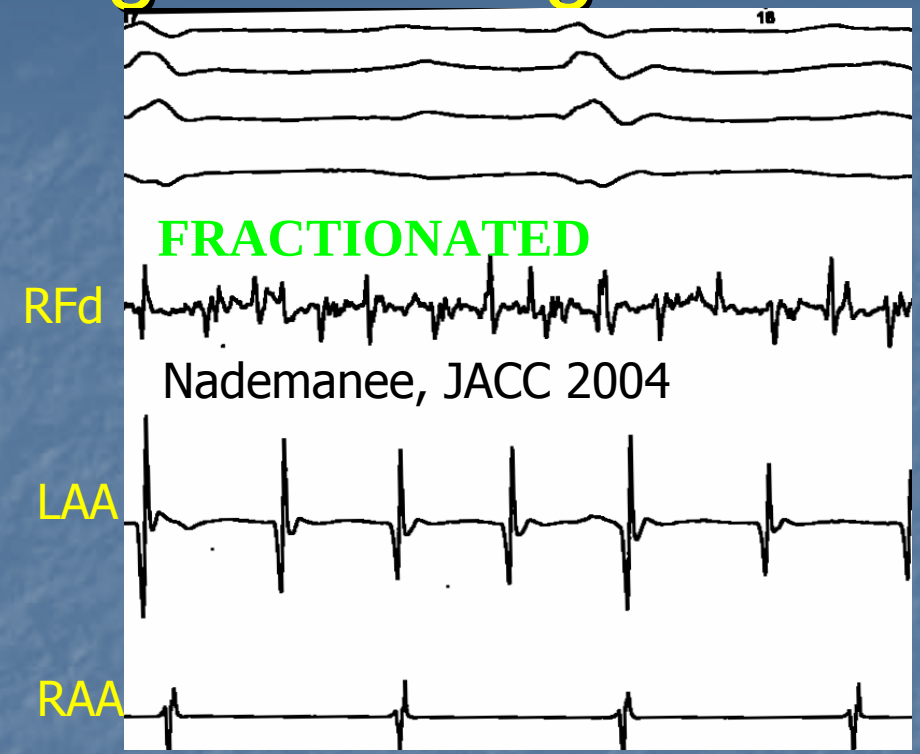
INFERIOR LA/CS INTERFACE

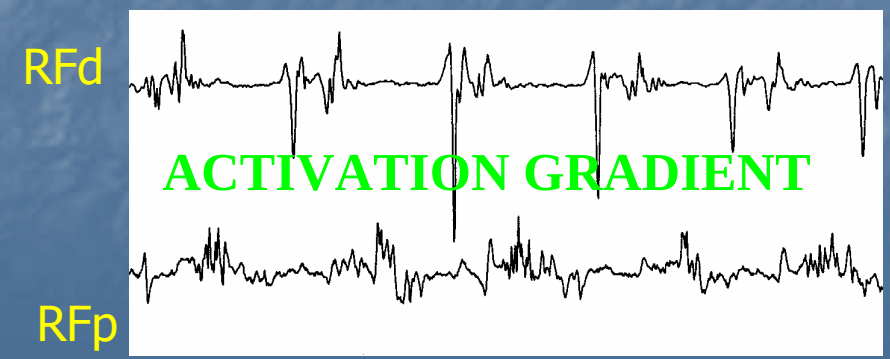


Left Atrial Wall Thickness

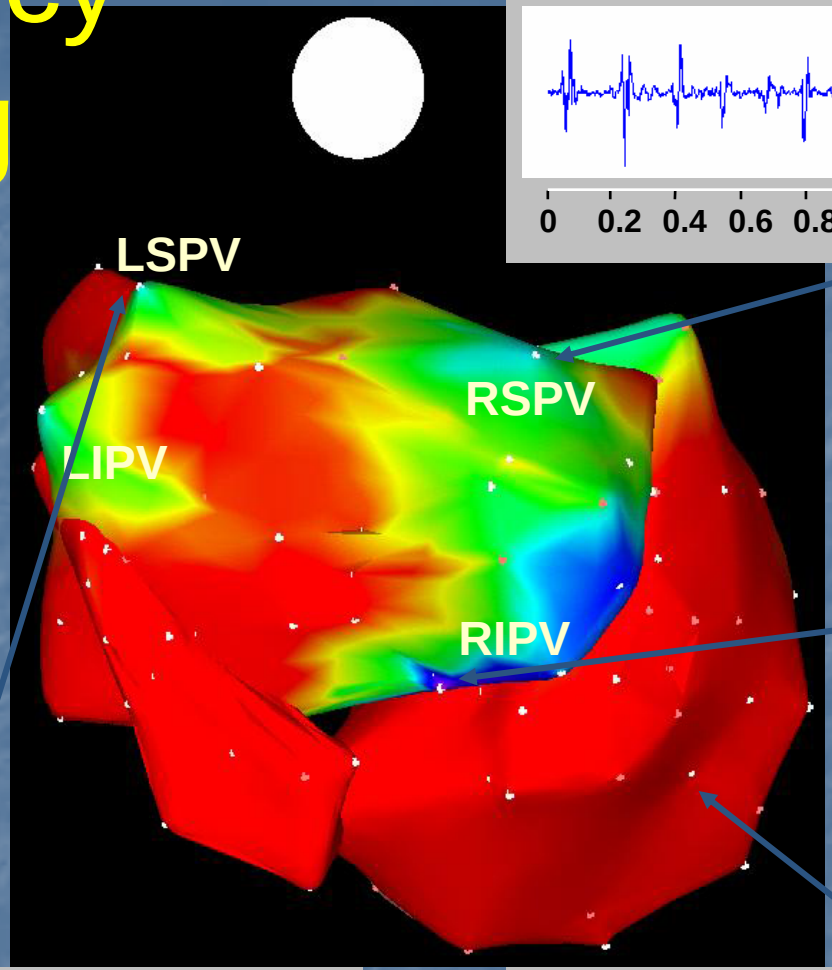
Types of Atrial Electrograms Targeted







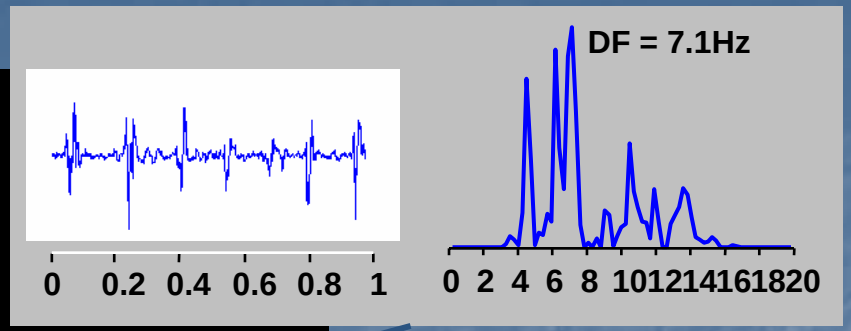
Frequency Mapping

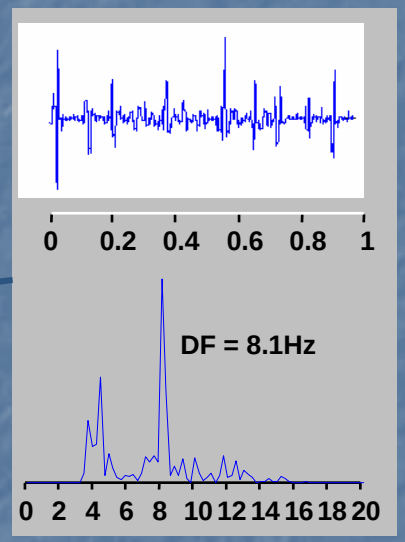


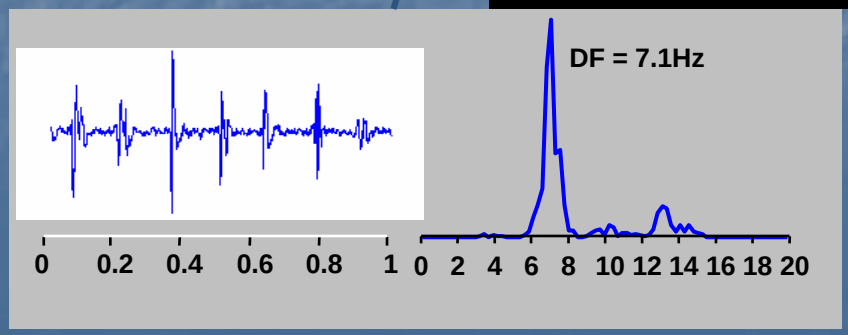
8.1Hz

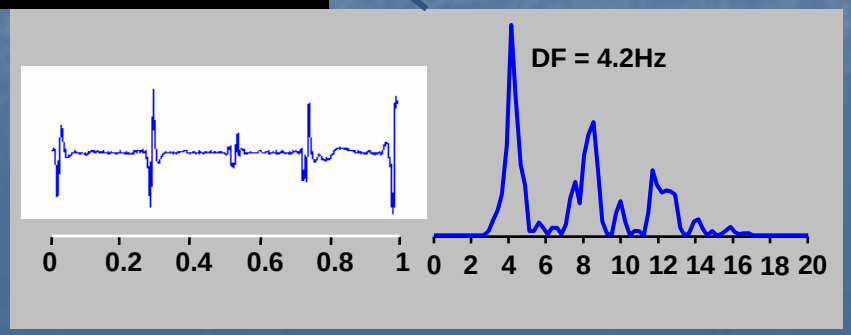
5Hz

Posterior-Anterior View

