RHYTHM 2017
Arrhythmias & Heart Failure
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# Benefits of AF ablation in heart failure


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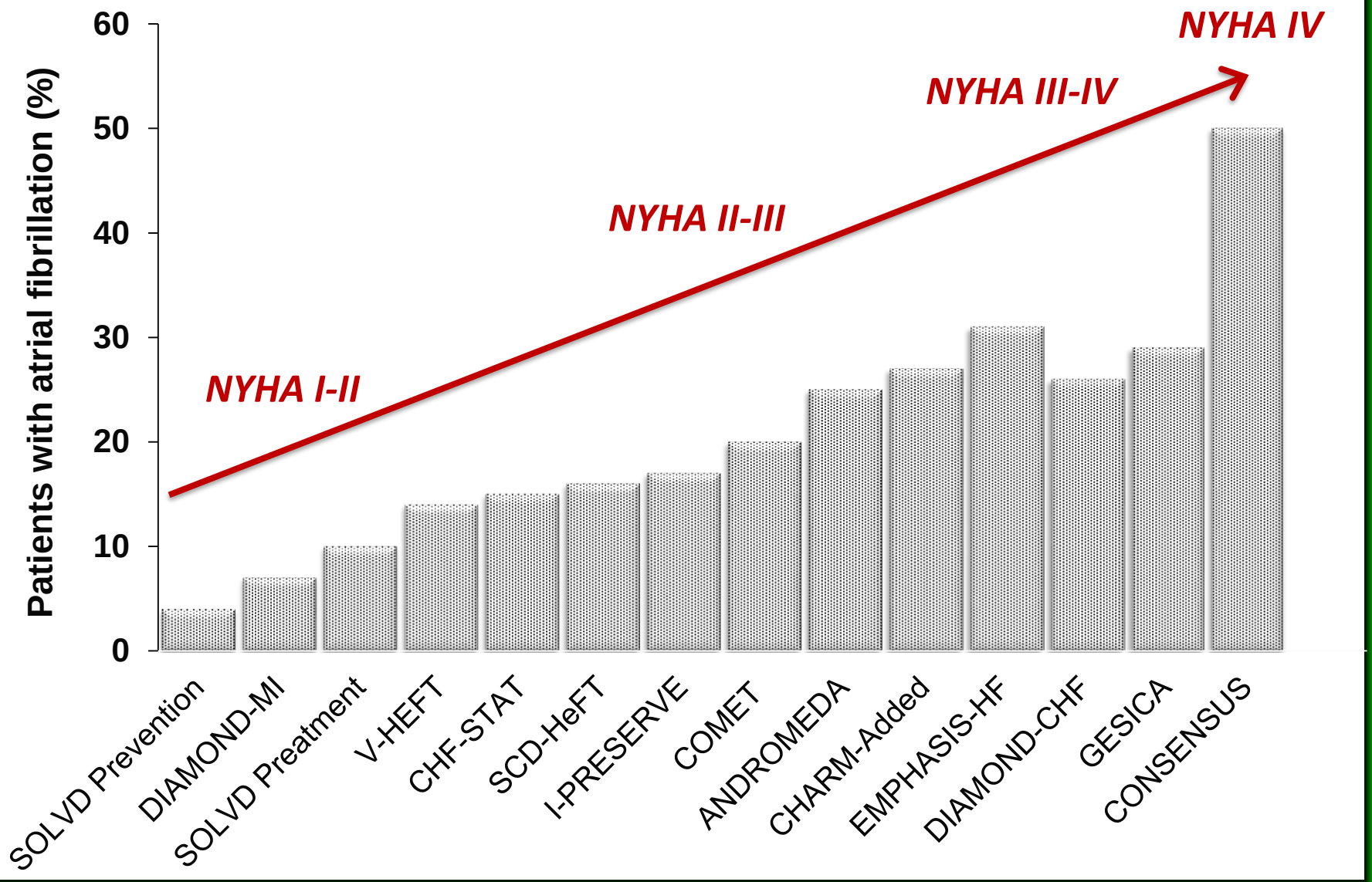
www.rhythmcongress.com

**Disclosure**

I have the following potential conflicts of interest to report:

