

# Percutaneous ablation for “lone” Atrial Fibrillation: patient selection, techniques and results



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**ESC / WCC Barcelona '06**

# “Lone” Atrial fibrillation

- AF without demonstrable underlying heart disease <sup>1</sup> and no reversible cause
- “younger” patients
- 30% to 45% of paroxysmal AF <sup>2</sup>
- 20% to 25% of persistent/permanent AF <sup>2,3</sup>
- Lone AF associated with a doubling in mortality <sup>4</sup>

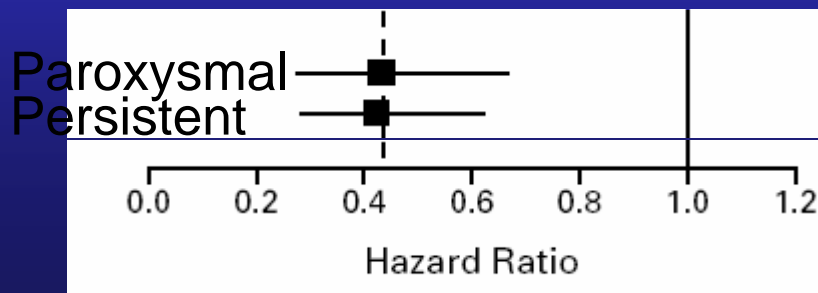
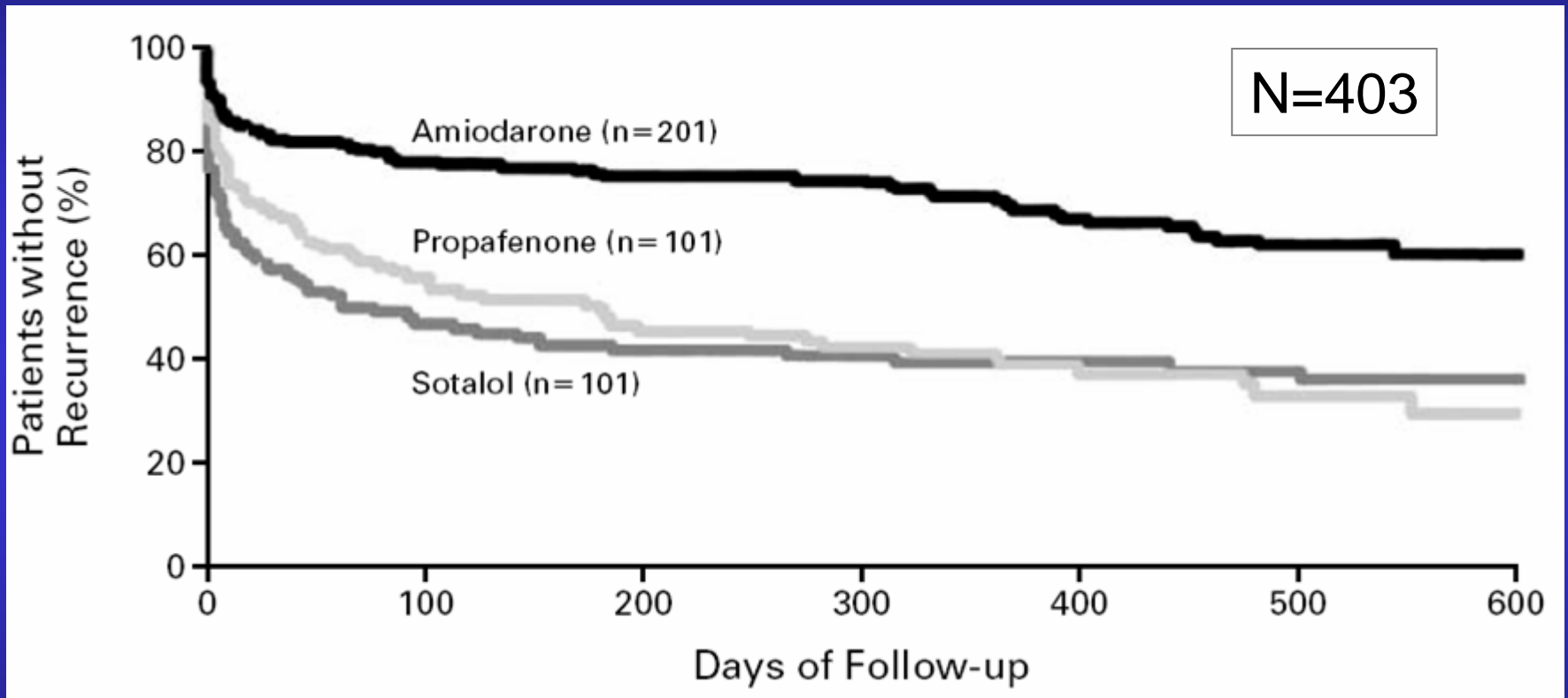
1. ACC/AHA/ESC Guidelines 2006

2. ALFA study. Circulation 1999

3. RACE study. NEJM 2002

4. Framingham. Circulation 1998

# AA drugs efficacy



CTAF study. N Engl J Med 2000

# AA drugs efficacy

TABLE 3. Covariates Significantly Associated With Survival Results With Echocardiographic Data Excluded

Covariate	<i>P</i>	HR	HR: 99% Confidence Limits	
			Lower	Upper
Age at enrollment*	<0.0001	1.06	1.04	1.08
Coronary artery disease	<0.0001	1.65	1.31	2.07
Congestive heart failure	<0.0001	1.83	1.45	2.32
Diabetes	<0.0001	1.56	1.22	2.00
Stroke or transient ischemic attack	<0.0001	1.54	1.17	2.05
Smoking	<0.0001	1.75	1.29	2.39
First episode of atrial fibrillation	0.0067	1.27	1.01	1.58
Sinus rhythm	<0.0001	0.54	0.42	0.70
Warfarin use	<0.0001	0.47	0.36	0.61
Digoxin use	<0.0001	1.50	1.18	1.89
Rhythm-control drug use	0.0005	1.41	1.10	1.83

\*Per year of age.

# Which patients ? Which techniques ?

## AF presentation

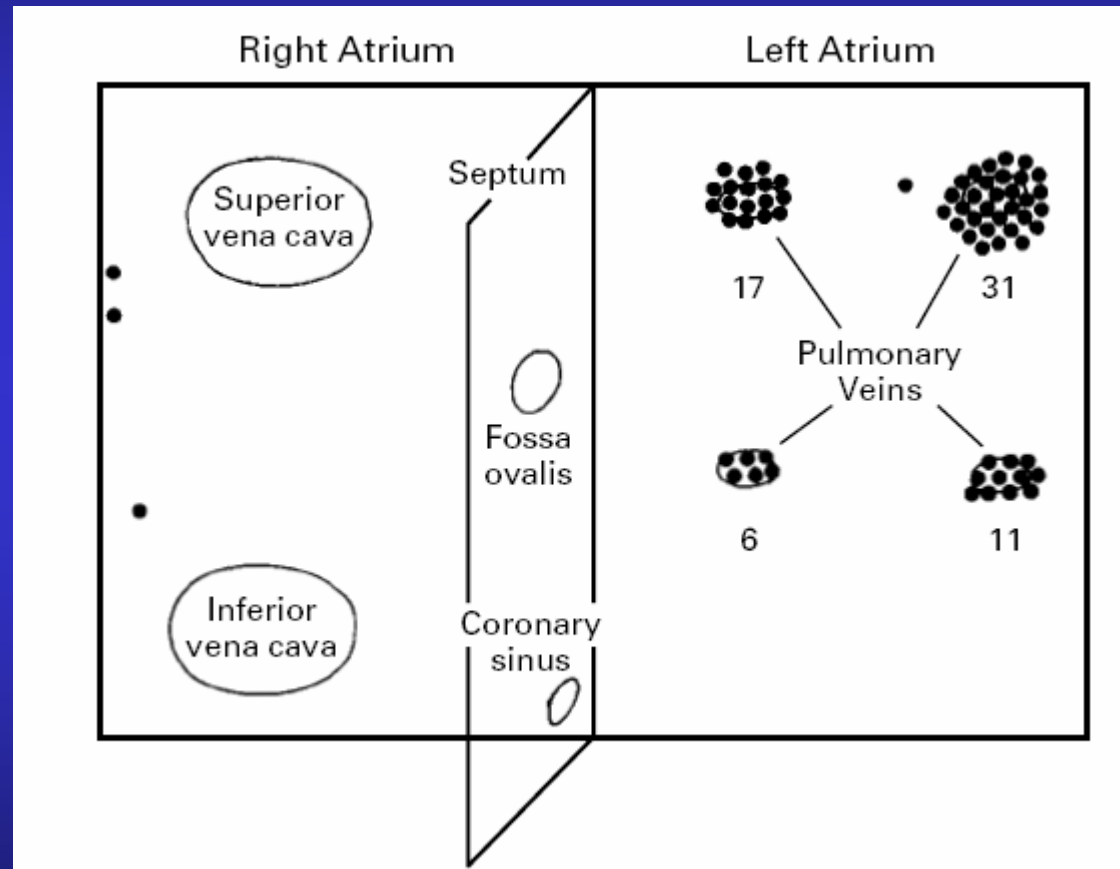
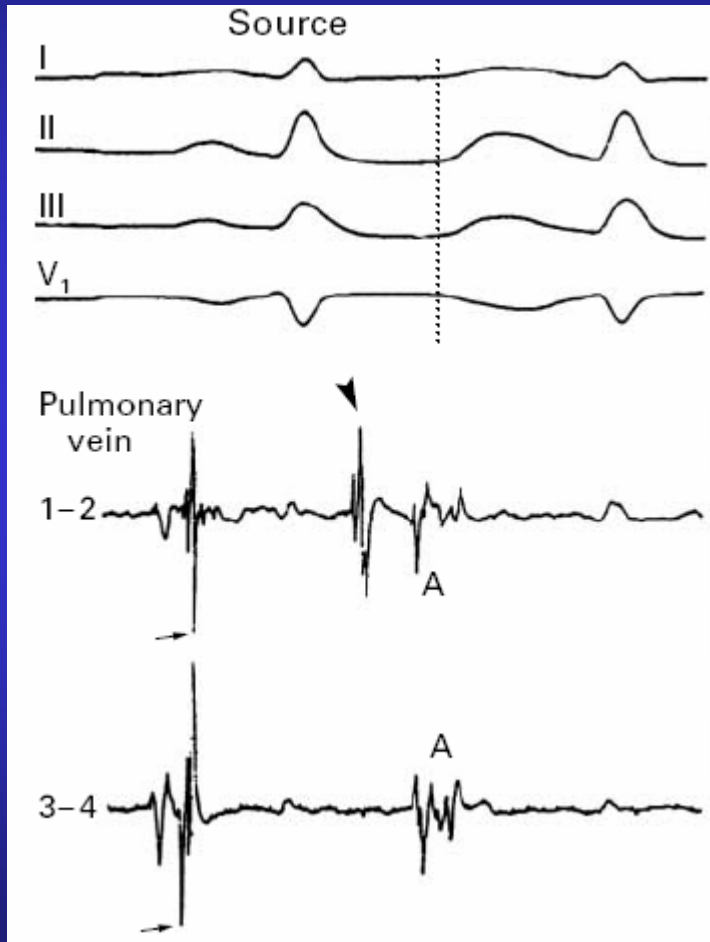
- paroxysmal
- persistent
- permanent