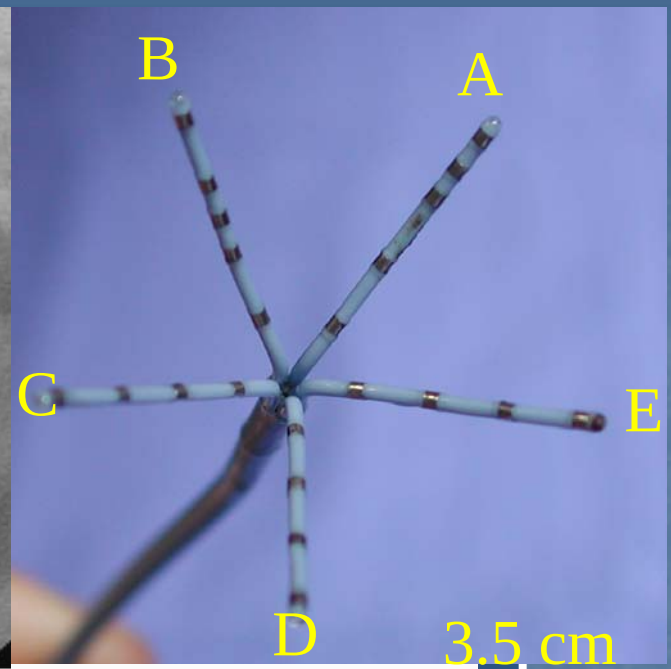


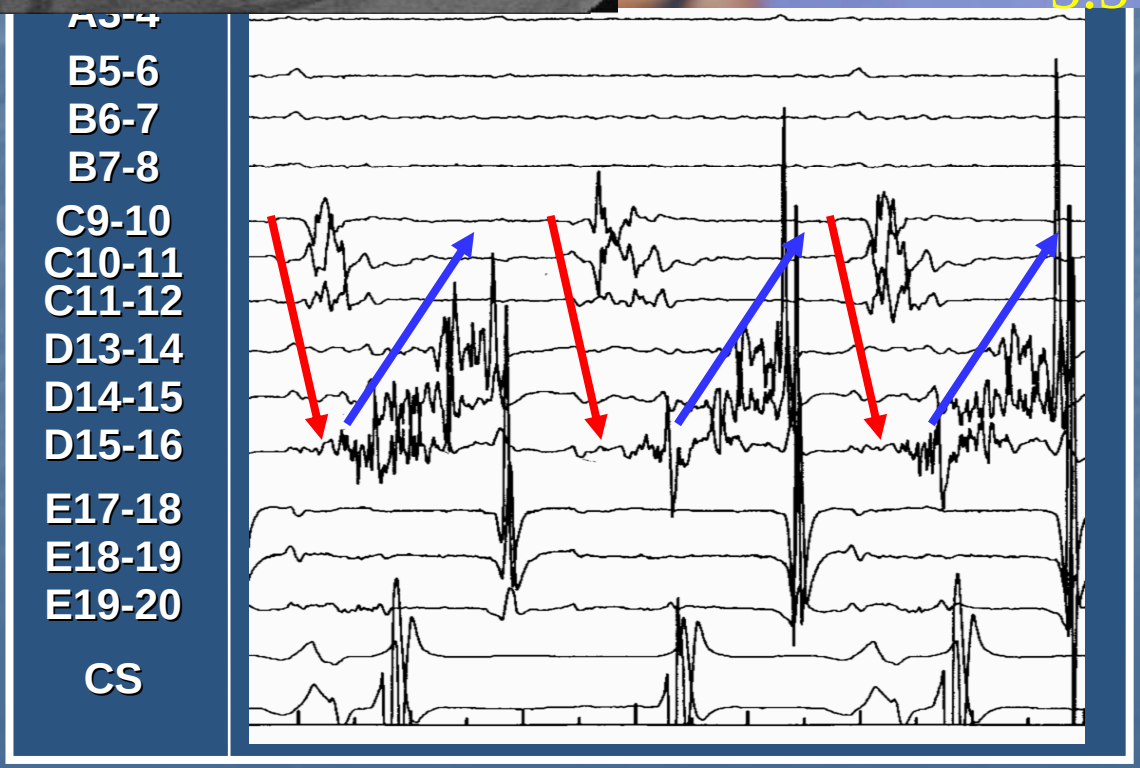




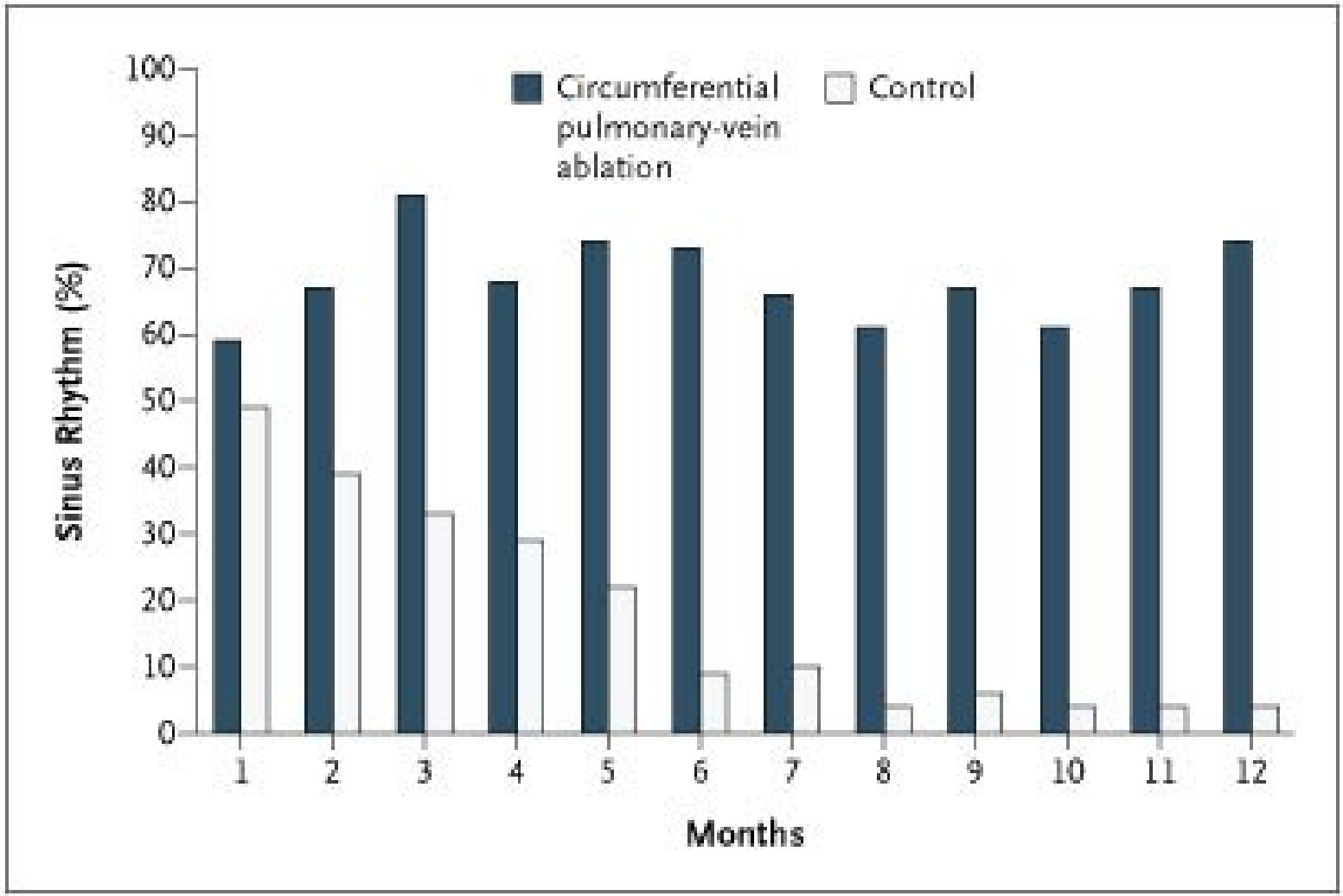


High Density Localized Mapping Catheter





Percentages of Patients without Atrial Fibrillation and Atrial Flutter in the Absence of Antiarrhythmic-Drug Therapy

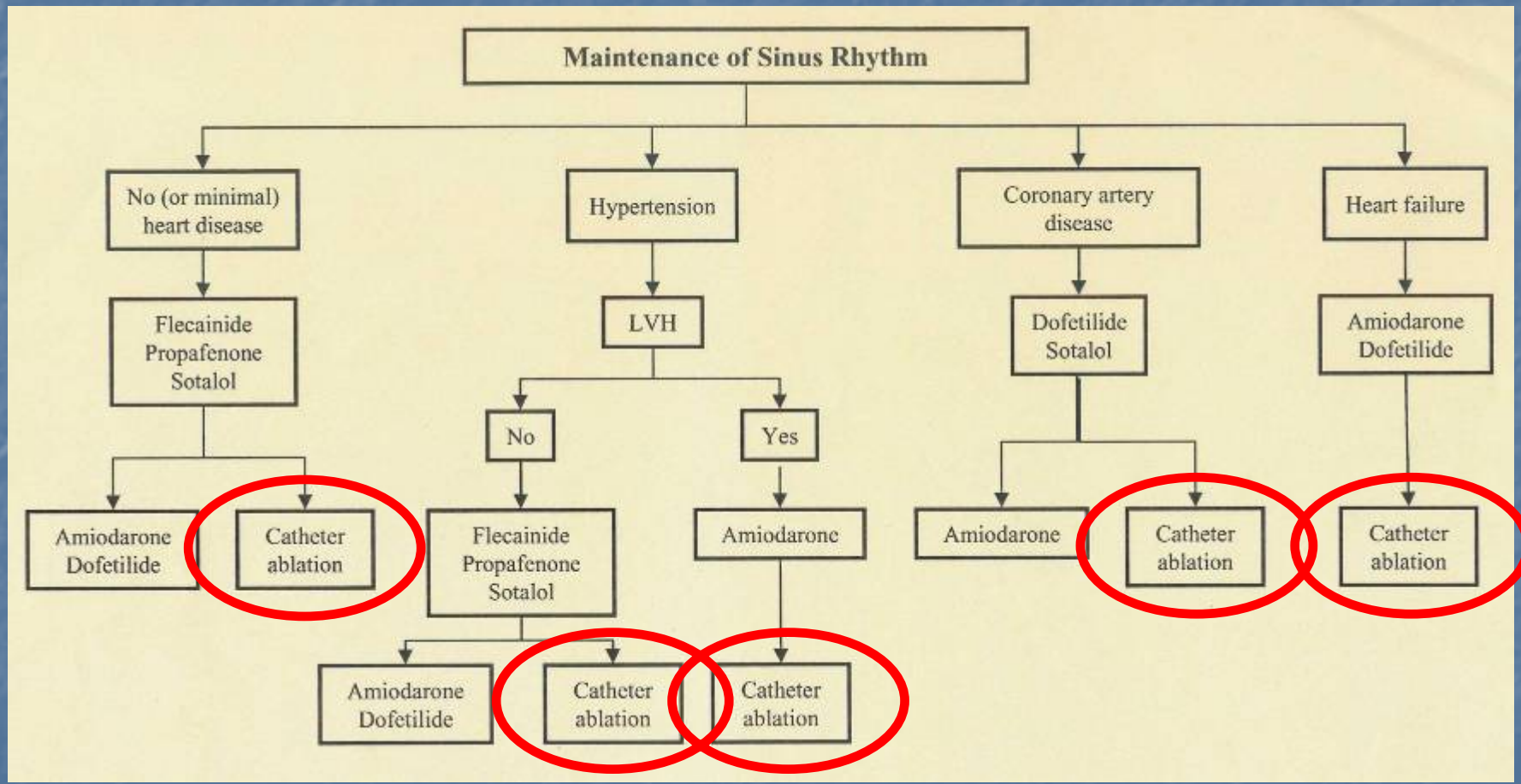


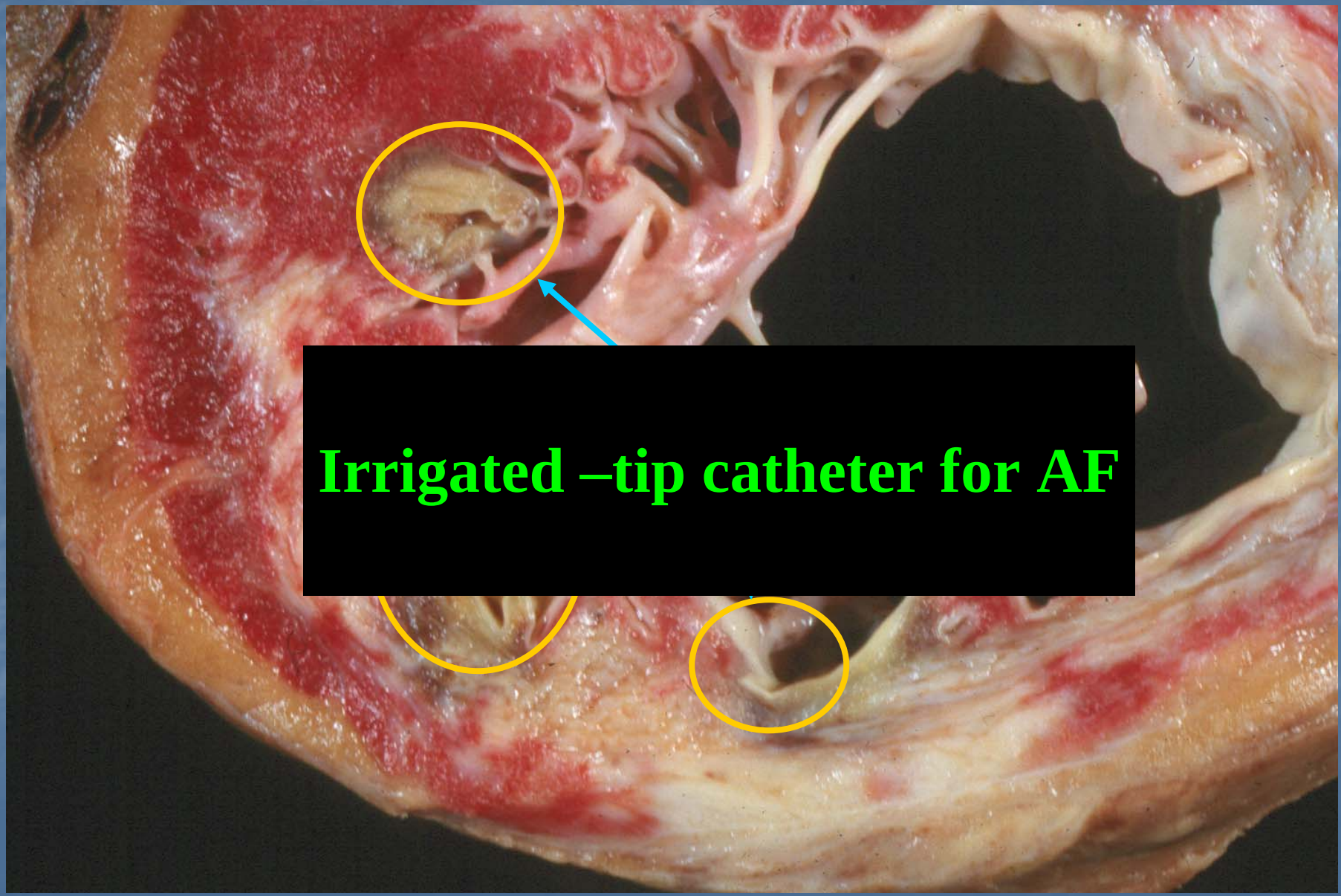
Oral H et al. N Engl J Med 2006;354:934-941