Honoraria (lecture fees) from St. Jude Medical and Biosense Webster

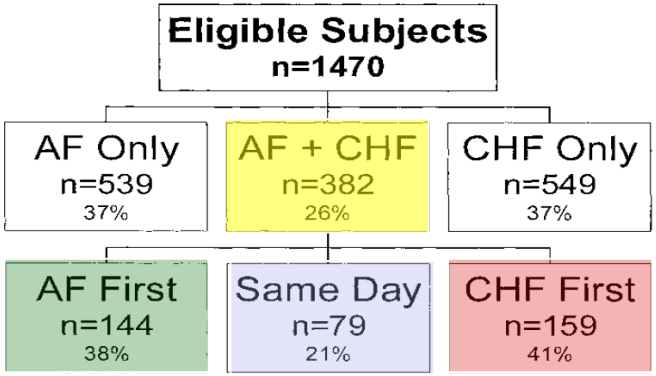
# Prevalence of AF in HF Trials



# Prognostic Impact of AF and HF

## Temporal Relations of Atrial Fibrillation and Congestive Heart Failure and Their Joint Influence on Mortality

### The Framingham Heart Study




**Pts with AF or HF who develop the other condition have poor prognosis**

Comorbid condition as a time-dependent variable

| | | |
|---|---|---|
| (A) Mortality after AF | | |
| Impact of incident CHF | 2.7 (1.9 to 3.7)* | 3.1 (2.2 to 4.2)* |
| (B) Mortality after CHF | | |
| Impact of incident AF | 1.6 (1.2 to 2.1)† | 2.7 (2.0 to 3.6)* |

Wang J et al. *Circulation* 2003;107:2920-5

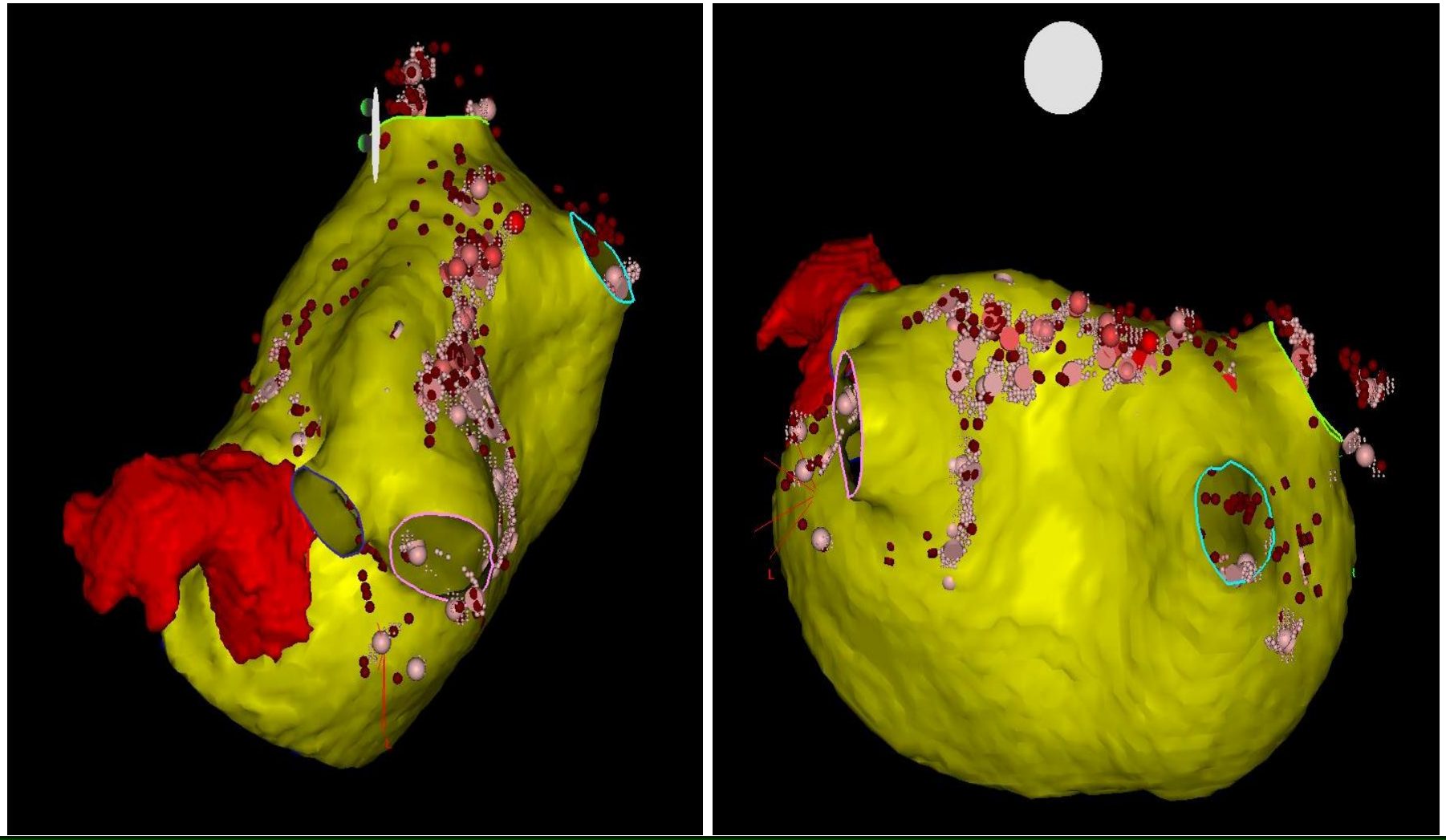
# Options for Pharmacological Rhythm Control in Patients with AF and HF