## Ablation target(s)

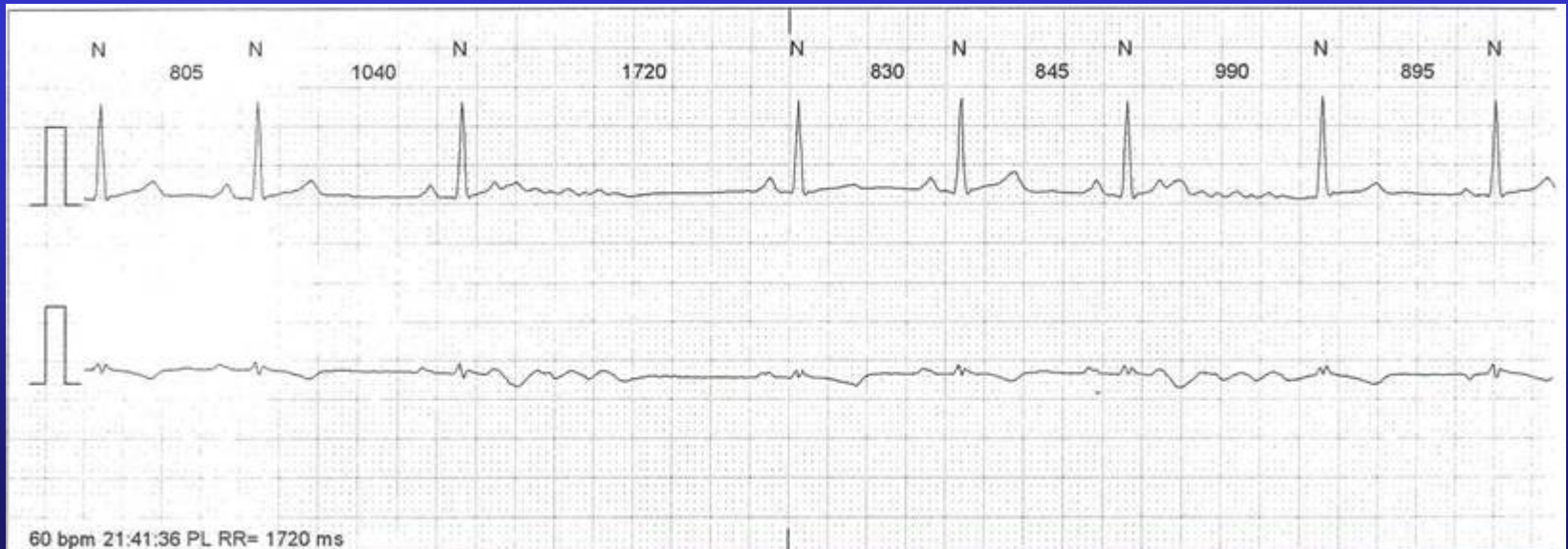
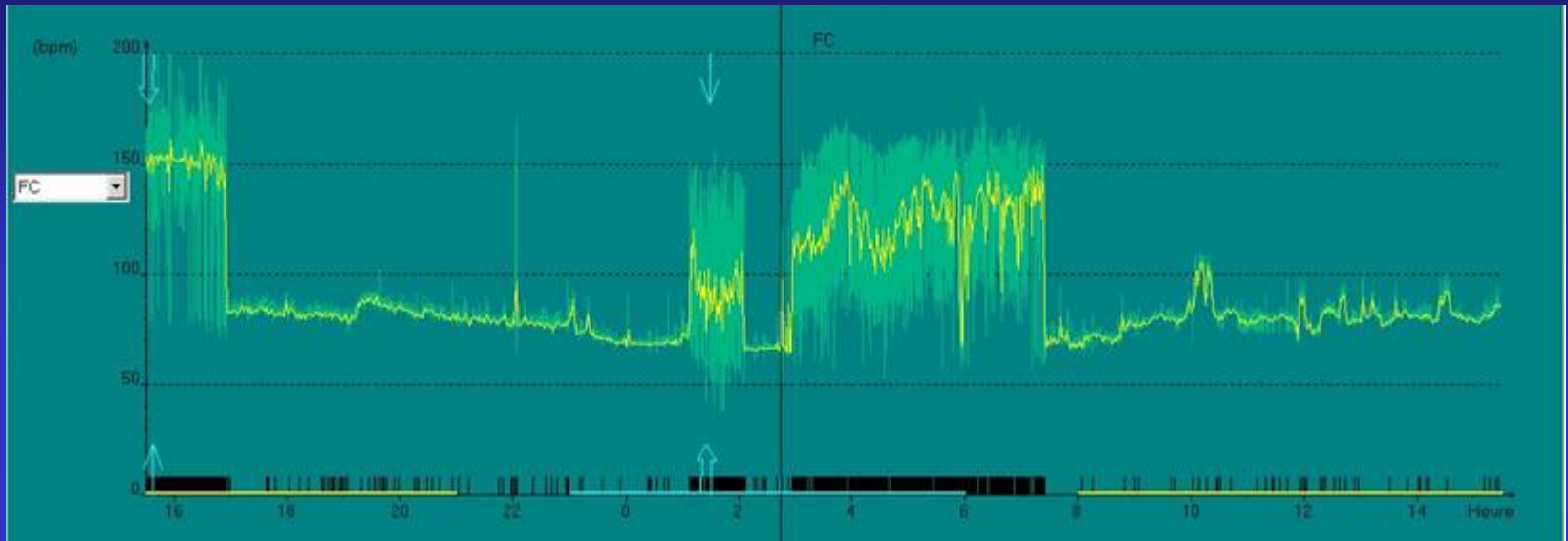
- trigger
- substrate
- ANS

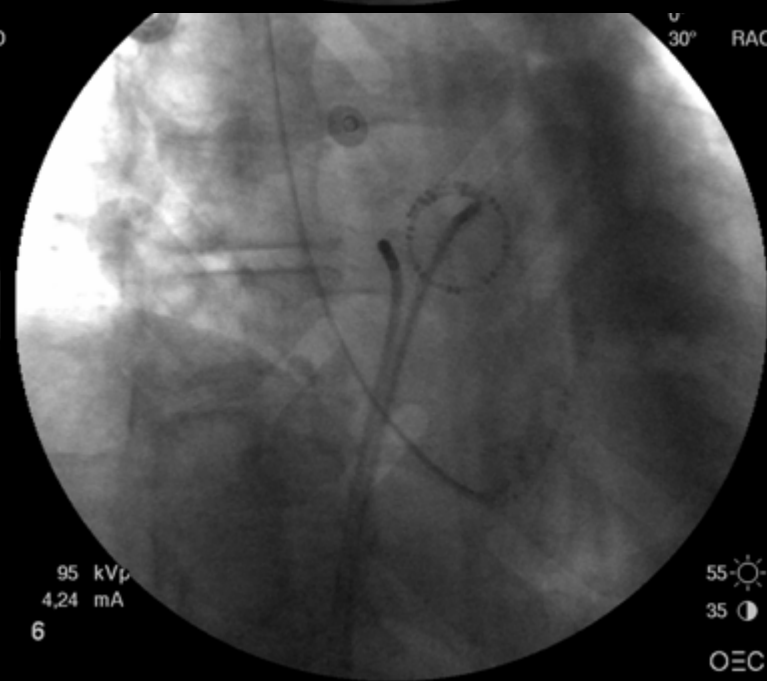
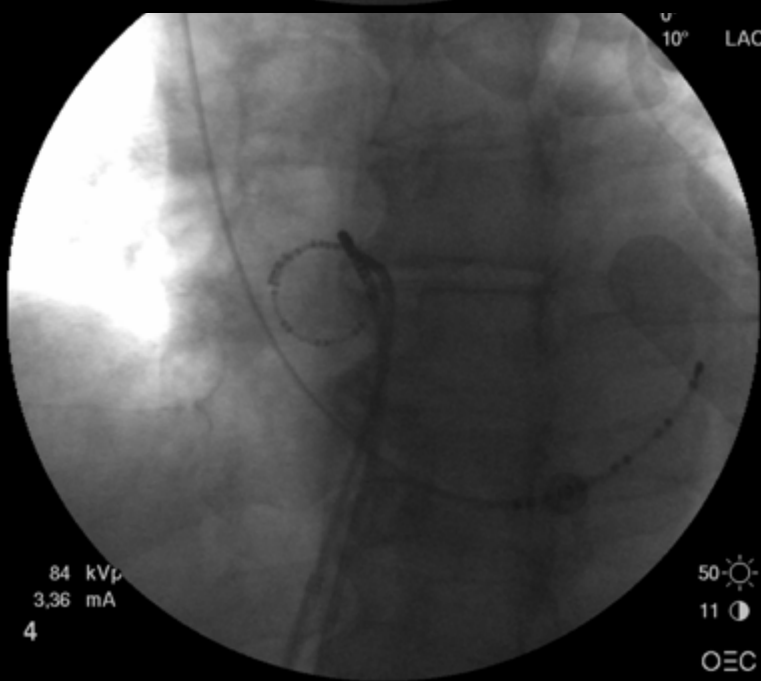
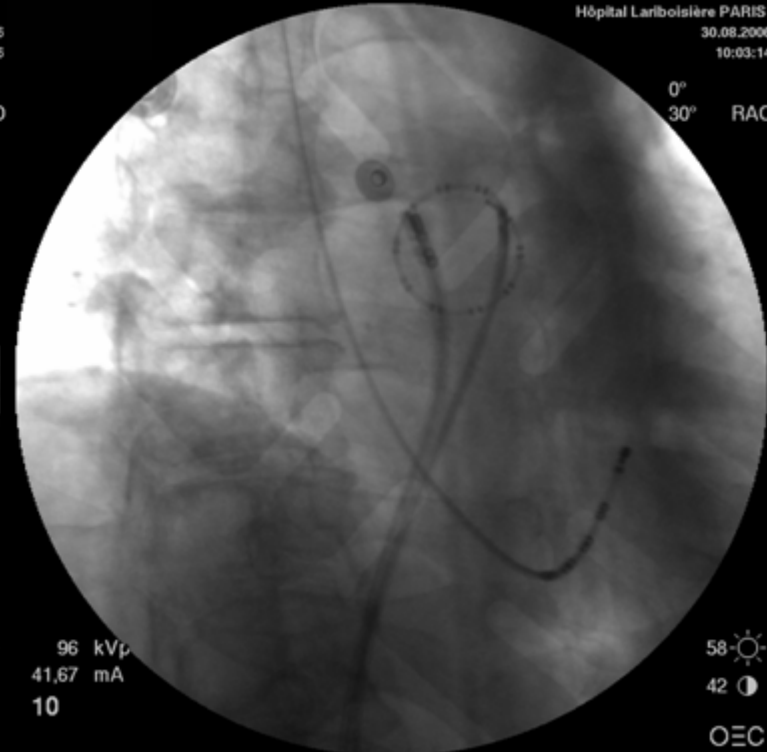
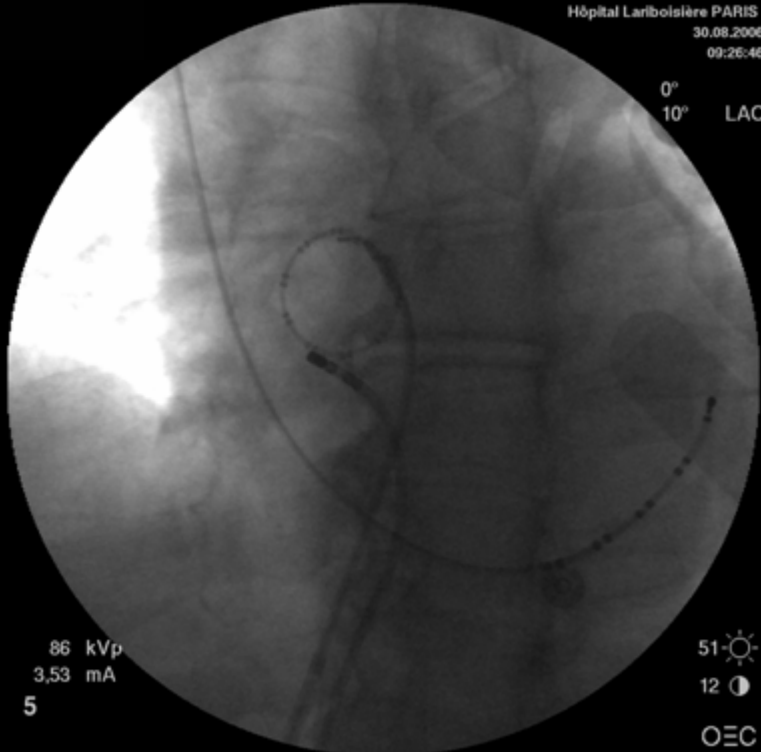
“Electrical” vs. “anatomic” approaches