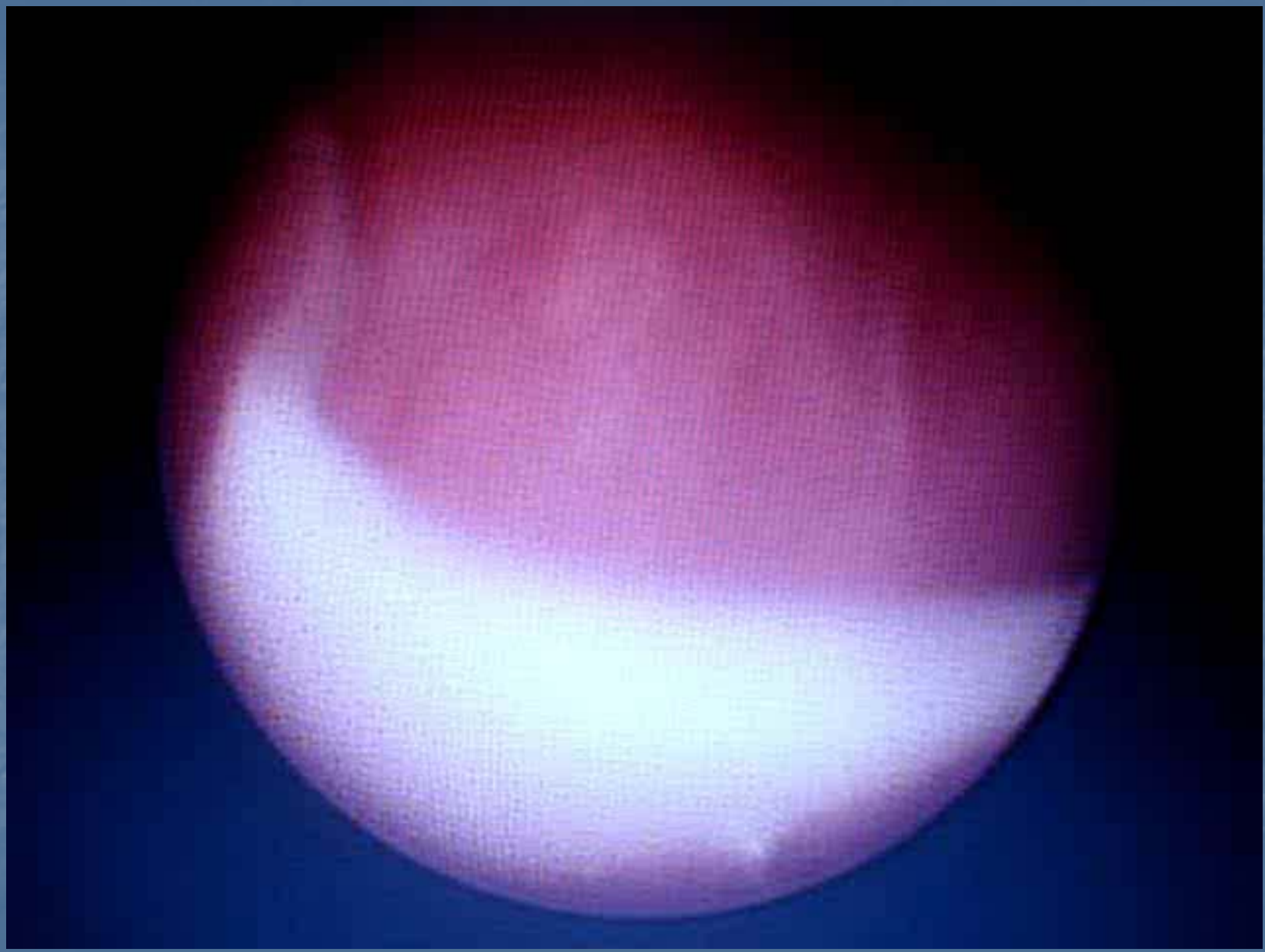
Catheter Ablation vs. Antiarrhythmic Drug Therapy for Atrial Fibrillation Trial (*CABANA*)

- **Prospective, Unblinded, Randomized-Controlled Trial**
  - A comparison of catheter ablation with medical therapy (rate or rhythm control) in AF patients requiring treatment
- **Endpoint:**
  - Primary: Total mortality
  - Secondary: Composite of Total CV mortality, disabling stroke, serious bleeding and cardiac arrest
- **Inclusion Criteria:**
  - Paroxysmal, Persistent or Permanent AF
  - Risk factor for stroke:
    - Age > 65, HTN, DM, CHF, Prior CVA/TIA, LA > 4.5cm, EF < 35%
- **Protocol:**
  - Randomize 3000 pts to ablation or drug Tx (1:1)
  - Minimum follow-up of 2 years

2006 ACC/AHA/ESC AF Management Guidelines




Irrigated –tip catheter for AF

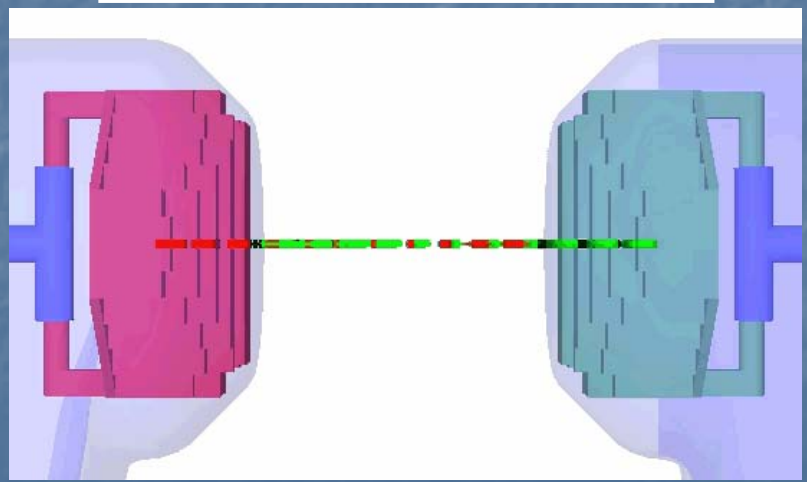


Technological Advances

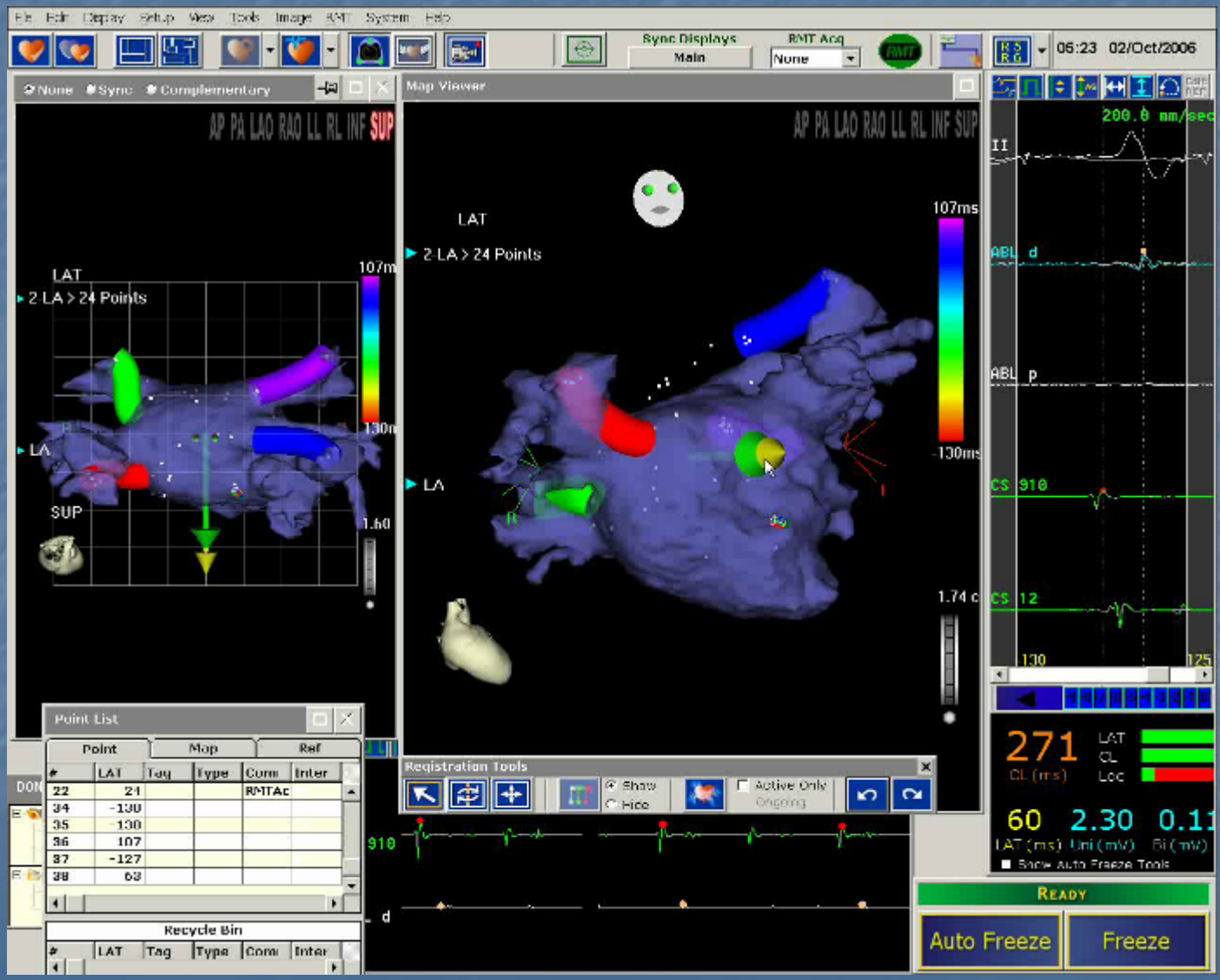
Magnetic Navigation

Robotic Navigation

Magnetic Manipulation



Remote LA Mapping: V8-RMT



Robotic Navigation

- Robotic Arm
- Catheter Control System
  - Internal Guide Sheath
    - 4-Quadrant Deflection
    - Insertion / Withdrawal
  - External Sheath
    - Single Deflection
    - Rotation
    - Insertion / Withdrawal
- "3D" Joystick
- Software Interface

Courtesy of Vivek Reddy

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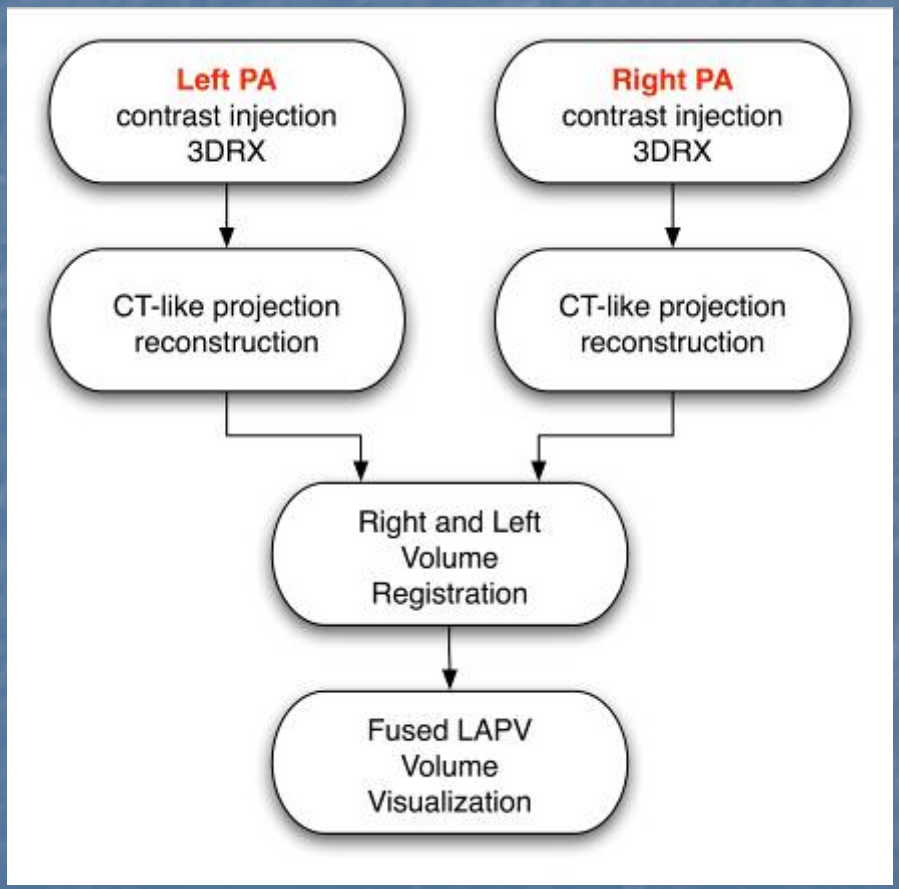
Courtesy of Vivek Reddy