- **Amiodarone**
- **Dofetilide** (not approved in EU, risk of TdP)
- **Dronedarone** (restricted use after ANDROMEDA)

| | | |
|---|---|---|
| Dronedarone is not recommended because of an increased risk of hospital admissions for cardiovascular causes and an increased risk of premature death in NYHA Class III-IV patients | III | A |

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic HF. Eur Heart J 2016; Aug 27

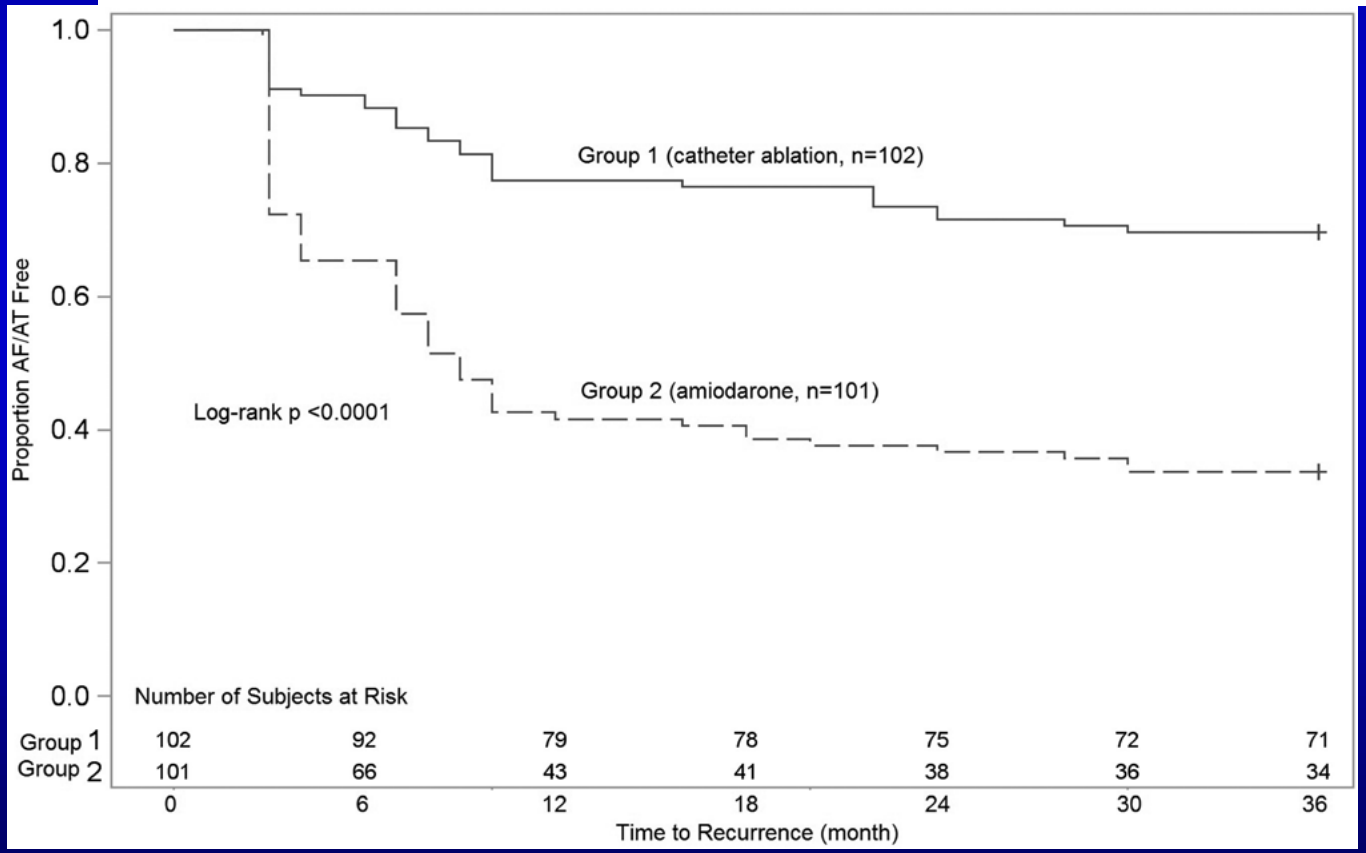
# Transcatheter Atrial Fibrillation Ablation in patients with Heart Failure