# The Trigger approach for focal AF

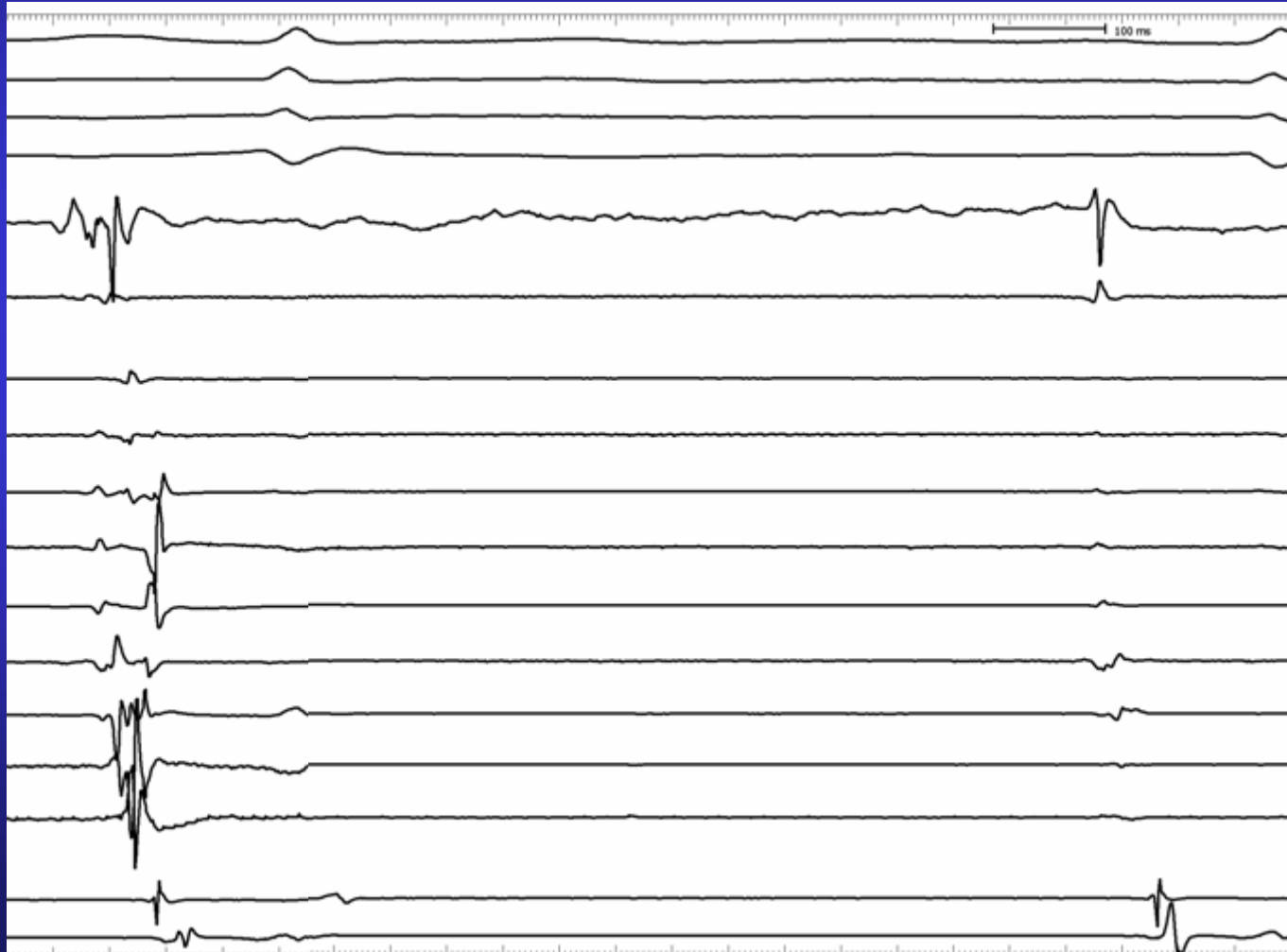


# The Trigger approach for focal AF

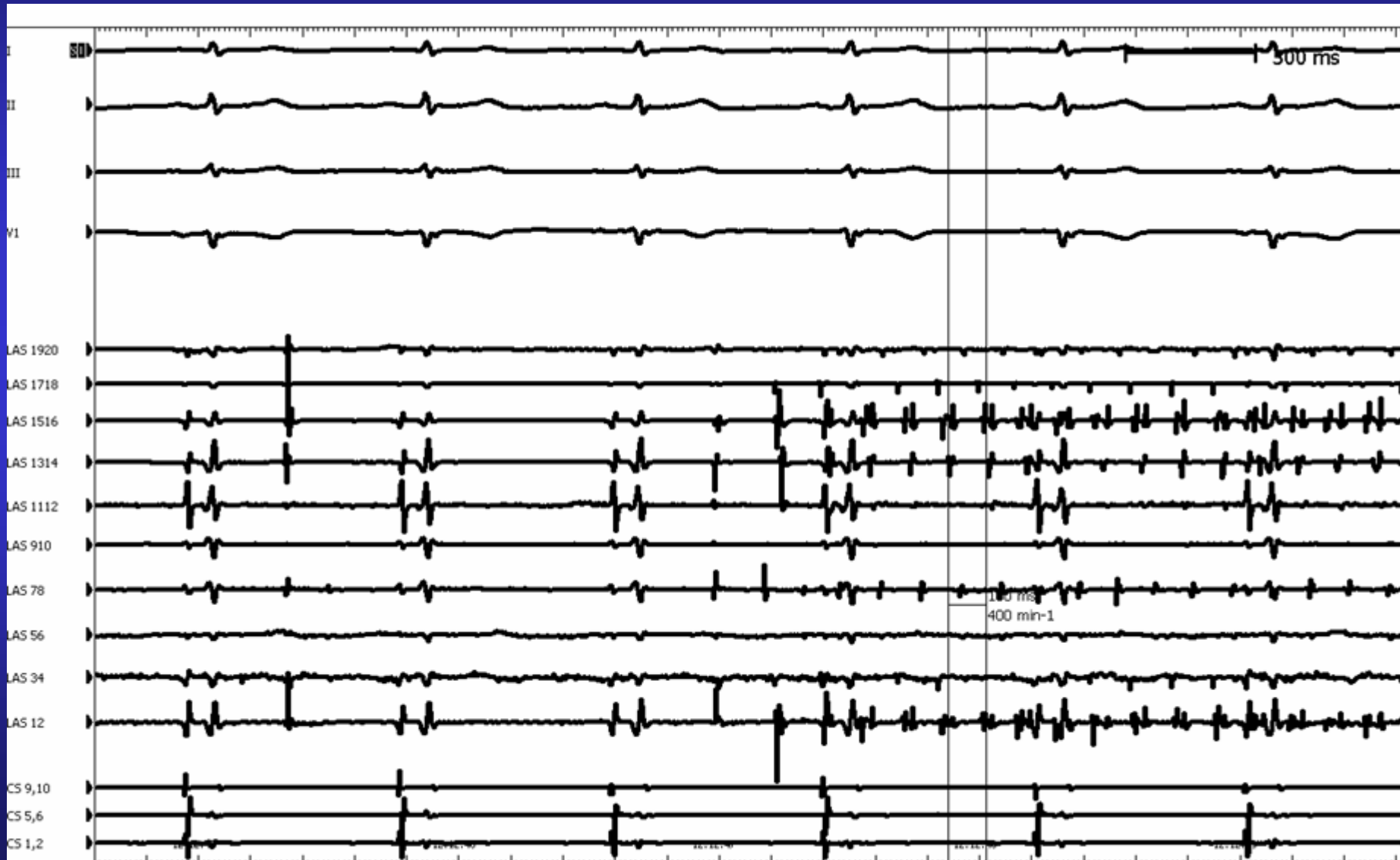




# Pulmonary veins isolation (PVI) for paroxysmal AF



# Pulmonary veins isolation (PVI) for paroxysmal AF



# Radiofrequency Ablation vs Antiarrhythmic Drugs as First-line Treatment of Symptomatic Atrial Fibrillation

## A Randomized Trial

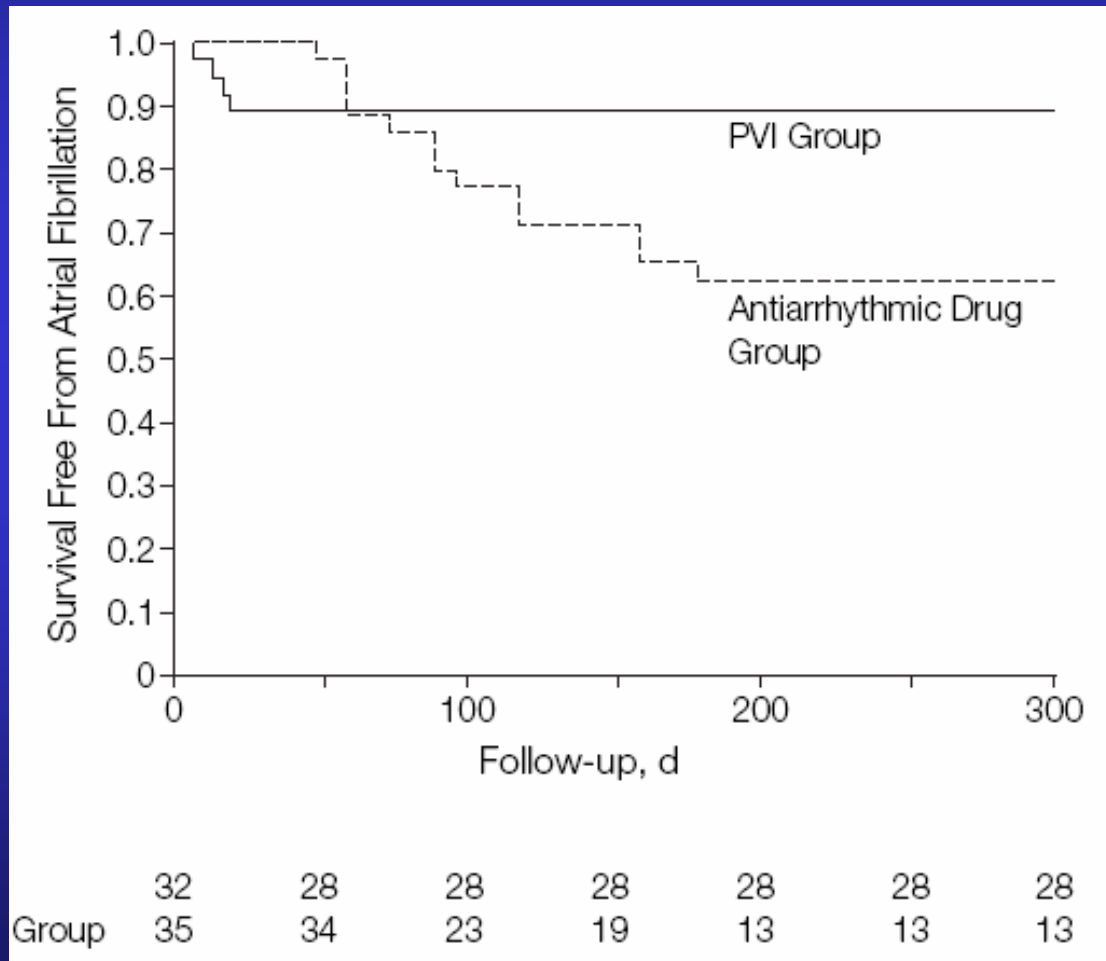
**Table 1.** Baseline Characteristics\*

Characteristics	Pulmonary Vein Isolation Group (n = 33)	Antiarrhythmic Drug Group (n = 37)