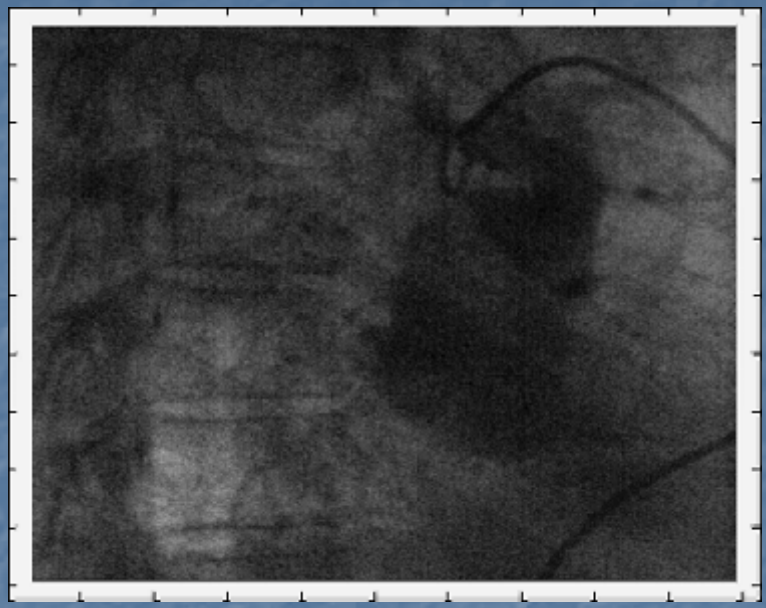
Technological Advances

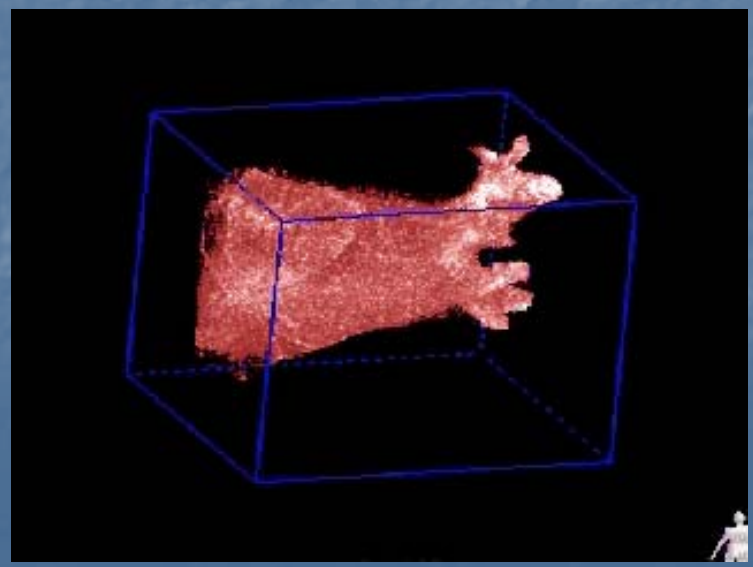
- Image Integration:
  - Fluoroscopy + CT/MR
  - Electroanatomical Mapping + CT/MR
    - Use of Remote Navigation
    - "Real-Time" Imaging
- Balloon Catheter Ablation:
  - Cryo- Ablation
  - Laser Ablation
  - HiFU Ablation
- Signal Processing

Rotational Angiography

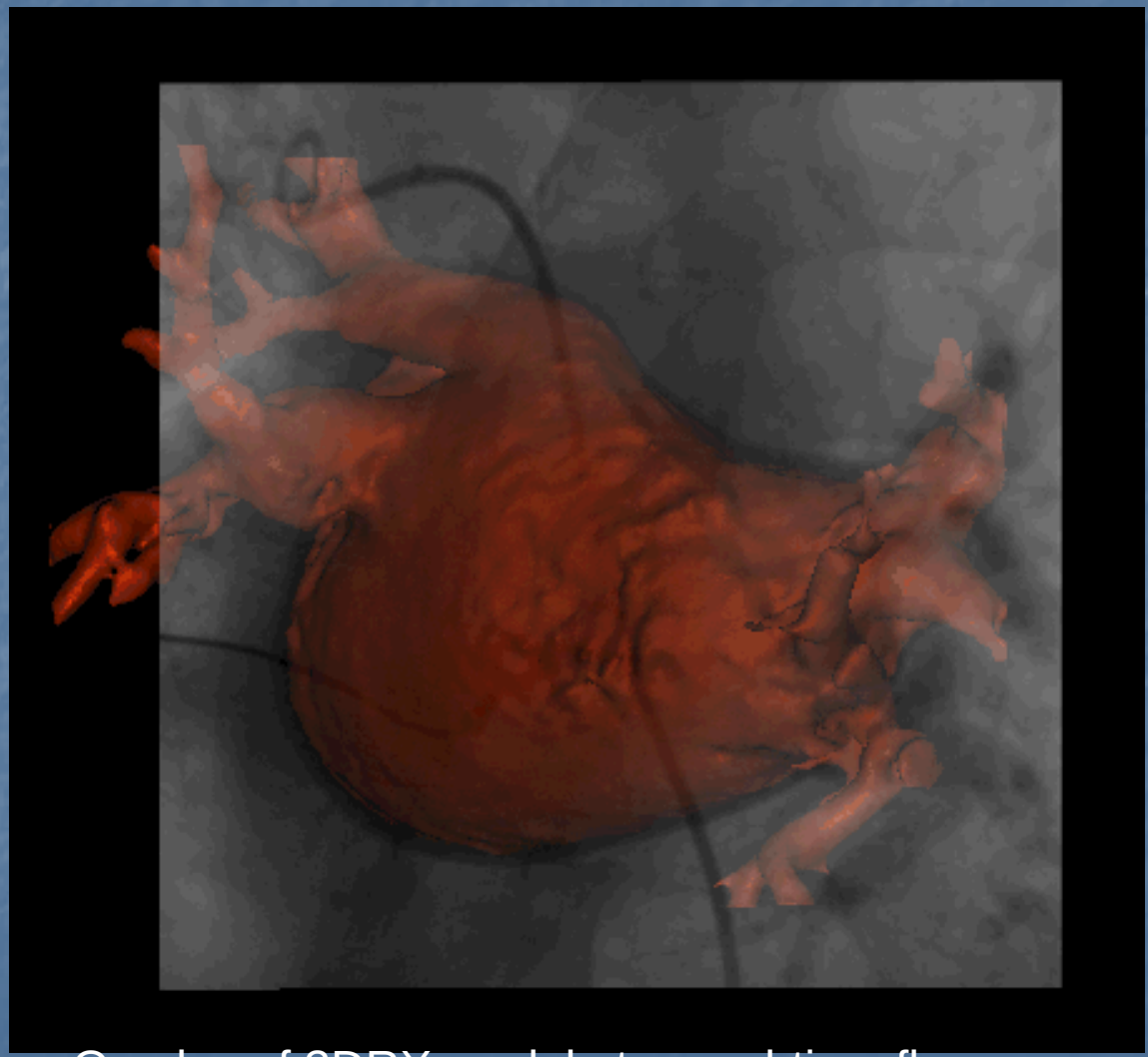
RotAngio: Clinical LA-PVs Imaging







RotX with X-Ray Overlay



Overlay of 3DRX model atop real-time fluoroscopy

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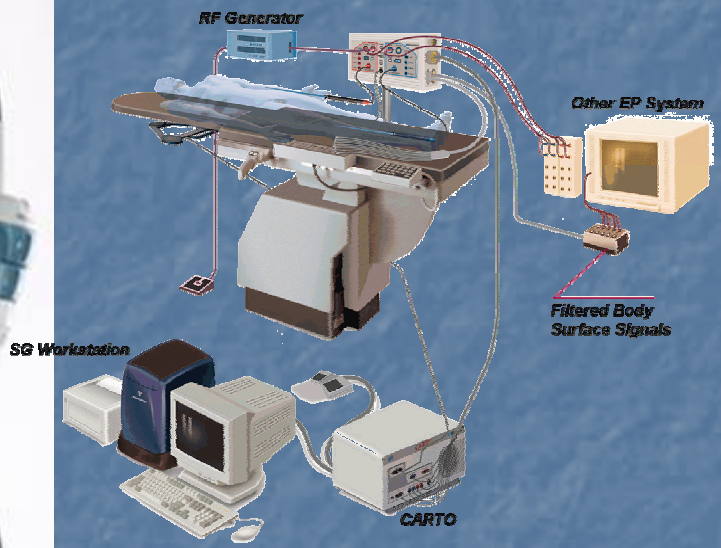
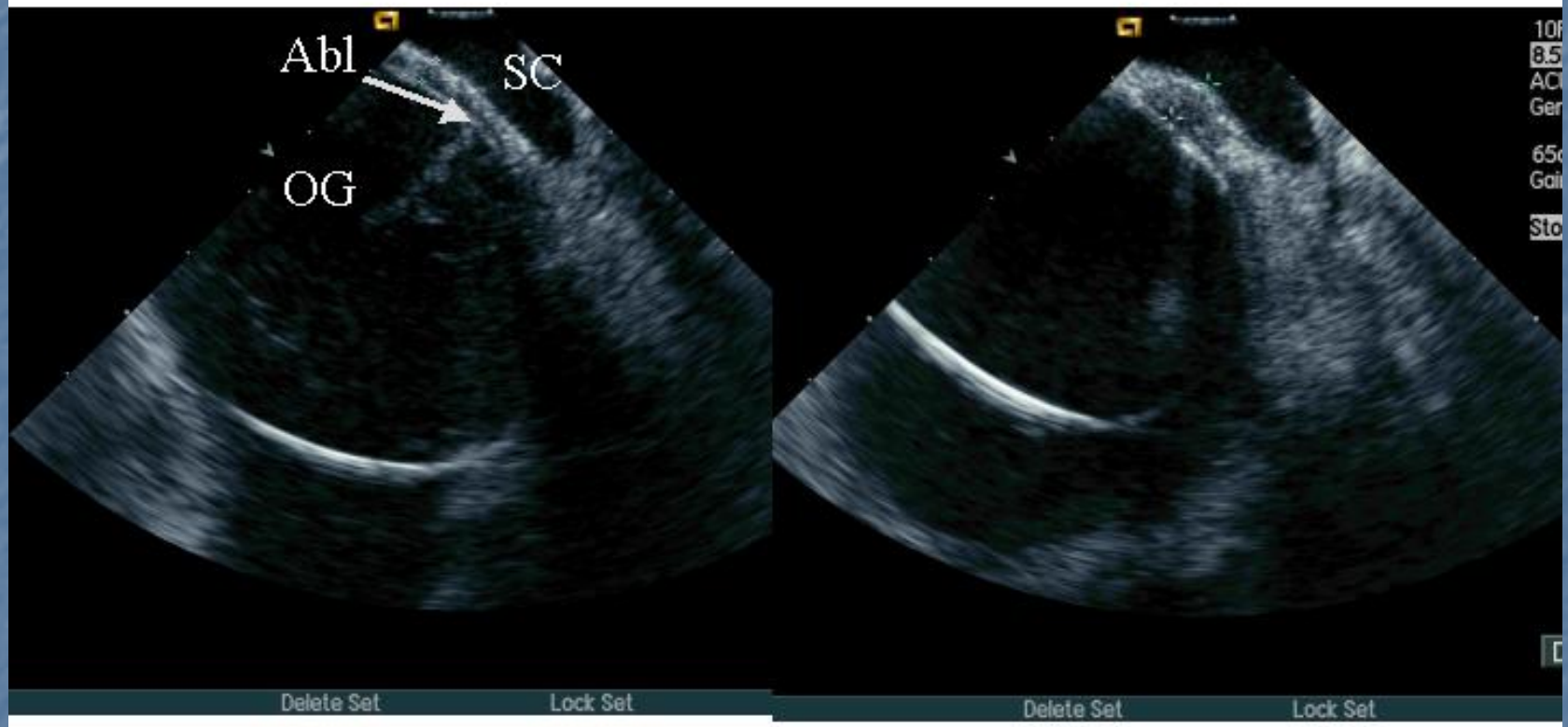
3D Ultrasound Imaging