# Ablation Versus Amiodarone for Treatment of Persistent Atrial Fibrillation in Patients With Congestive Heart Failure and an Implanted Device

## Results From the AATAC Multicenter Randomized Trial

Luigi Di Biase, MD, PhD; Prasant Mohanty, MBBS, MPH; Sanghamitra Mohanty, MD; Pasquale Santangeli, MD; Chintan Trivedi, MD, MPH; Dhanunjaya Lakkireddy, MD; Madhu Reddy, MD; Pierre Jais, MD; Sakis Themistoclakis, MD; Antonio Dello Russo, MD; Michela Casella, MD; Gemma Pelargonio, MD; Maria Lucia Narducci, MD; Robert Schweikert, MD; Petr Neuzil, MD; Javier Sanchez, MD; Rodney Horton, MD; Salwa Beheiry, RN; Richard Hongo, MD; Steven Hao, MD; Antonio Rossillo, MD; Giovanni Forleo, MD; Claudio Tondo, MD; J. David Burkhardt, MD; Michel Haissaguerre, MD; Andrea Natale, MD




Circulation 2016; 133(17)

# Benefits of AF ablation in heart failure

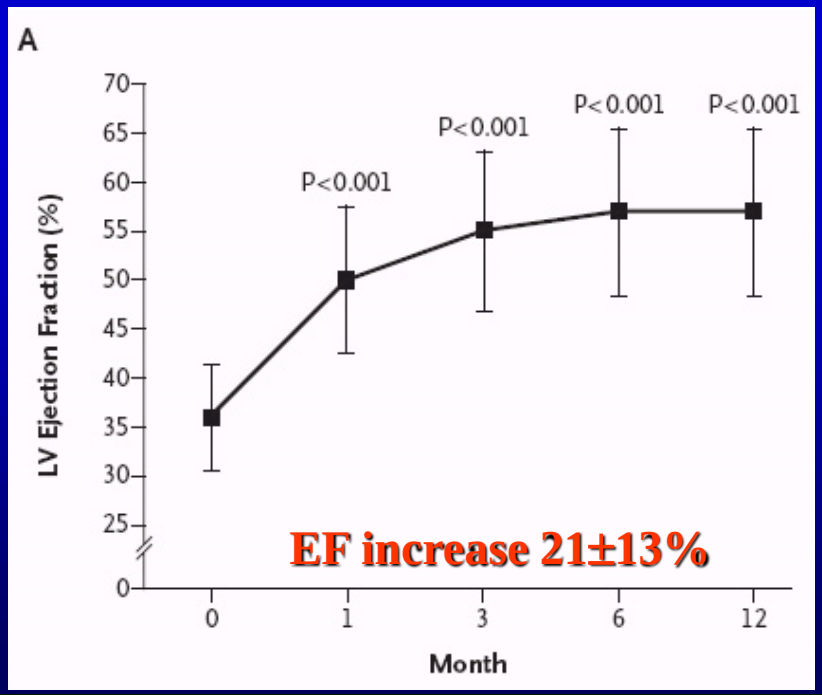
**NYHA Class**

PRE-ABLATION **2.3 ± 0.5**

POST-ABLATION **1.4 ± 0.5**

58 patients,
12 months f-up

**LV Ejection fraction**

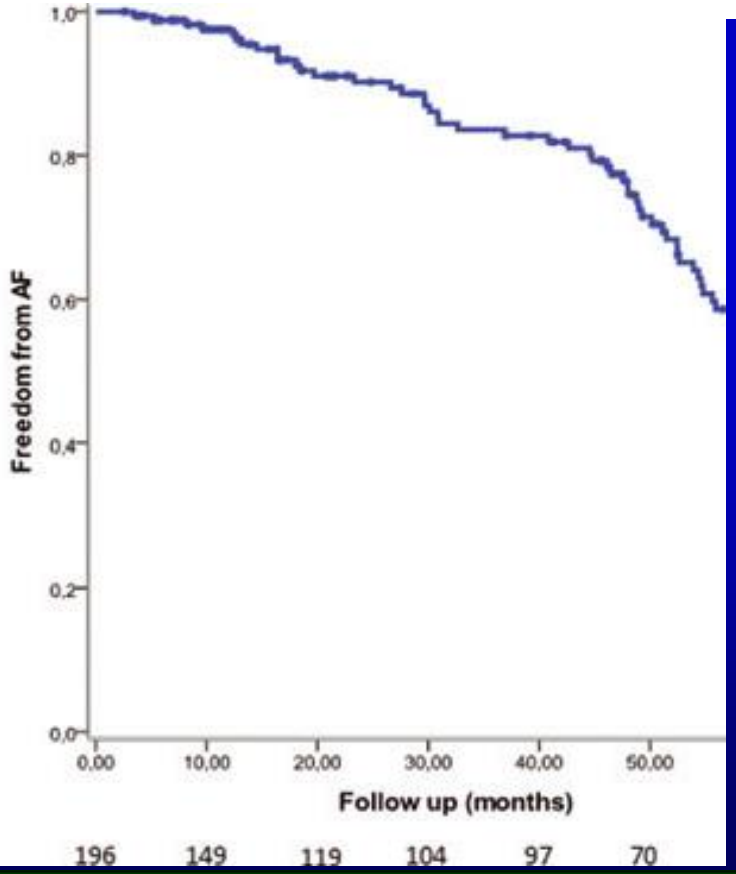



Hsu, L.-F. et al. N Engl J Med 2004;351:2373

# Long-term benefits of AF ablation in heart failure

## Long-Term Results of Transcatheter Atrial Fibrillation Ablation in Patients with Impaired Left Ventricular Systolic Function

MATTEO ANSELMINO, M.D., PH.D.,* STEFANO GROSSI, M.D.,† MARCO SCAGLIONE, M.D.,‡ DAVIDE CASTAGNO, M.D.,* FRANCESCA BIANCHI, M.D.,† GAETANO SENATORE, M.D.,§ MARIO MATTA, M.D.,* DARIO CASOLATI, M.D.,* FEDERICO FERRARIS, M.D.,* YVONNE CRISTOFORETTI, M.D.,* ALESSANDRO NEGRO, M.D.,* and FIORENZO GAITA, M.D.*