Age, mean (SD), y	53 (8)	54 (8)
Left atrial size, mean (SD), cm	4.1 (0.8)	4.2 (0.7)
Duration of atrial fibrillation, mean (SD), mo	5 (2.0)	5 (2.5)
Atrial fibrillation		
Paroxysmal	32 (97)	35 (95)
Persistent	1 (3)	2 (5)
Structural heart disease and hypertension	8 (25)	10 (28)
Left ventricular ejection fraction, mean (SD), %	53 (5)	54 (6)
Use of $\beta$ -blocker therapy	19 (57)	23 (62)

\*Data are presented as No. (%) unless otherwise specified.

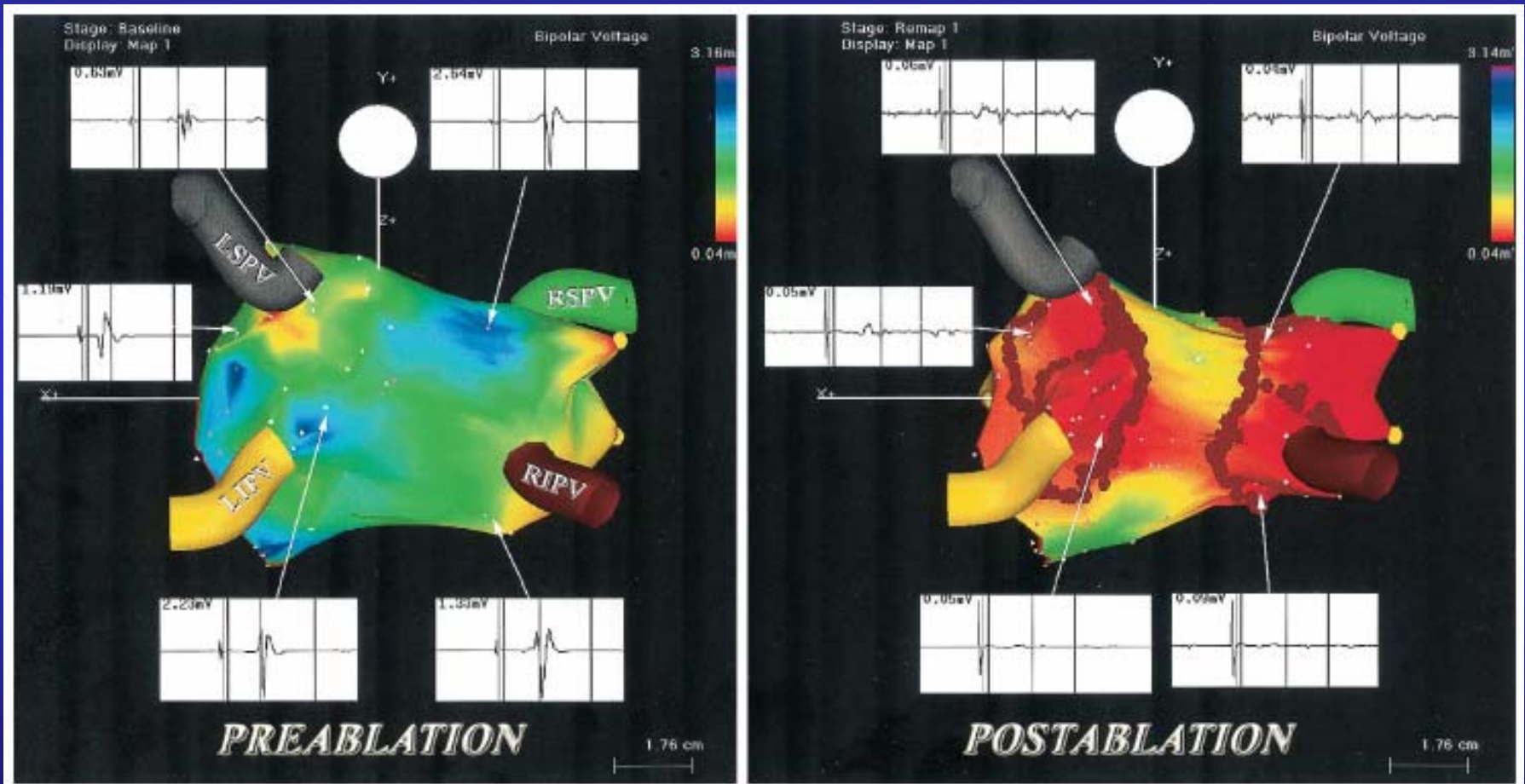
# Radiofrequency Ablation vs Antiarrhythmic Drugs as First-line Treatment of Symptomatic Atrial Fibrillation