Courtesy of Vivek Reddy

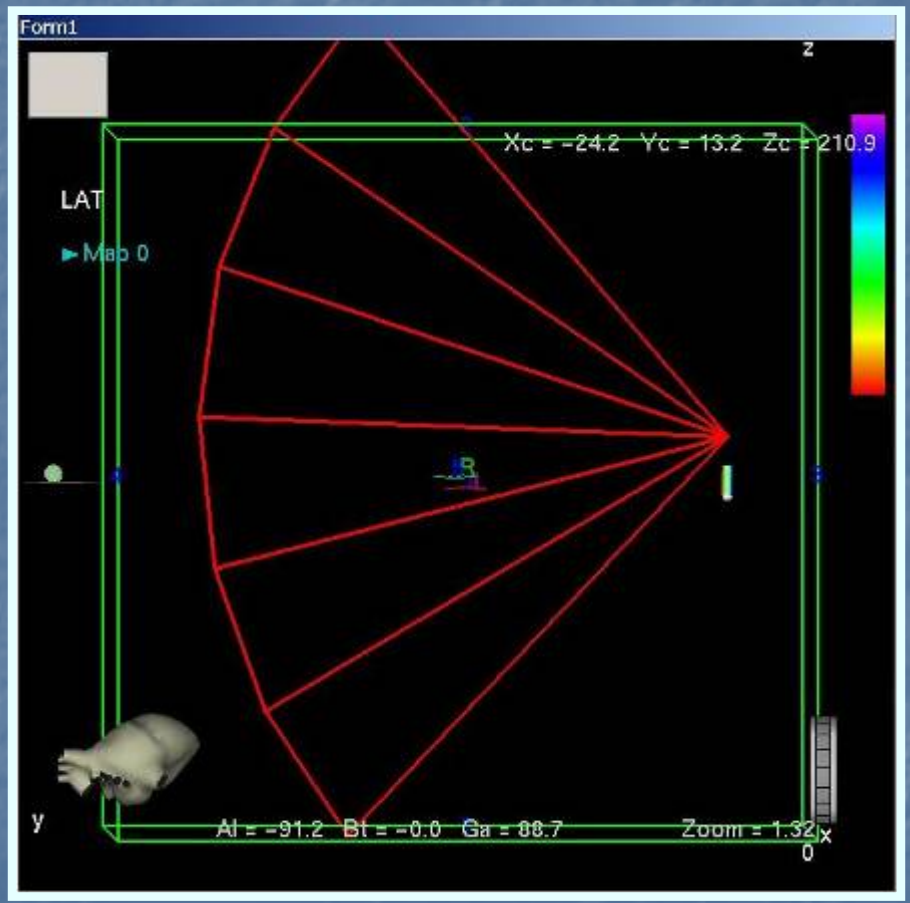
Pré ablation:
épaisseur de la paroi
sur la ligne d'ablation: 3 mm

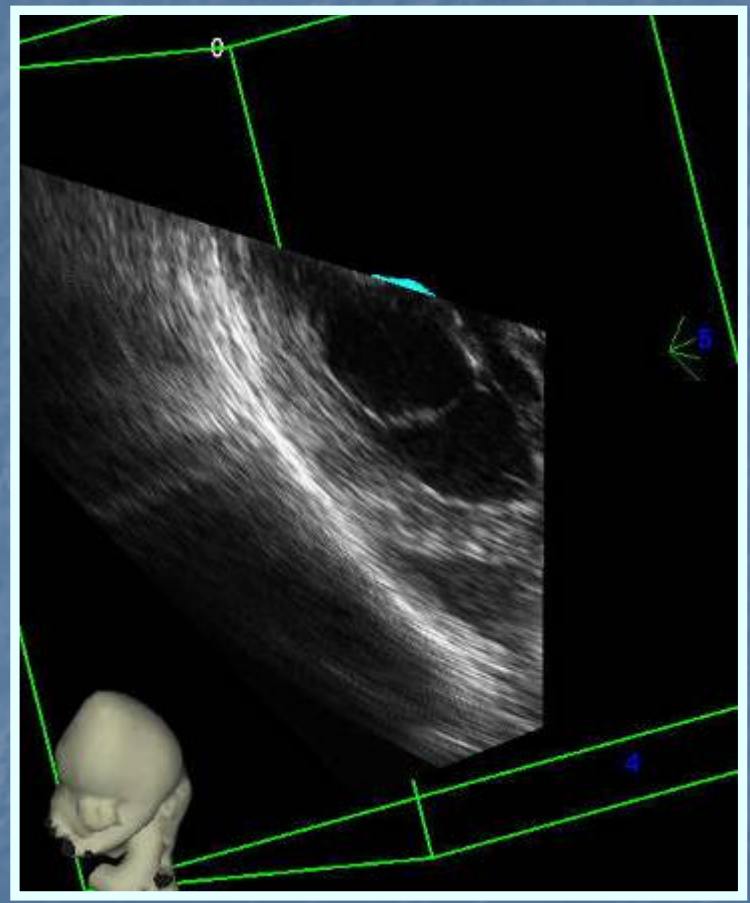
Post ablation:
l'épaisseur a doublé,
elle est de 6 mm



Abl: cathéter d'ablation situé sur la face endocardique de l'isthme gauche

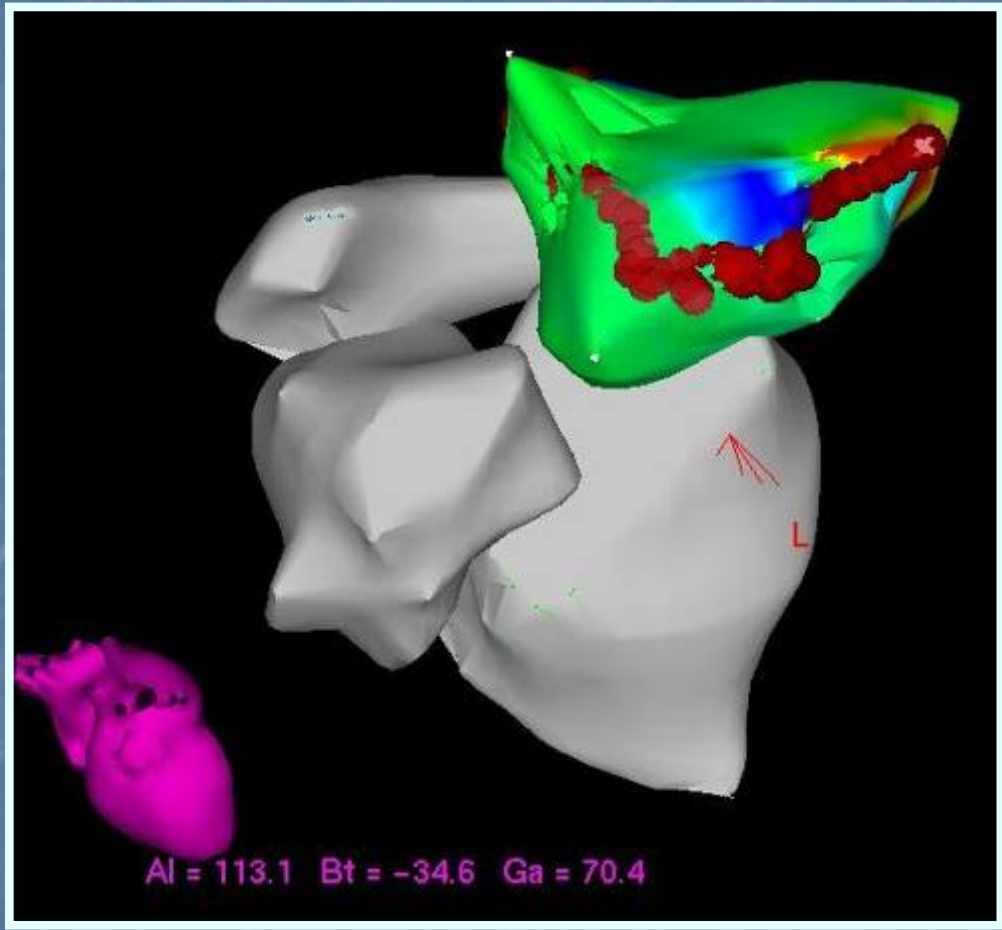
“Localized” ICE Imaging

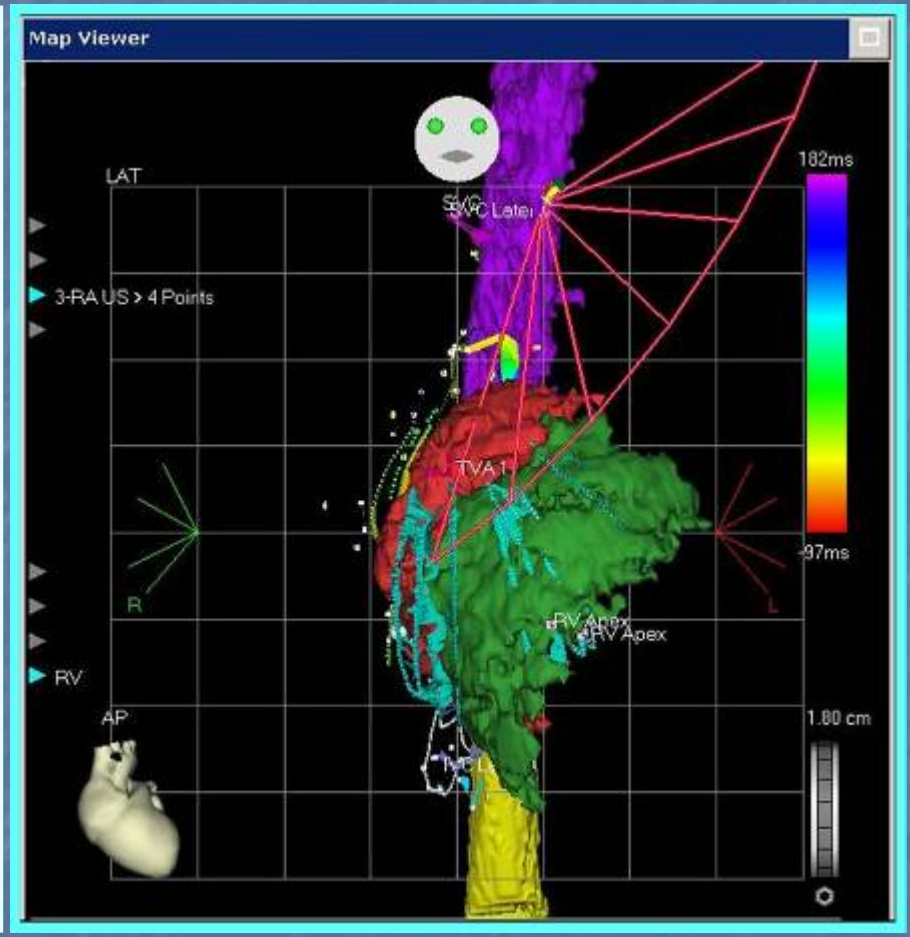




Courtesy: Biosense-Webster, Inc.