**196 patients,**
**46 months mean follow-up**
**78% pers AF, 22% parox AF**
**15% PVI, 85% PVI+lines/CFAE**

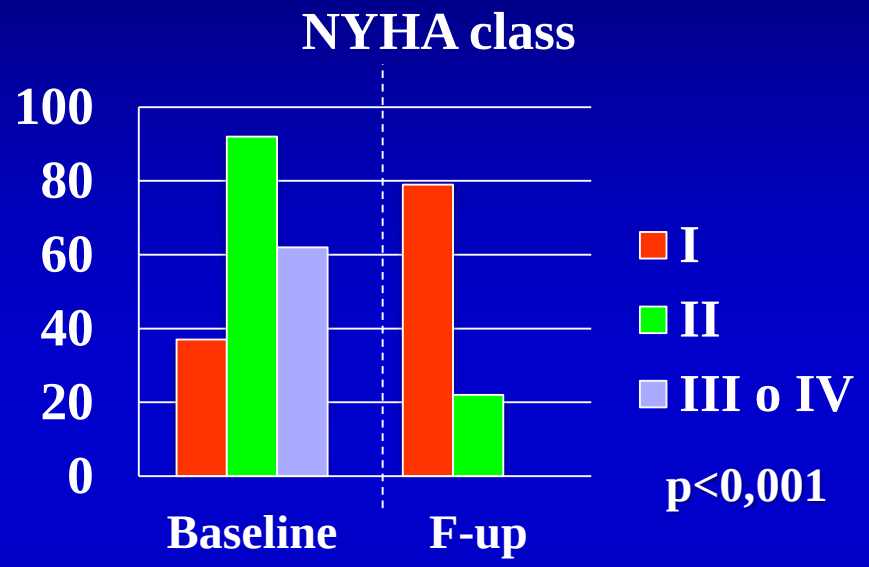
**62% patients free from AF**

J Cardiovasc Electrophysiol 2013

# Long-term benefits of AF ablation in heart failure

**196 patients, 46 months f-up**

## NYHA Class




## LV Ejection fraction

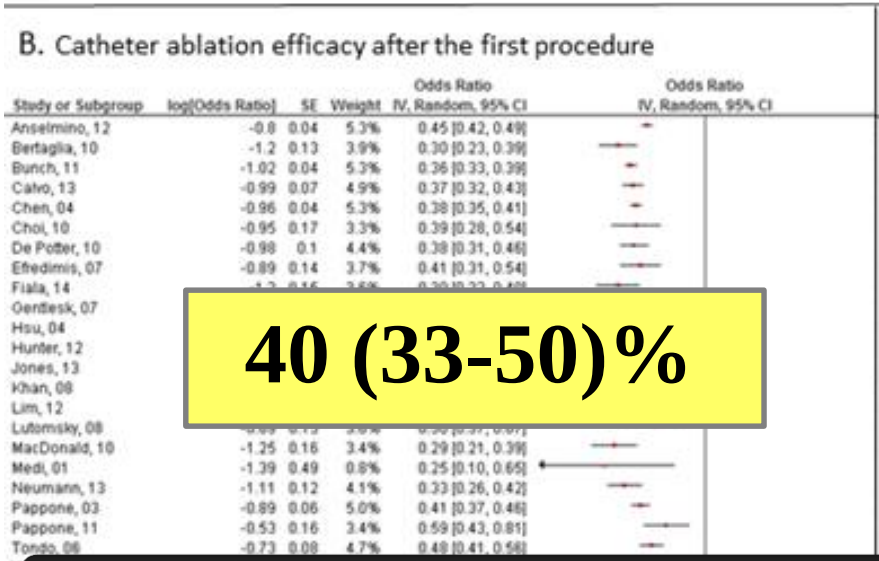
| | |
|---|---|
| PRE-ABLATION | 40.4 ± 7.2 |
| POST-ABLATION | 50.3 ± 9.5 |

J Cardiovasc Electrophysiol 2013

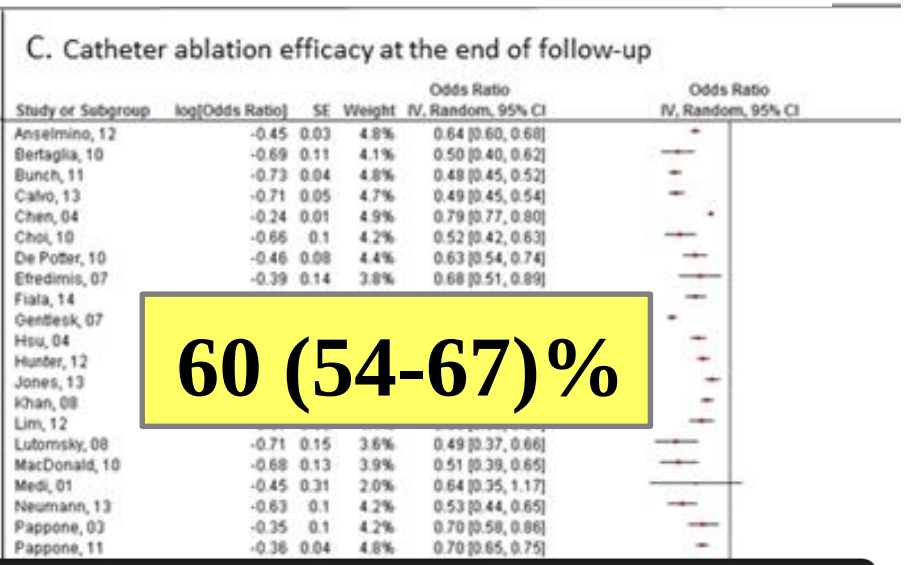
# Catheter Ablation of Atrial Fibrillation in Patients With Left Ventricular Systolic Dysfunction