## A Randomized Trial

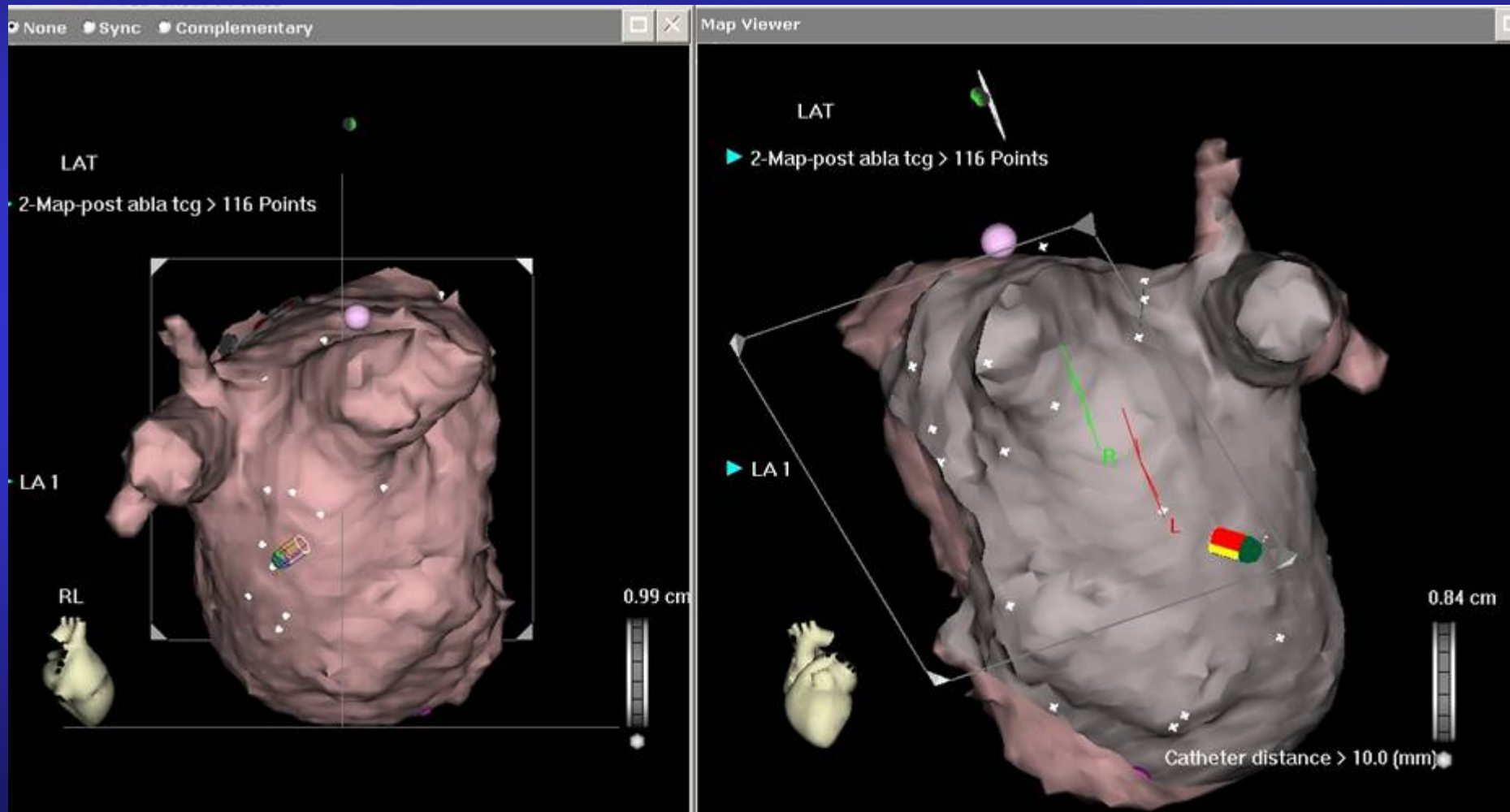


Wasni et al. JAMA. 2005;293:2634-40

# Substrate modification for paroxysmal AF

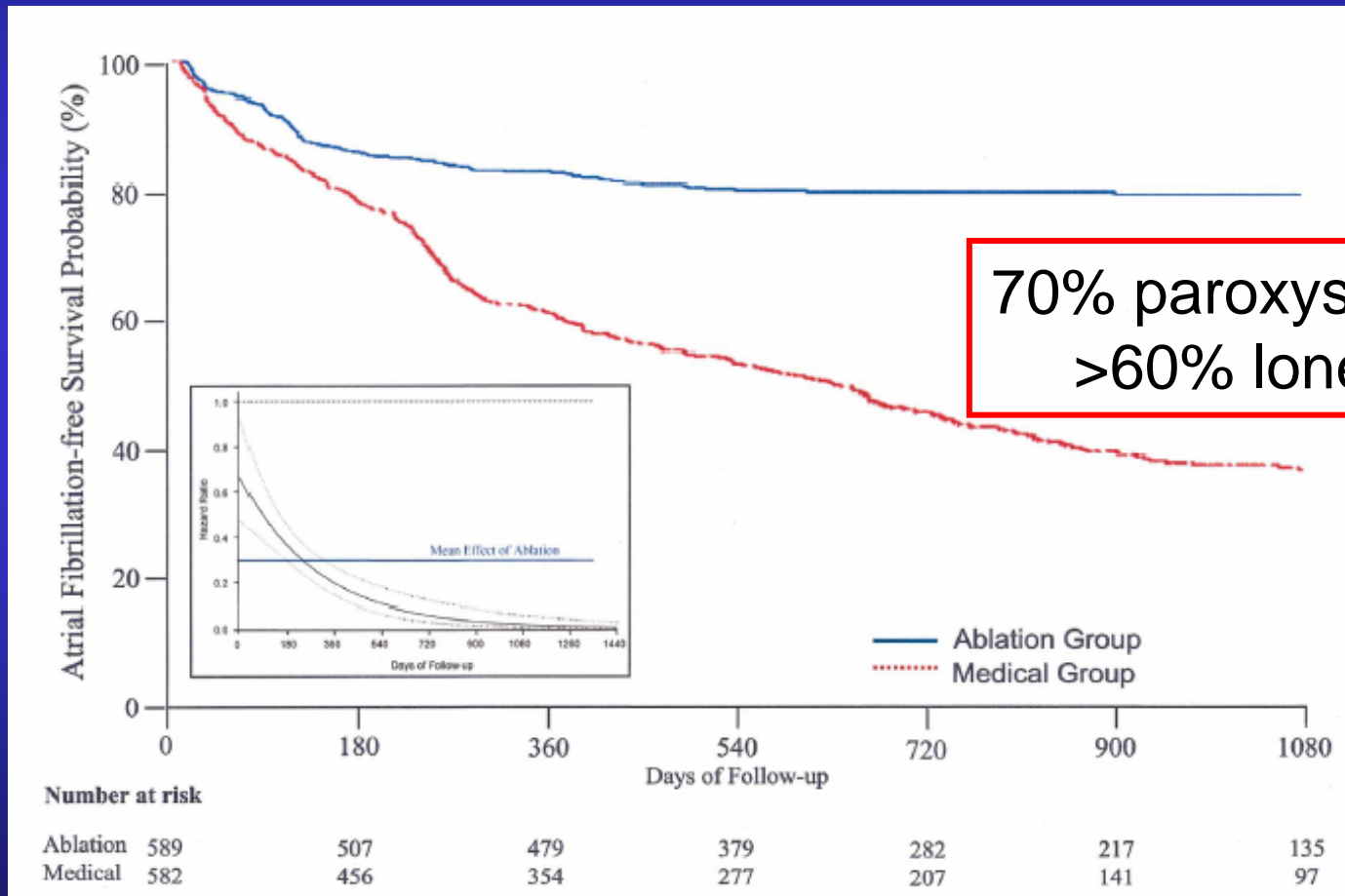


# Technological support for the anatomic approach



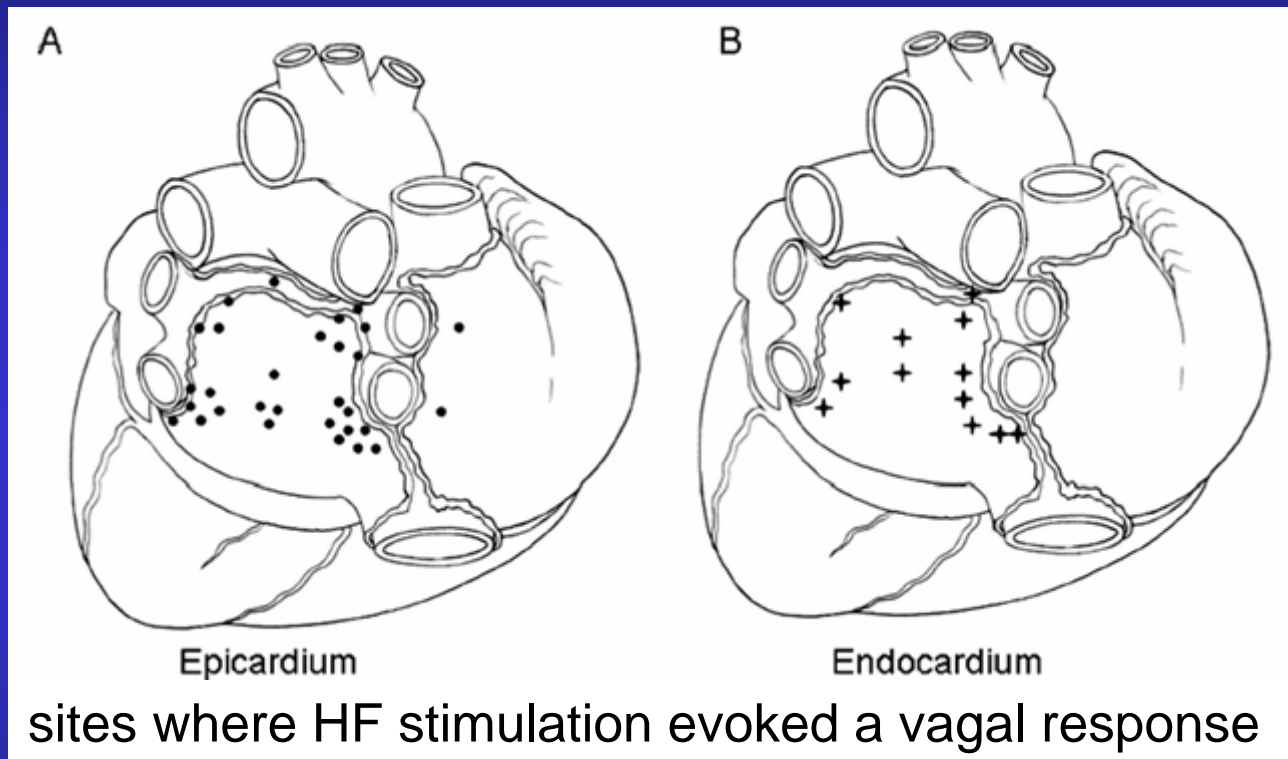
# Mortality, Morbidity, and Quality of Life After Circumferential Pulmonary Vein Ablation for Atrial Fibrillation

## Outcomes From a Controlled Nonrandomized Long-Term Study



## Selective Atrial Vagal Denervation Guided by Evoked Vagal Reflex to Treat Patients With Paroxysmal Atrial Fibrillation

Mauricio Scanavacca, Cristiano F. Pisani, Denise Hachul, Sissy Lara, Carina Hardy, Francisco Darrieux, Ivani Trombetta, Carlos Eduardo Negrão and Eduardo Sosa  
*Circulation* published online Aug 21, 2006;



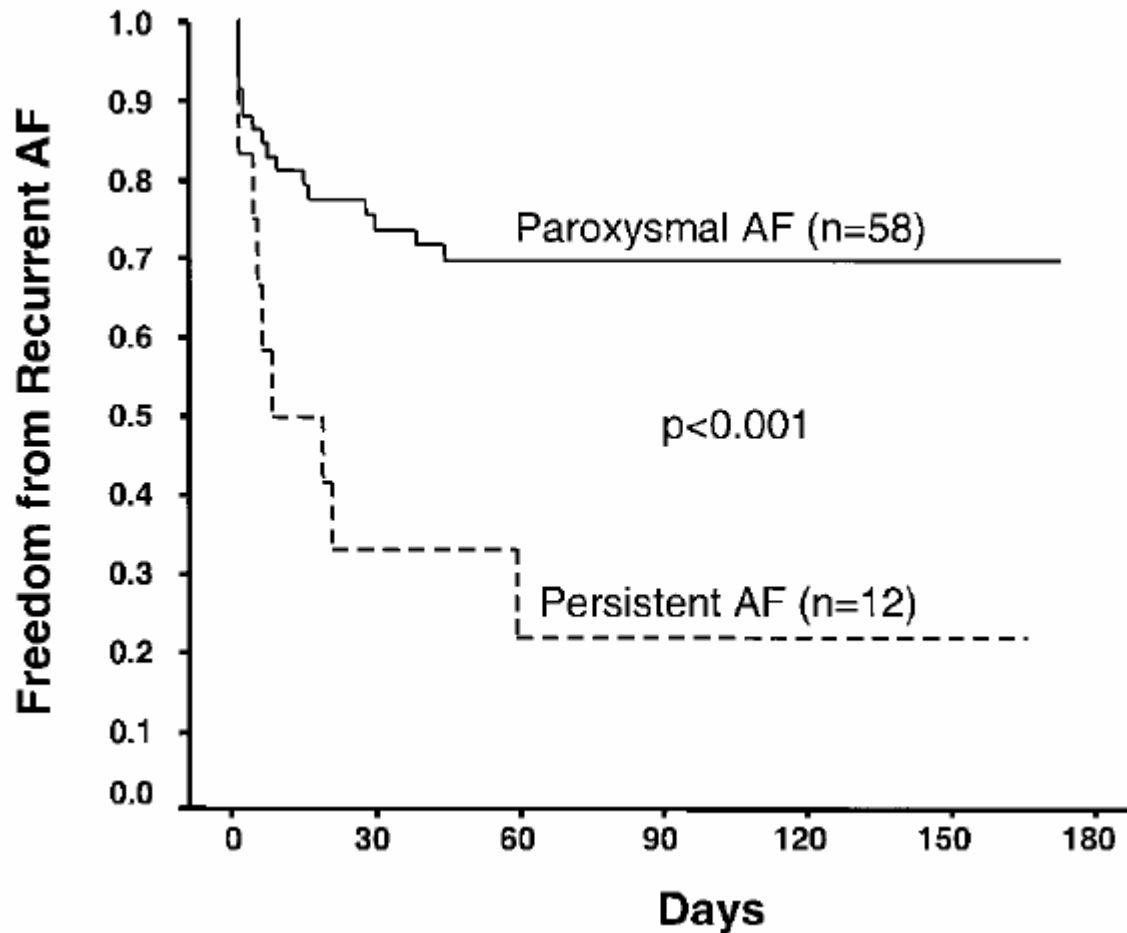
- “parasympathetic changes obtained without PV disconnection were enough to prevent clinical AF episodes in few selected patients”
- “extensive PV antrum ablation itself promotes left atrial autonomic denervation”

# Catheter ablation for paroxysmal AF

## Results

- Which technique?
  - different patients
  - non standardized techniques
  - different end-points and follow-up
- **Success rate in experimented centers >80%**
  - Pappone et al. J Am Coll Cardiol 2003;42:185–97
  - Ouyang et al. Circulation 2004;110:2090-6
  - Wasni et al. JAMA. 2005;293:2634-40
  - Oral et al. Circulation 2006;113:1824-31
  - Jais et al. Heart Rhythm meeting 2006
  - others...