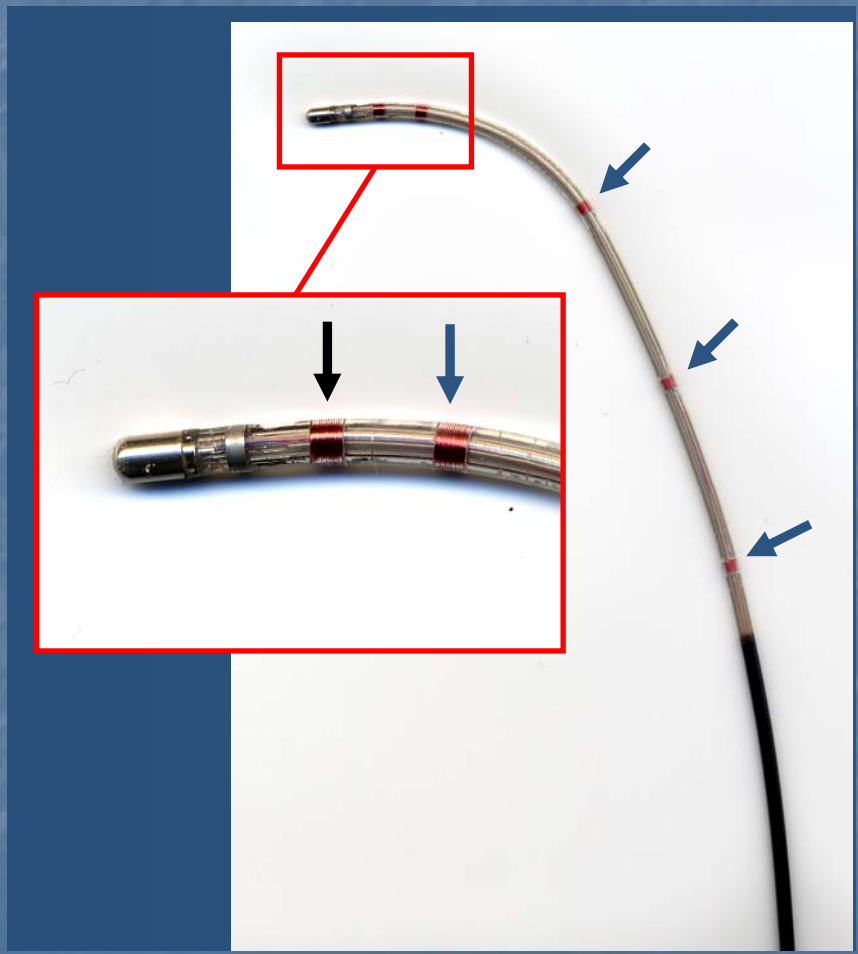
"Localized" ICE Imaging

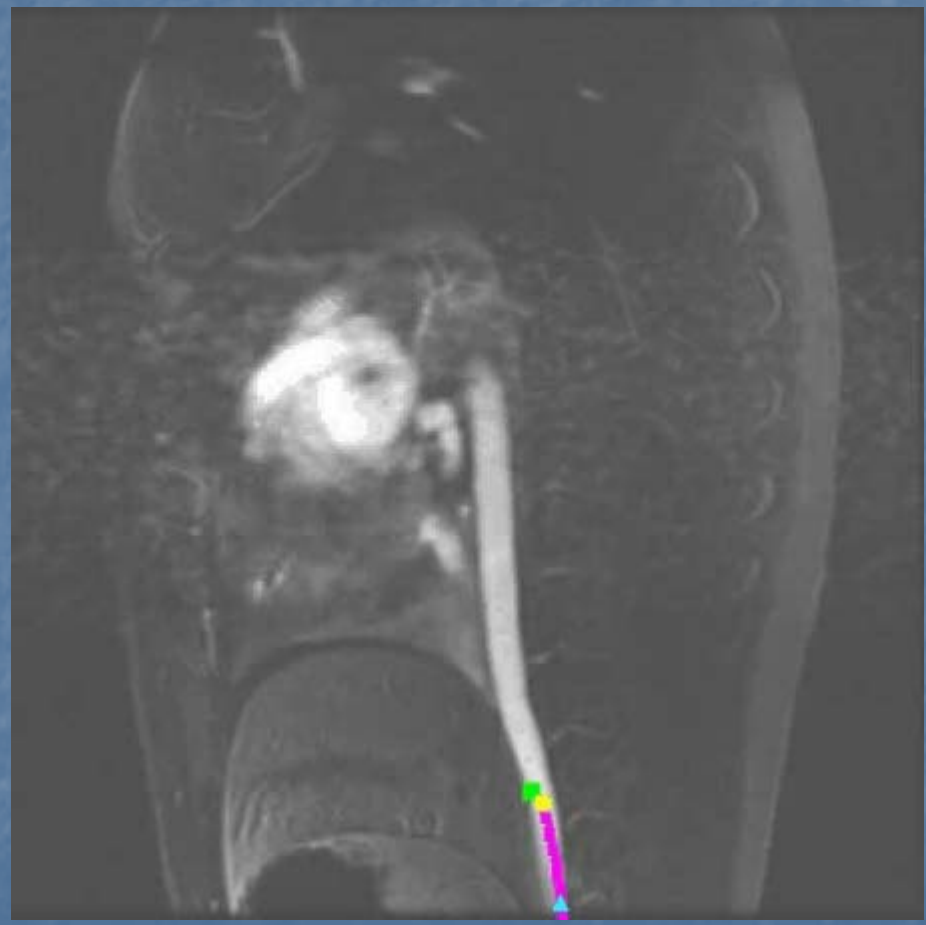




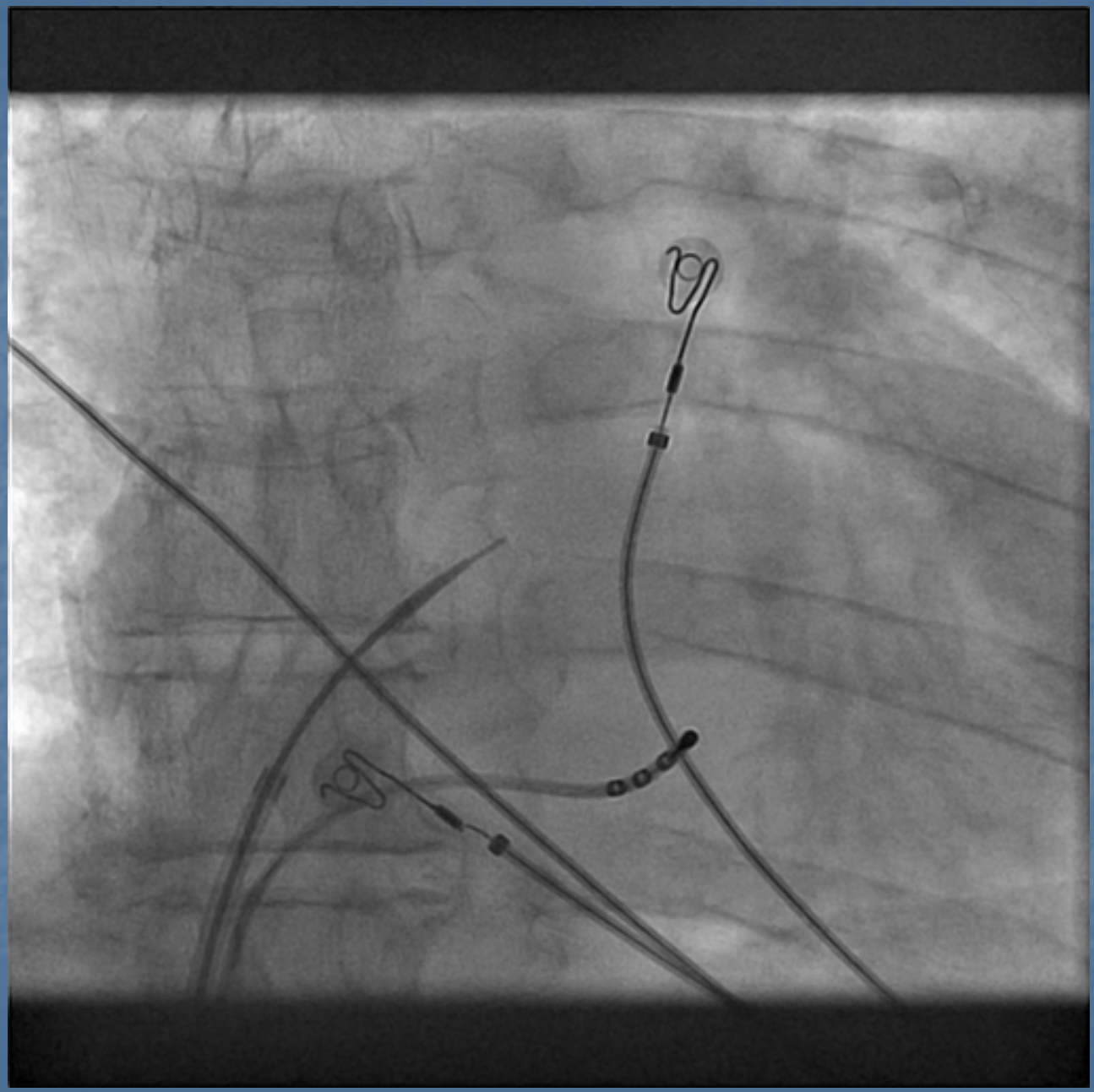
Courtesy: Biosense-Webster, Inc.

MR-Compatible Catheters





Courtesy of Vivek Reddy



Electrode Length

- Increasing electrode tip from 2mm to 4mm results in more than doubling of lesion size, but larger electrodes result in smaller lesions at fixed power (Langberg *PACE* 1990)

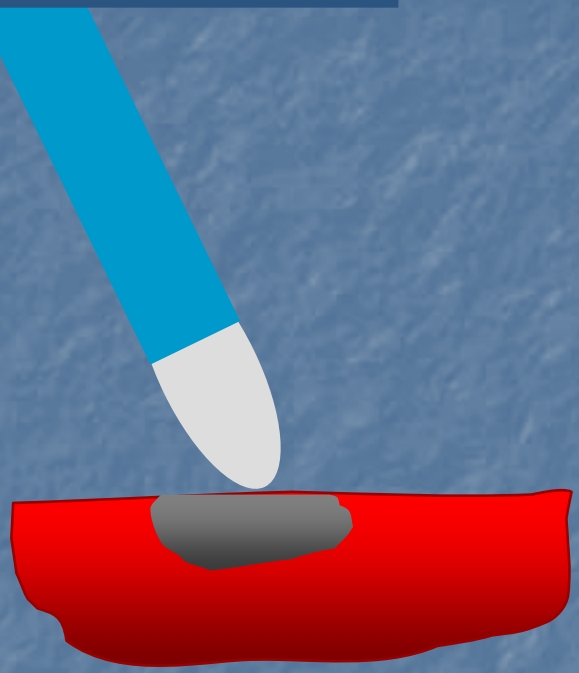
- But if increased power used to maintain electrode temp, 8mm tip further doubled lesion depth; 12mm tip made smaller lesions, charring/crater formation seen (Langberg *Circulation* 1993)

Electrode Contact

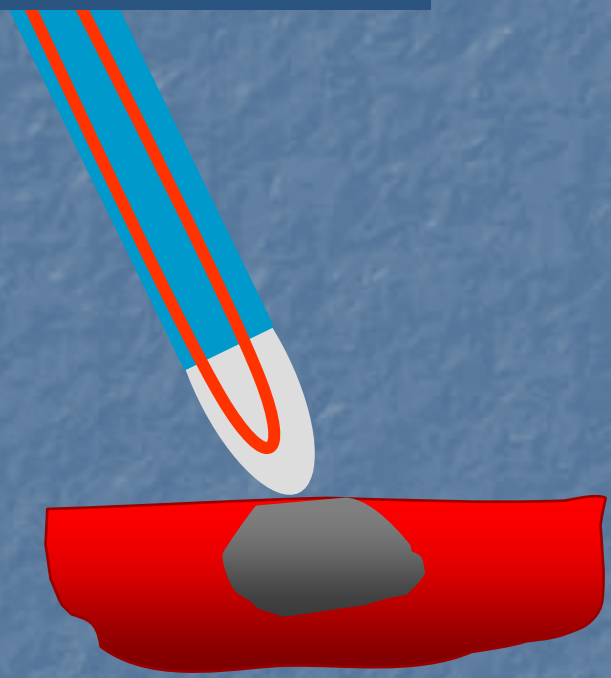
- Better electrode-tissue pressure and contact improves lesion formation (Avitall *PACE* 1997)

- Parallel catheter position produces larger lesions than perpendicular contact (Kongsgaard *PACE* 1997)

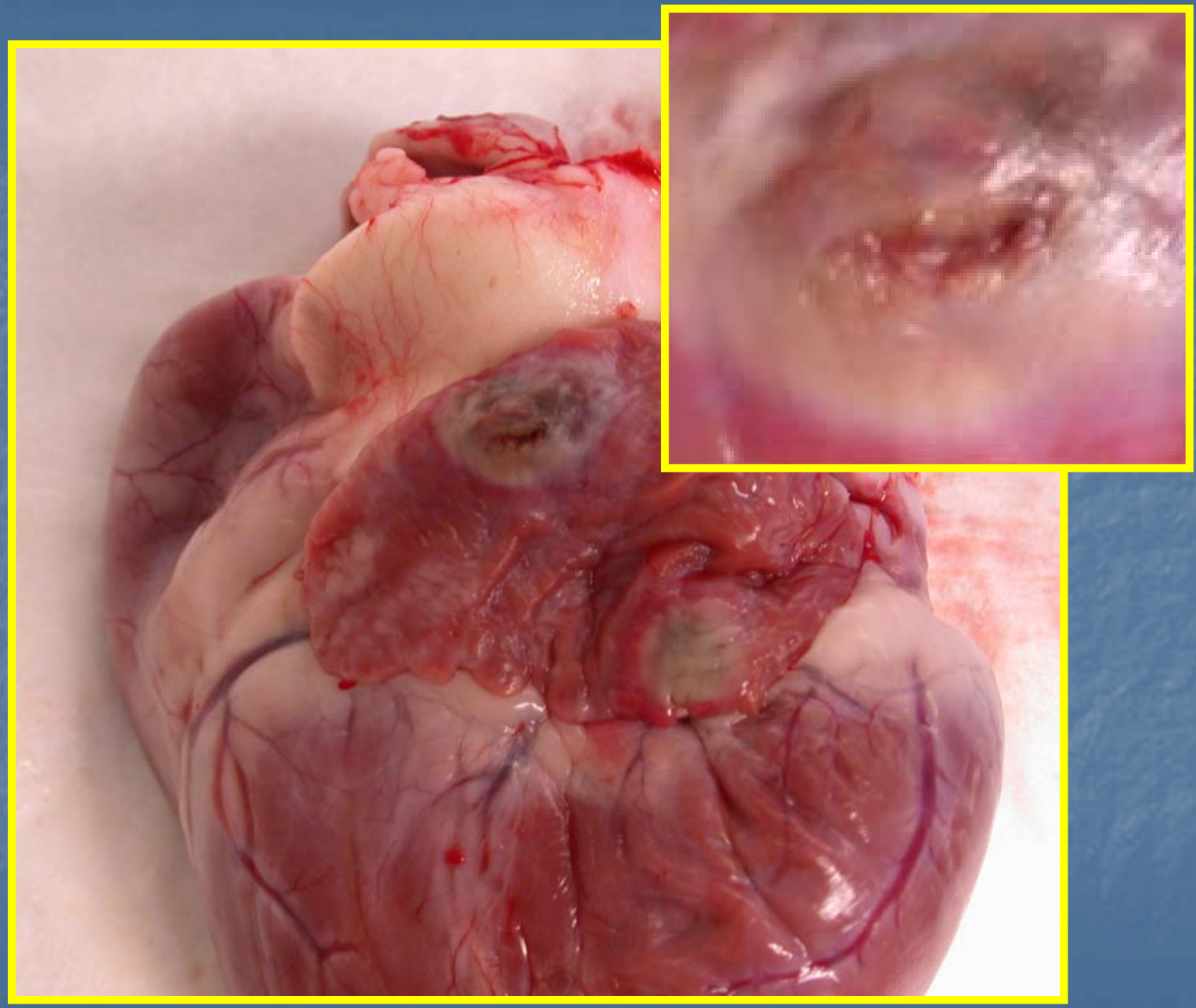
Standard RF ablation



Cooled RF ablation

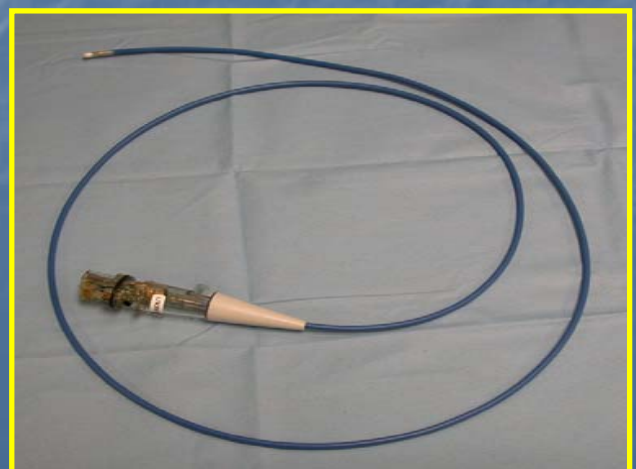


Risks of deeper heating
greater tissue damage
intramural “pops”