## A Systematic Review and Meta-Analysis

Matteo Anselmino, MD, PhD; Mario Matta, MD; Fabrizio D'Ascenzo, MD; T. Jared Bunch, MD; Richard J. Schilling, MD; Ross J. Hunter, MD, PhD; Carlo Pappone, MD, PhD; Thomas Neumann, MD; Georg Noelker, MD; Martin Fiala, MD, PhD; Emanuele Bertaglia, MD; Antonio Frontera, MD; Edward Duncan, MD; Chrishan Nalliah, BSc, MBBS; Pierre Jais, MD; Rukshen Weerasooriya, MD; Jon M. Kalman, MD, PhD; Fiorenzo Gaita, MD




**40 (33-50)%**




**60 (54-67)%**

**No death** (out of 1838 patients)

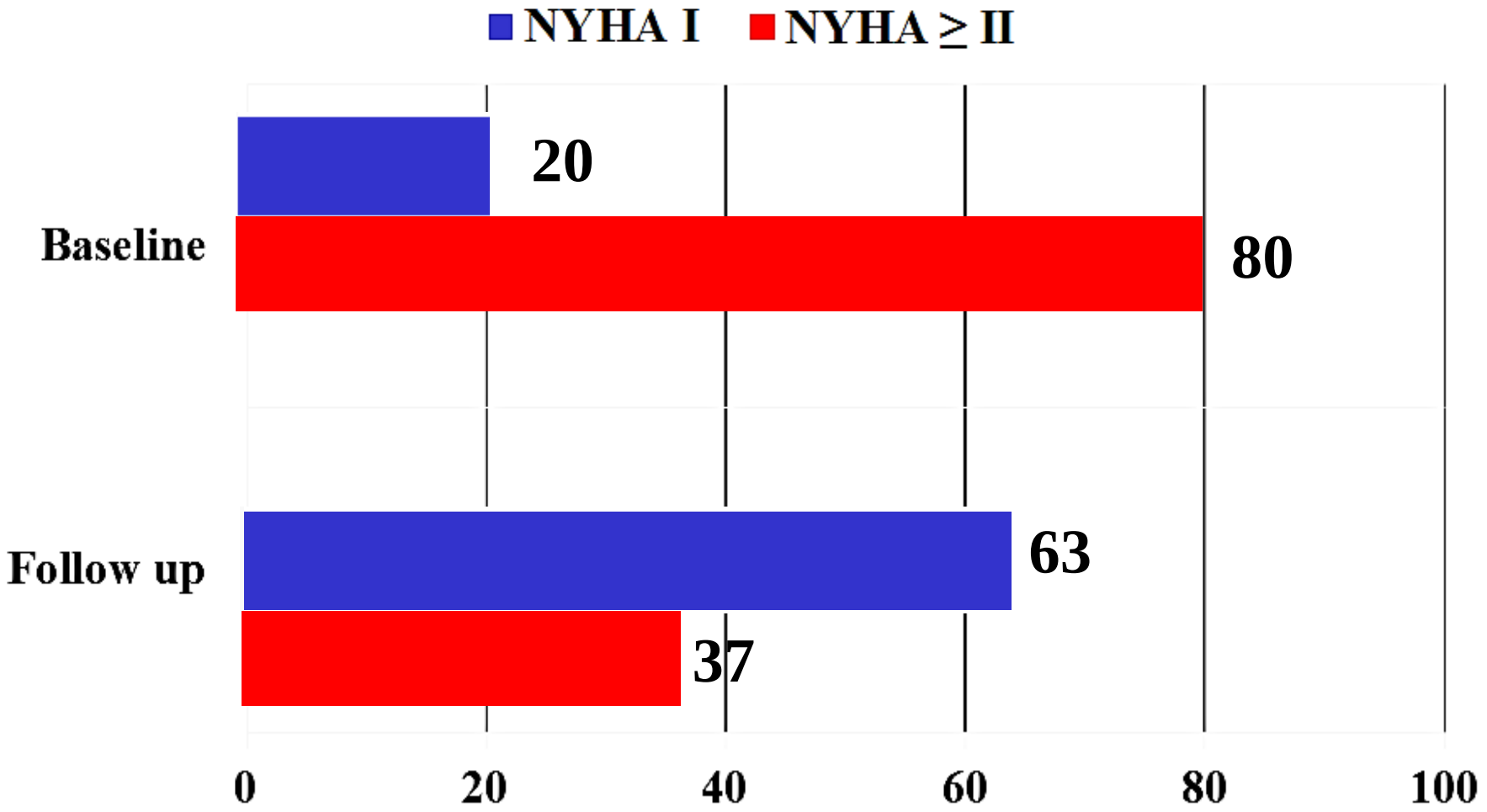
**21 thromboembolic events stroke/TIA** (1.14%)