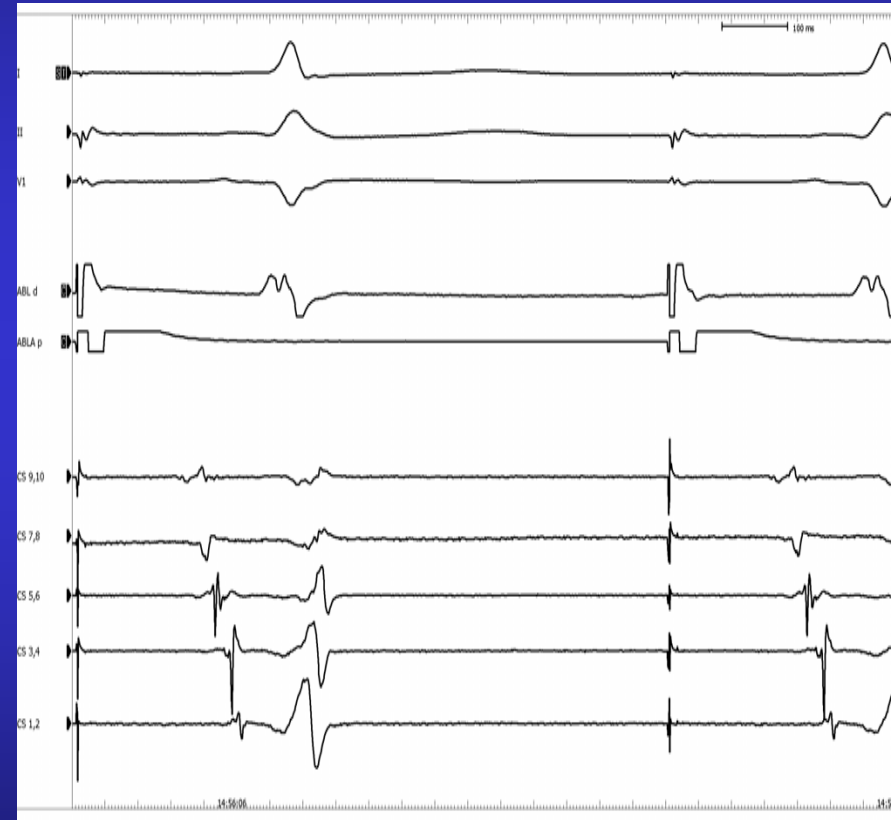
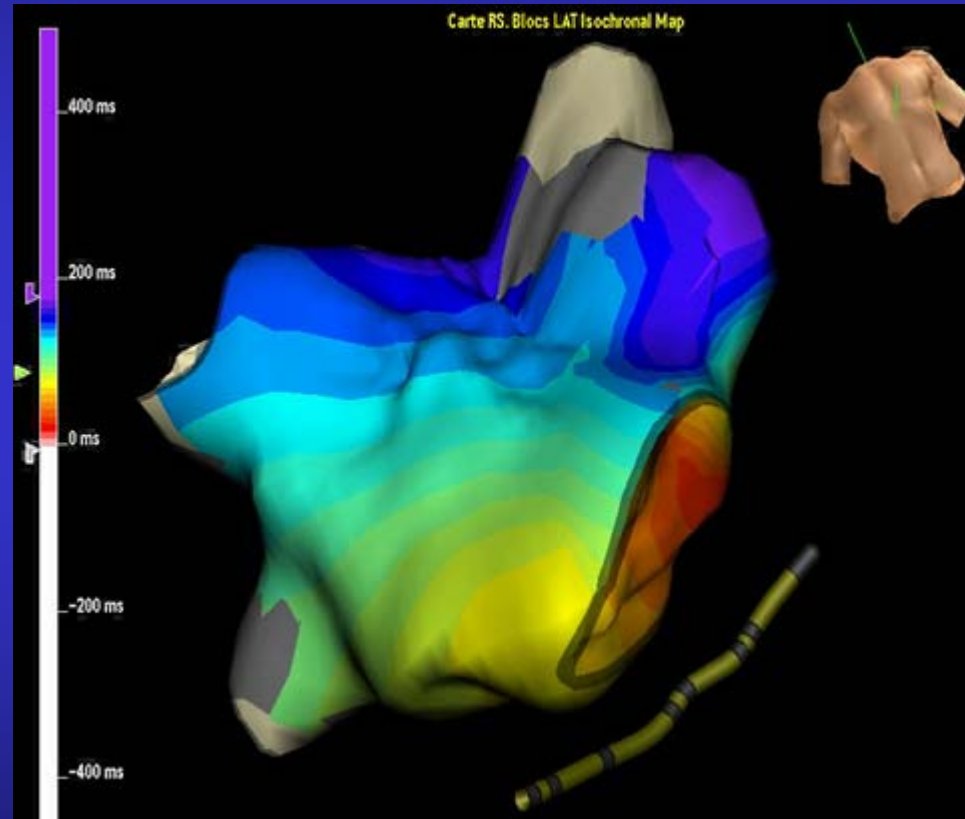
# Pulmonary veins isolation for persistent/permanent AF



# Substrate modification for persistent / permanent AF

- Anatomic approach
  - Oral et al. N Engl J Med 2006;354:34-41
- Electro-anatomic approach
  - Ouyang et al. Circulation 2005;112:3038-48
- PVI ± Left mitral isthmus ± Left atria roof line
  - Haissaguerre et al. JCE 2005;16:1138-47
  - Fassini et al. JCE 2005;16:1150-6

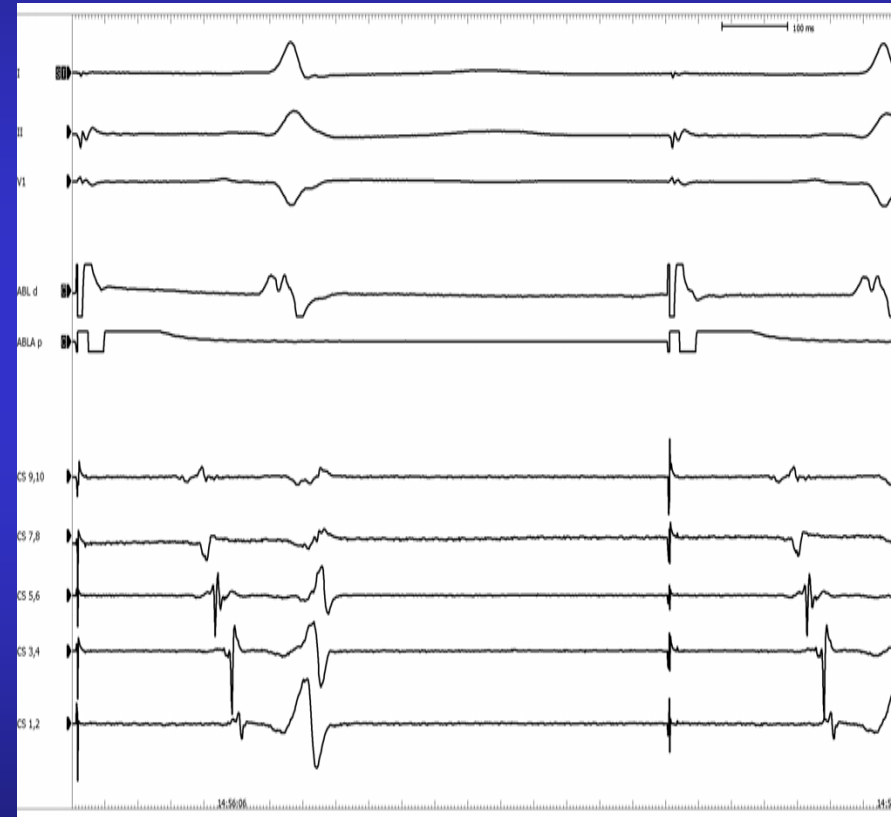
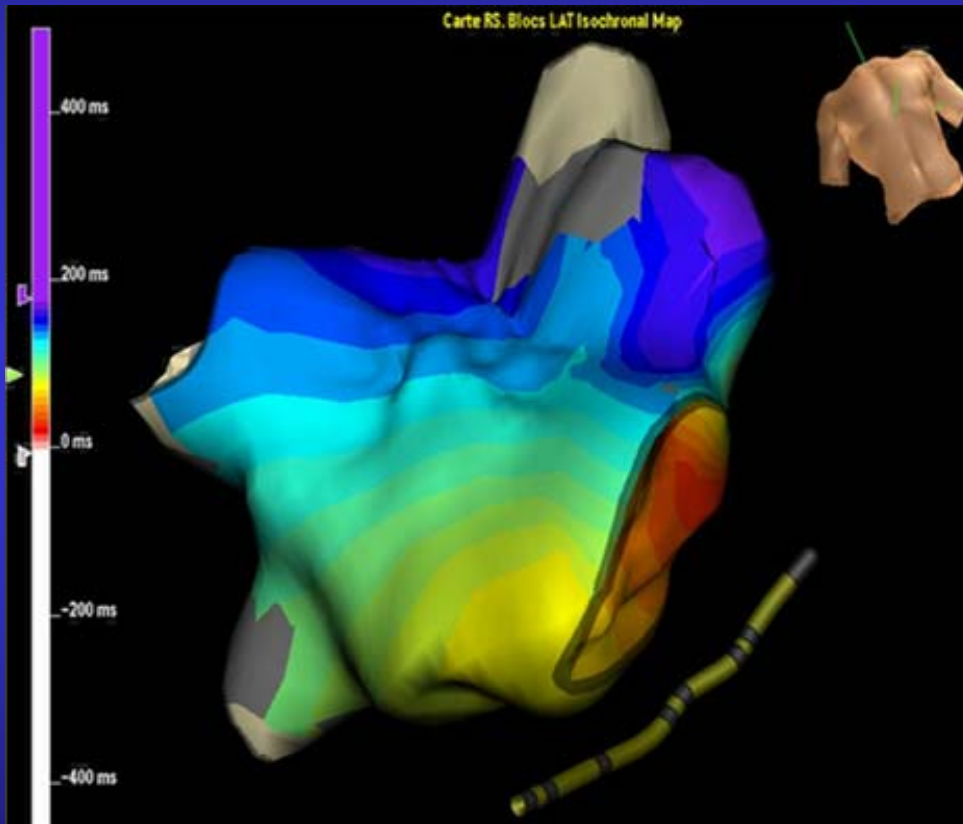
# Substrate modification for persistent / permanent AF