Internal irrigation at 36 ml/min

Intracardiac ultrasound



Saline irrigated RF ablation

- Markers of steam pops
  - audible pop
  - sudden decrease in temperature
  - sudden catheter movement
  - sudden change in impedance

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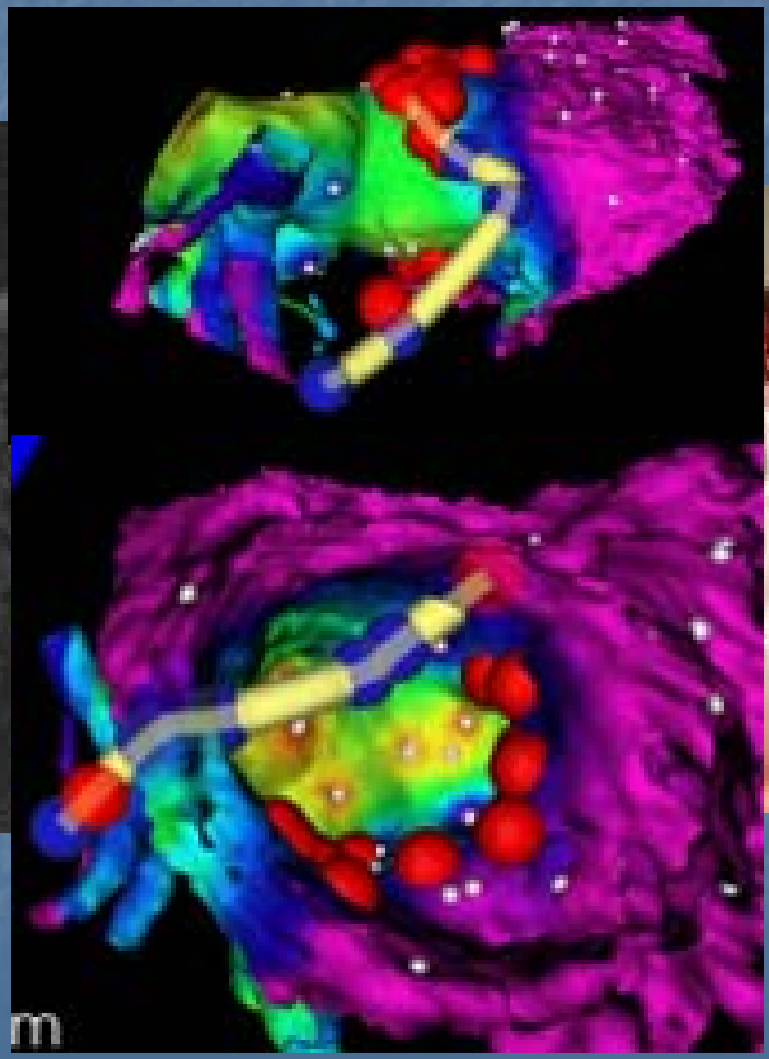
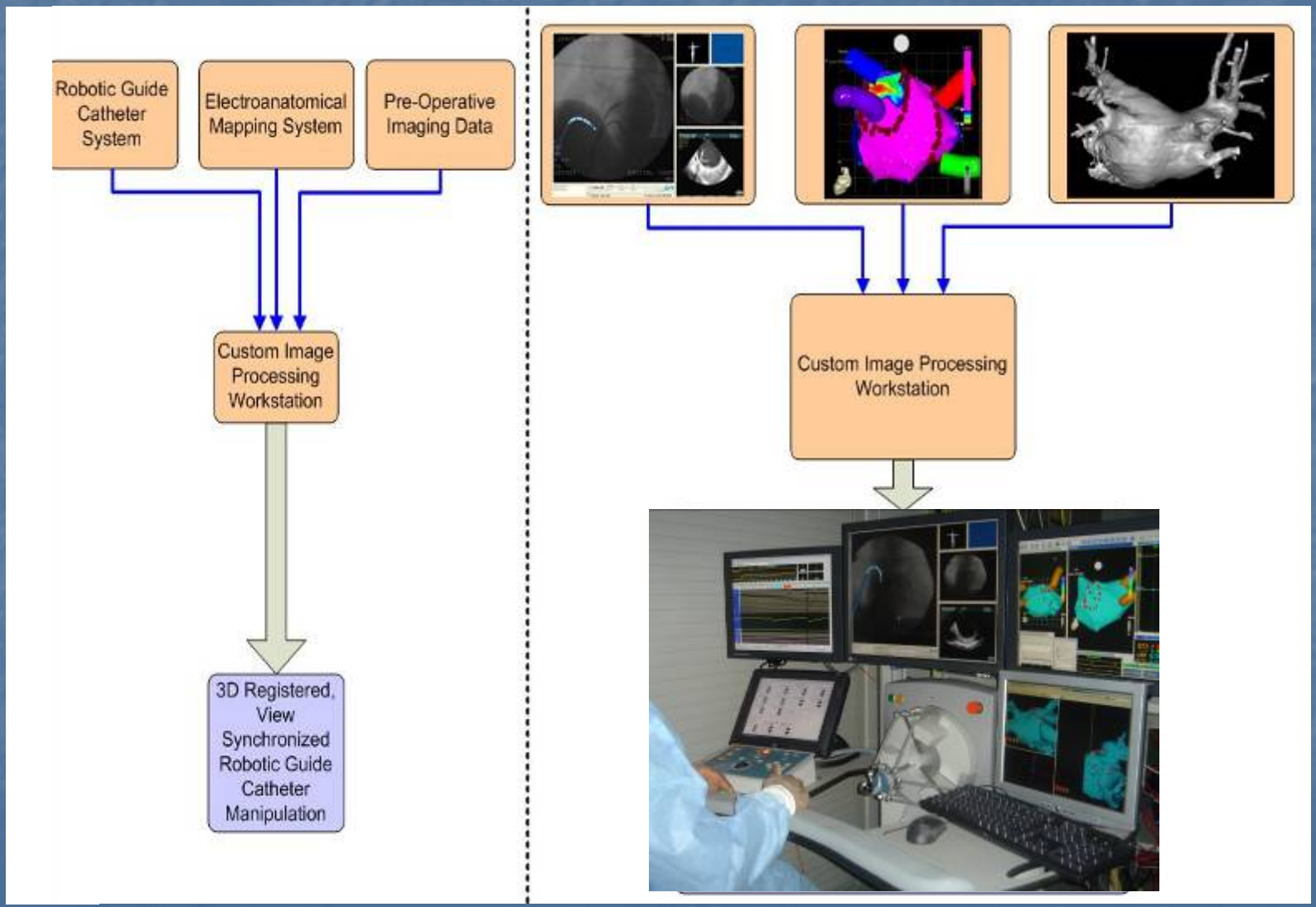
i MRI

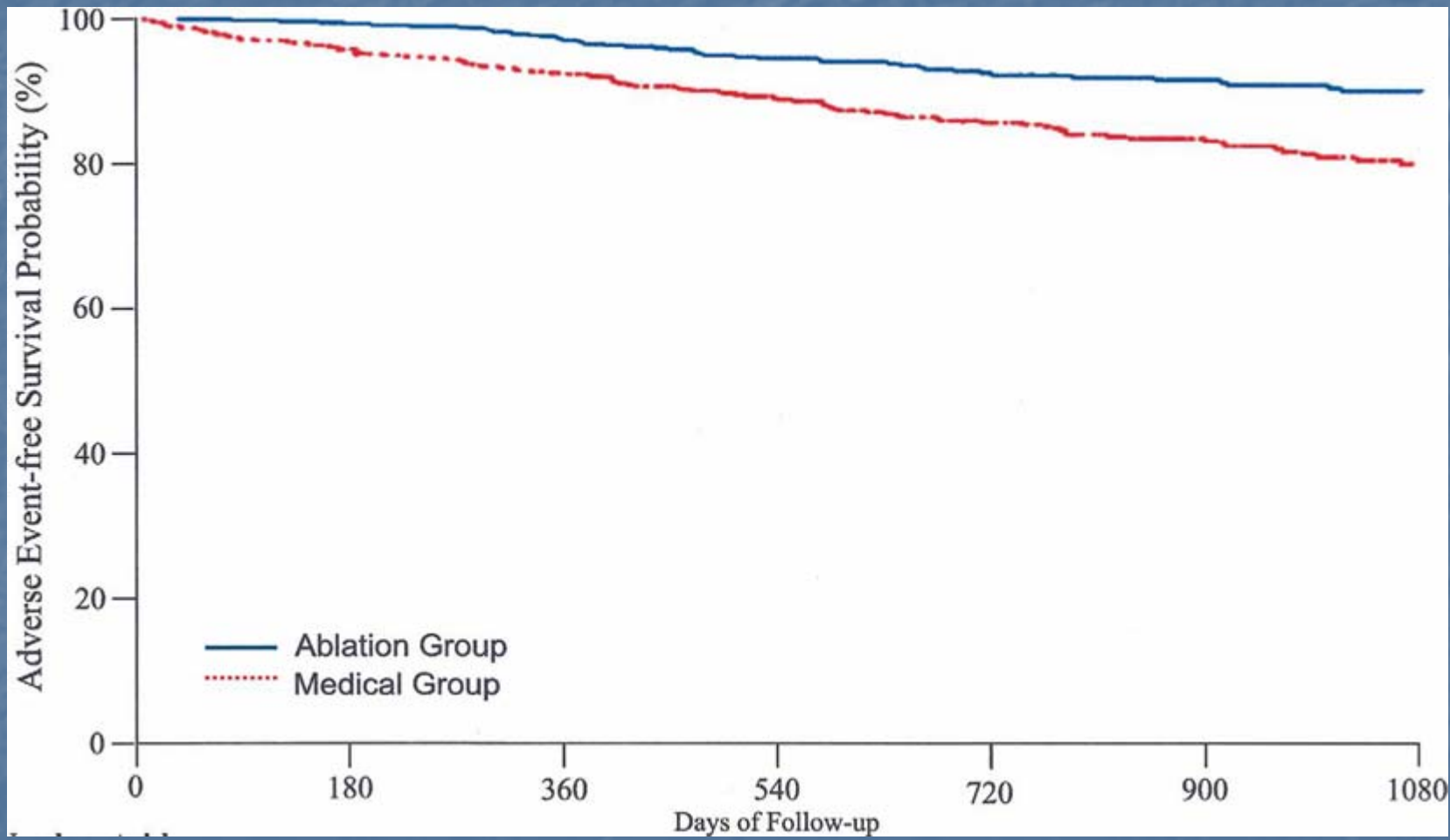
MRI: PV Ablation



Robotic Image-Guided Therapy

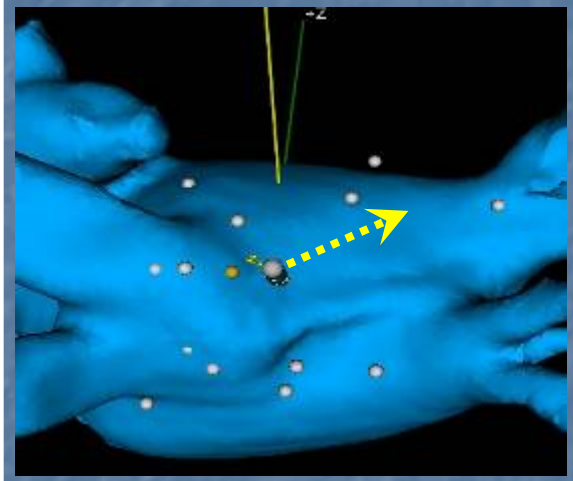


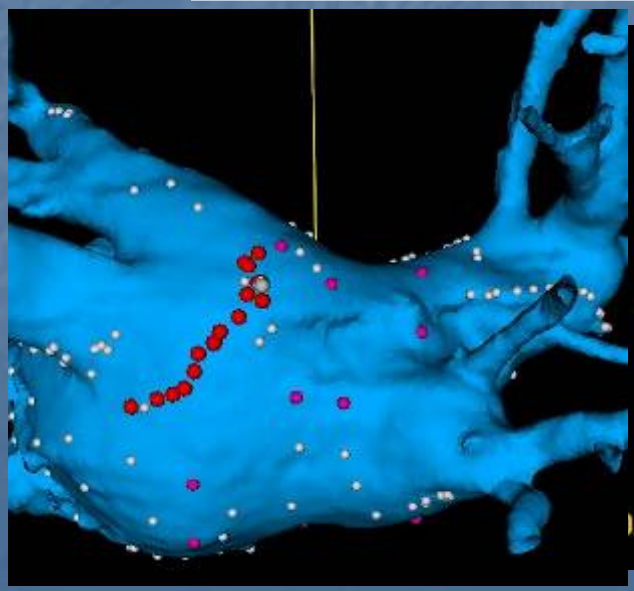
Ablation *vs* Medications for AF

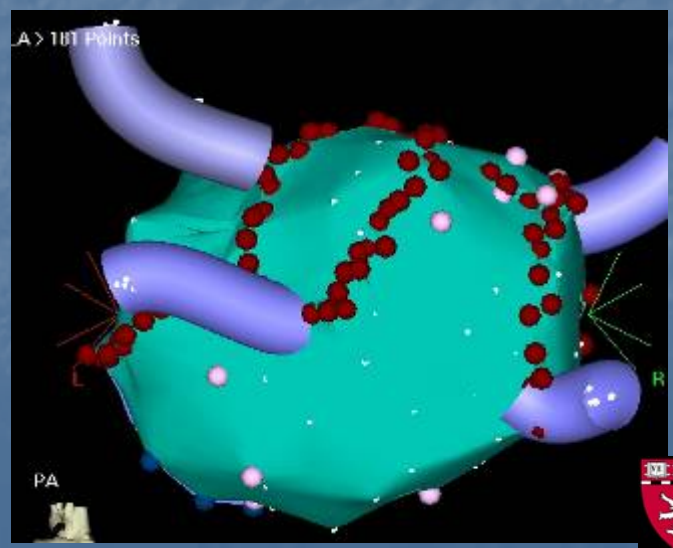


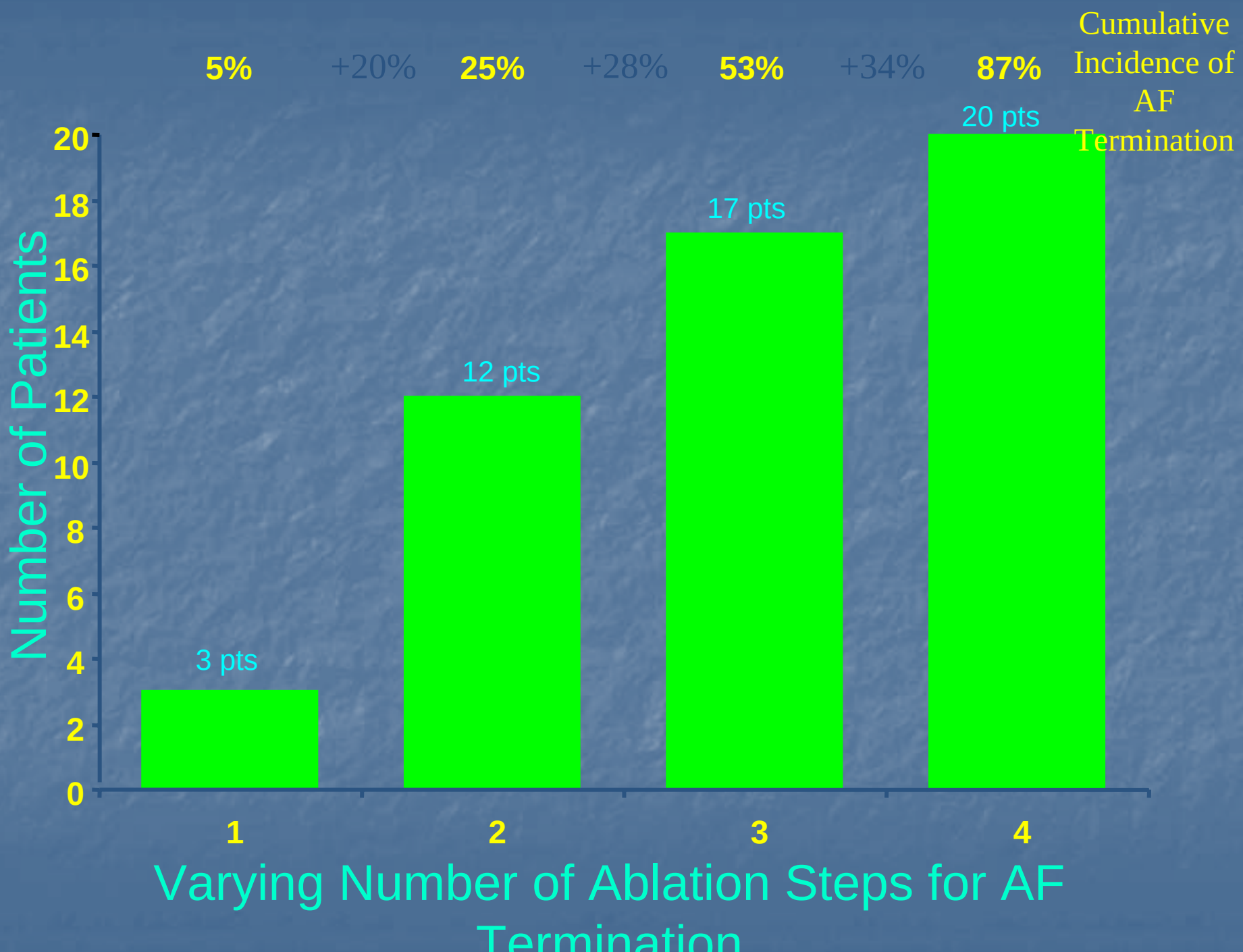
Pappone et al *JACC* 42: 185 (2003)

View-Synchronized Robotic Mapping

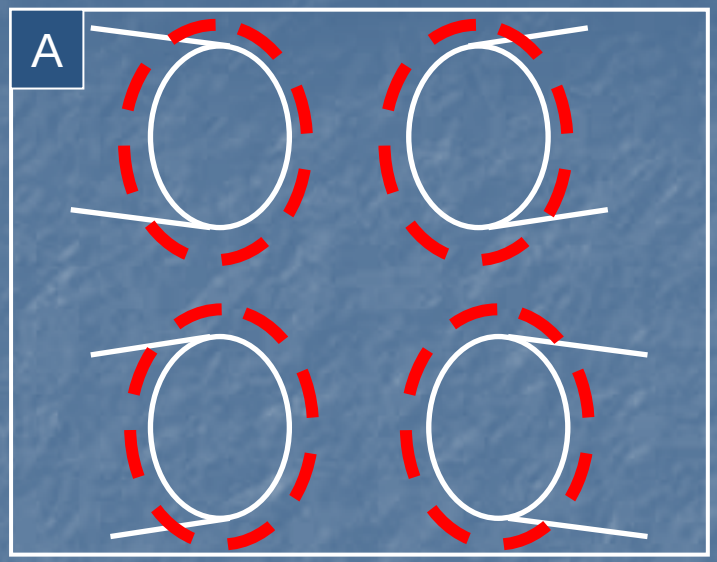


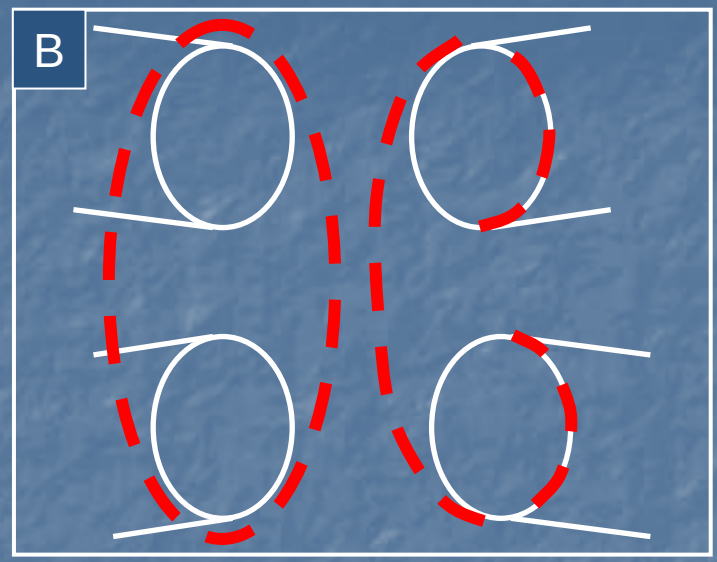


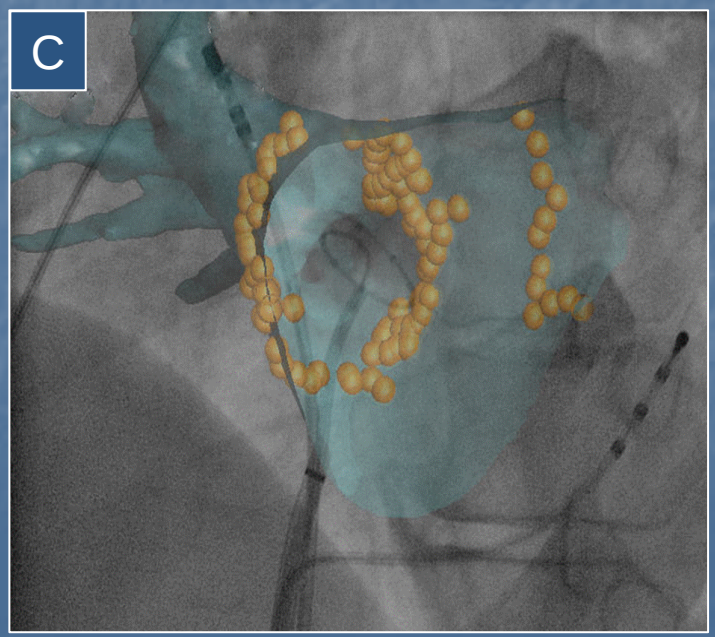


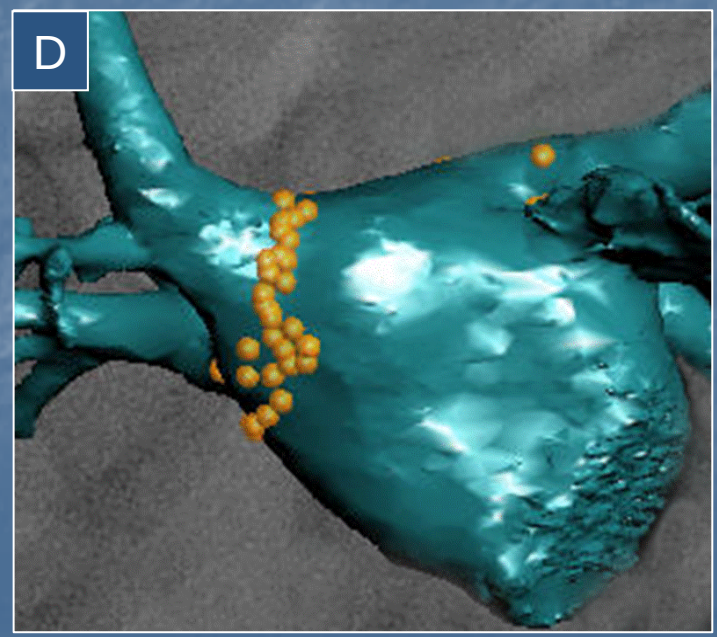

Cumulative Incidence of AF Termination
5%
+20%
25%
+28%
53%
+34%
87%
20 pts
17 pts
12 pts
3 pts
Number of Patients
0
2
4
6
8
10
12
14
16
18
20
1
2
3
4
Varying Number of Ablation Steps for AF Termination

TECHNIQUES OF PV ISOLATION









Vector mapping: finding the earliest region