Coronary sinus stimulation

Left atrial appendage stimulation

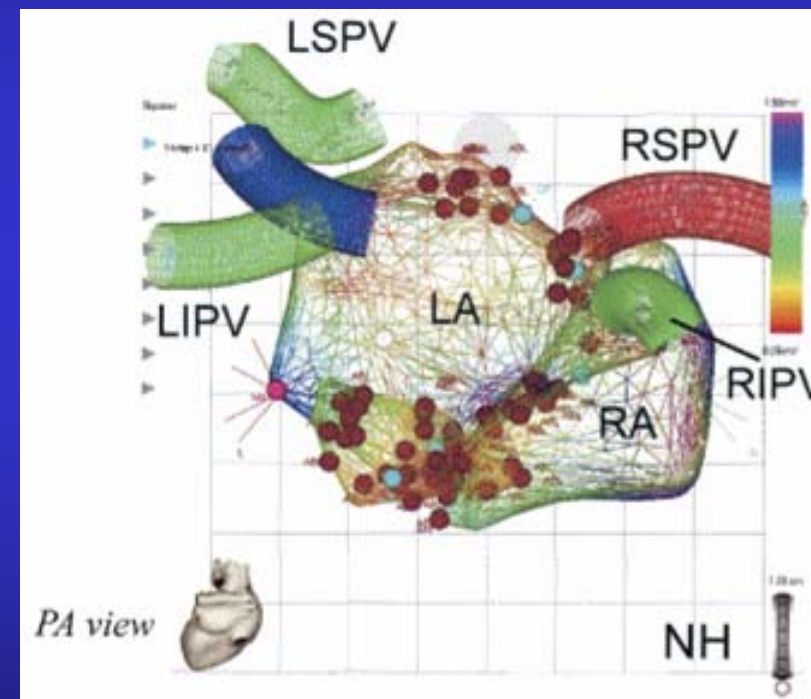
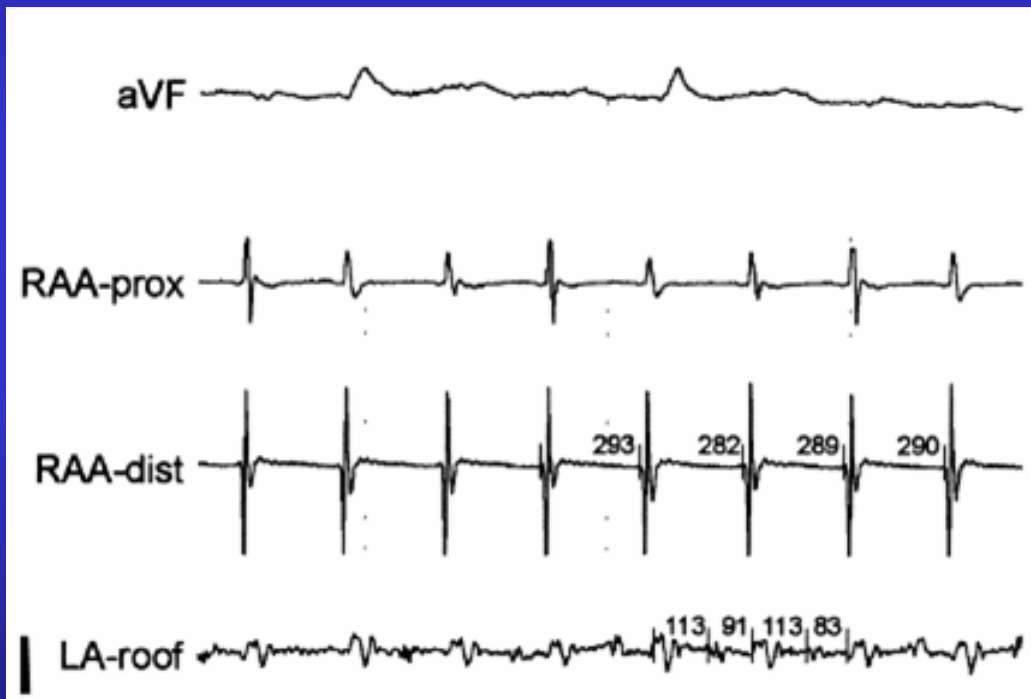
# Substrate modification for persistent / permanent AF



Coronary sinus stimulation

Left atrial appendage stimulation

# Substrate modification for persistent / permanent AF



# Catheter ablation for persistent & permanent AF : Results

- $\approx 70\%$  Hsu et al. N Engl J Med 2004;351:2373-83
- $>90\%$  Ouyang et al. Circulation 2005;112:3038-48
- $\approx 70\%$  Fassini et al. JCE 2005;16:1150-6
- $>85\%$  Haissaguerre et al. JCE 2005;16:1138-47
- $\approx 70\%$  Willems et al. Eur Heart J. 2006;16
- $>70\%$  Oral et al. N Engl J Med 2006;354:34-41

# Worldwide Survey on the Methods, Efficacy, and Safety of Catheter Ablation for Human Atrial Fibrillation

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## Complications % of patients

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Peri-procedural death	0.05%
Chronic PV Stenosis	1.62%
Chronic PV Occlusion	0.24%
Tamponade	1.22%
Stroke	0.28%
Transient Ischemic Attack	0.66%
PseudoA & fistulae	0.95%
Others	0.90%

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**TOTAL 5.9%**

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**N=8745**

# Catheter ablation for persistent & permanent AF : Complications

- Redo procedure : up to 50%
- RF induced Atrial Flutter
- Tamponade : 1 to 6% (++ lines)
- Oesophageal fistula

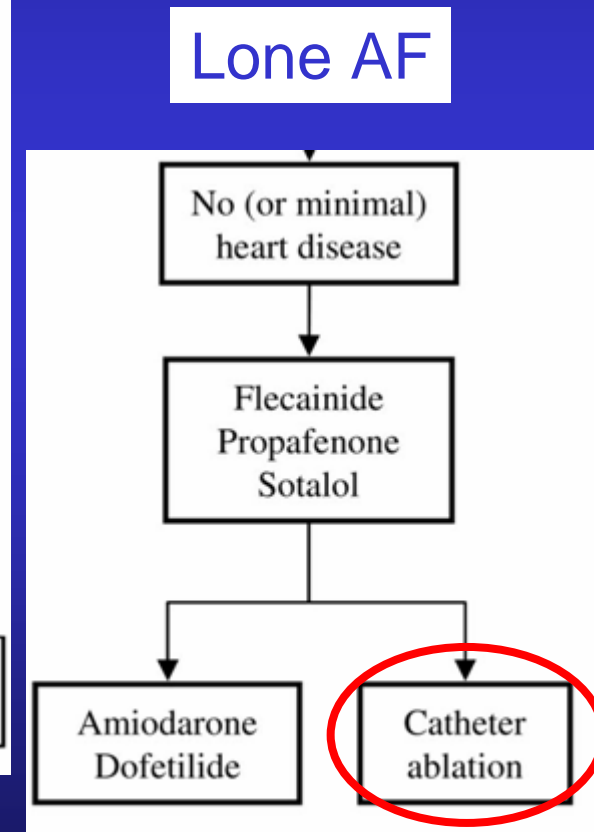
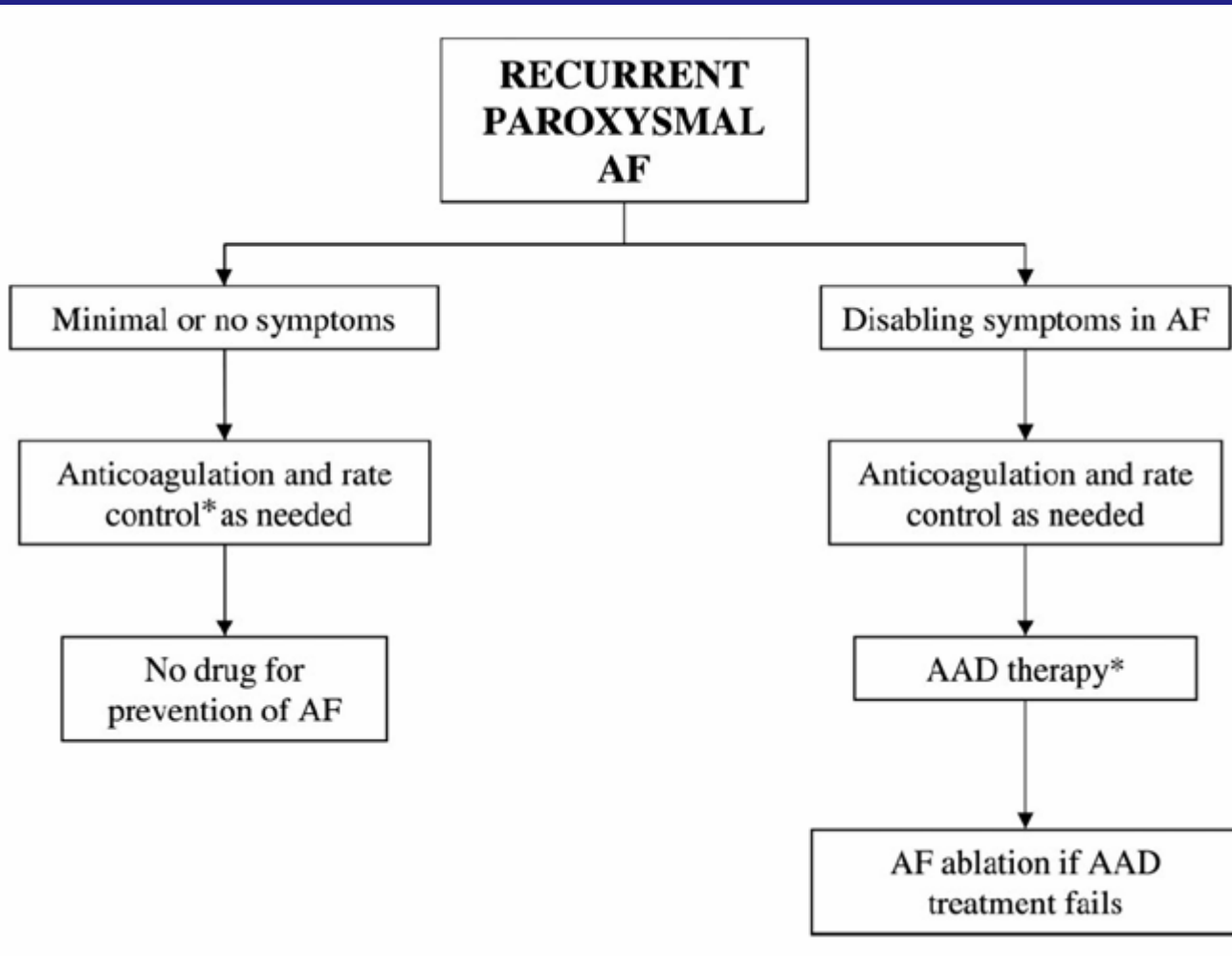
# Conclusions

- **Catheter ablation for lone paroxysmal AF**
  - high success rates
  - acceptable complication rates
  - good indication after a class I AA drug failure
- **Catheter ablation for persistent/permanent AF**
  - more difficult - lower success rates
  - higher complication rates
  - more controversial for “lone” AF
  - for patients who really need Sinus rhythm

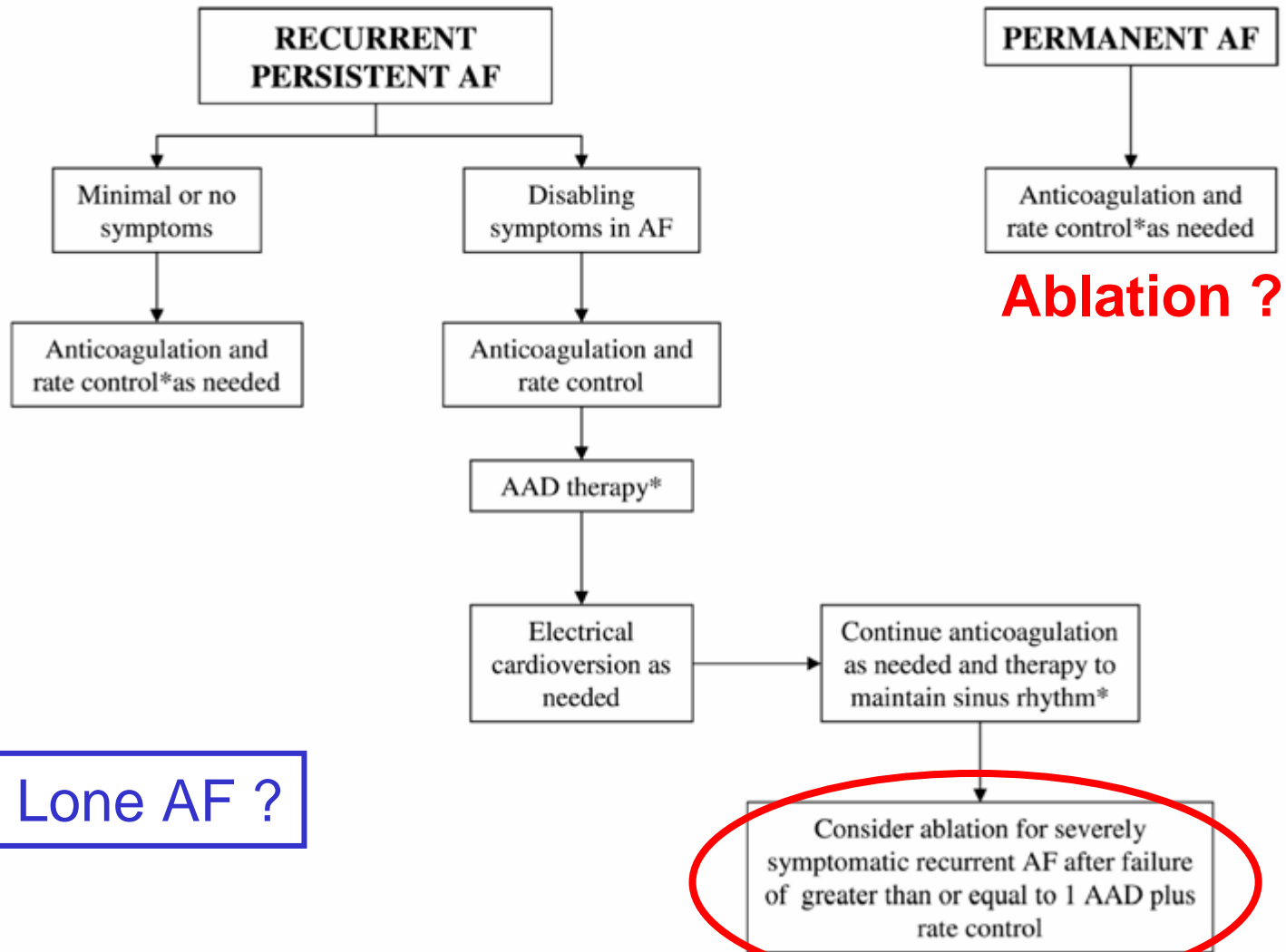
# Conclusions

- Expected future improvements :
  - catheters design, robotic systems, energies
  - better subject-specific target definition
- Need for prospective randomized studies with a mortality end-point

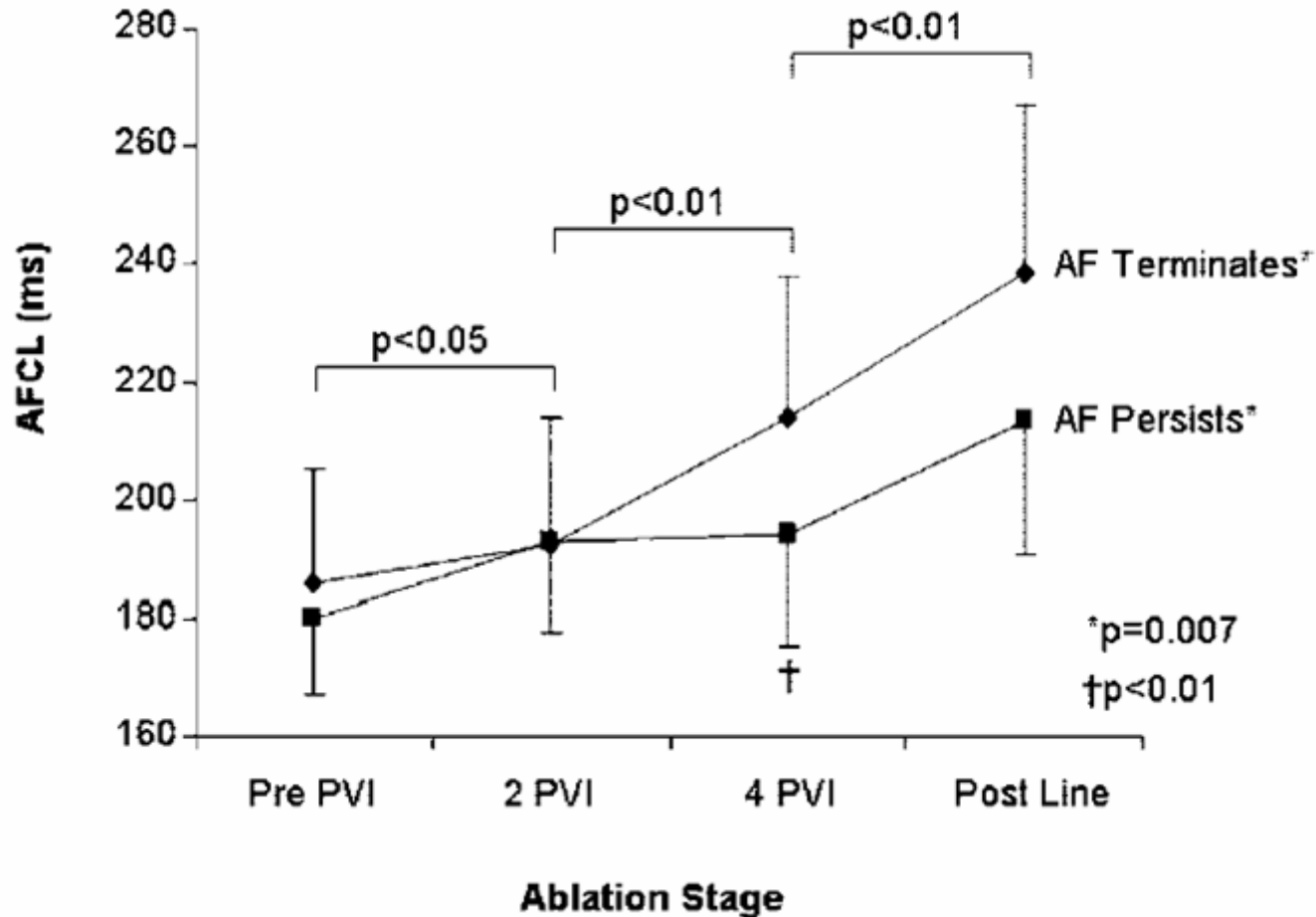
# Which patients ?



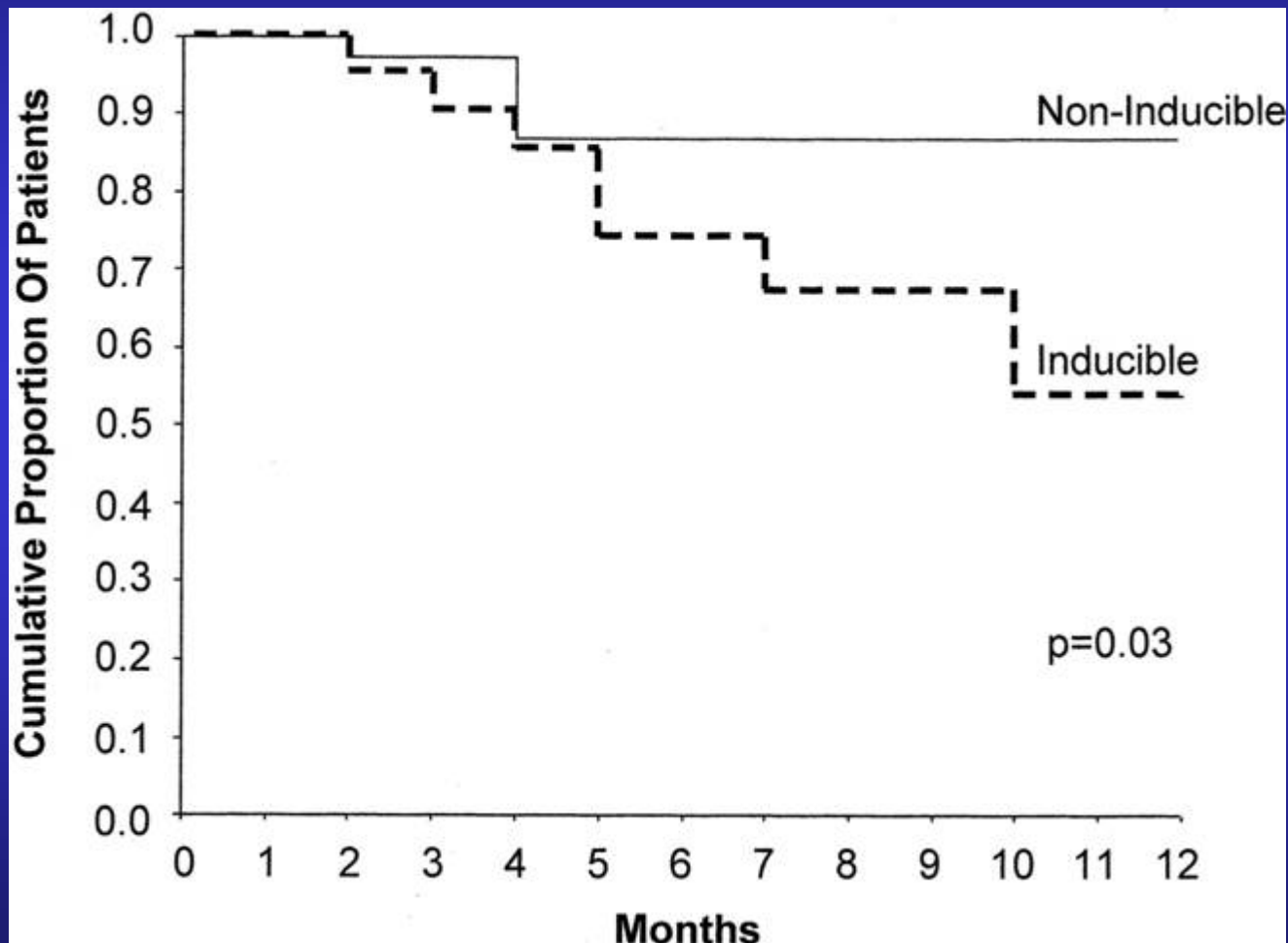
# Which patients ?



# Substrate modification for paroxysmal AF



# Substrate modification for paroxysmal AF



Haïssaguerre et al. Circulation 2004;109:3007-13

# Catheter Ablation for Atrial Fibrillation in Congestive Heart Failure

Li-Fern Hsu, M.B., B.S., Pierre Jaïs, M.D., Prashanthan Sanders, M.B., B.S., Ph.D., Stéphane Garrigue, M.D., Ph.D.,  
Mélèze Hocini, M.D., Frédéric Sacher, M.D., Yoshihide Takahashi, M.D., Martin Rotter, M.D.,  
Jean-Luc Pasquié, M.D., Ph.D., Christophe Scavée, M.D., Pierre Bordachar, M.D., Jacques Clémenty, M.D.,  
and Michel Haïssaguerre, M.D.