**12 pericardial tamponade** (0.65%)

# Catheter Ablation of Atrial Fibrillation in Patients With Left Ventricular Systolic Dysfunction

## A Systematic Review and Meta-Analysis

## Impact on Functional Class

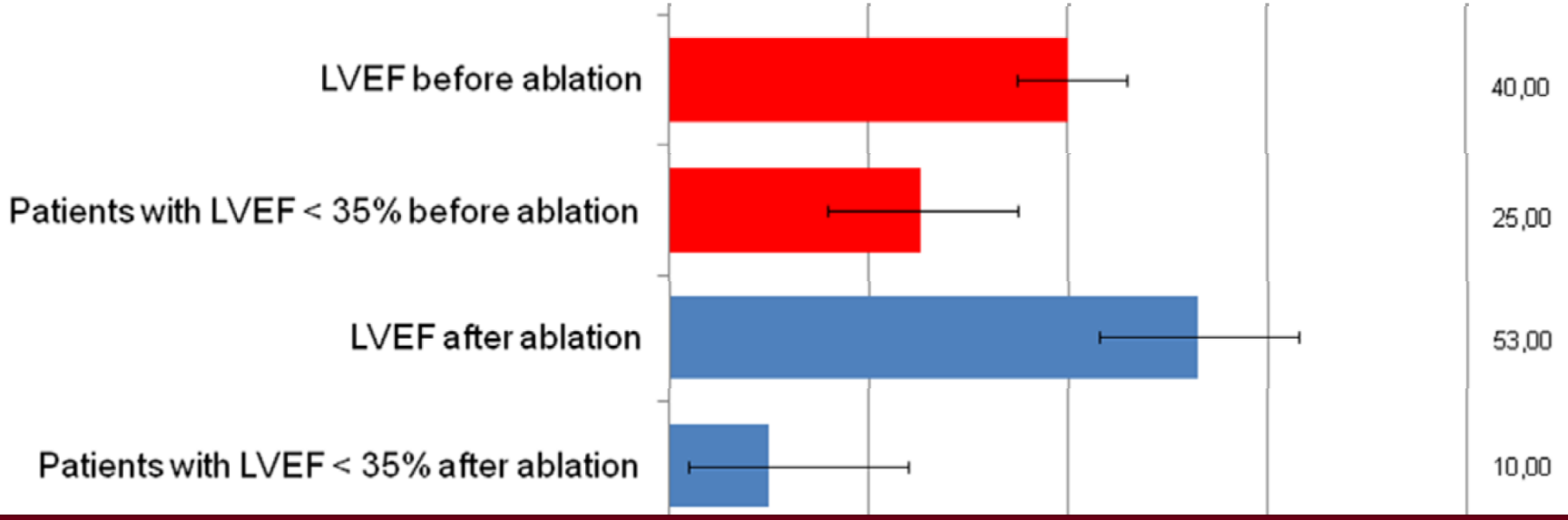



Circ Arrhythm Electrophysiol 2014; 7: 1011-1018

# Catheter Ablation of Atrial Fibrillation in Patients With Left Ventricular Systolic Dysfunction

## A Systematic Review and Meta-Analysis

## Impact on Left Ventricular Function

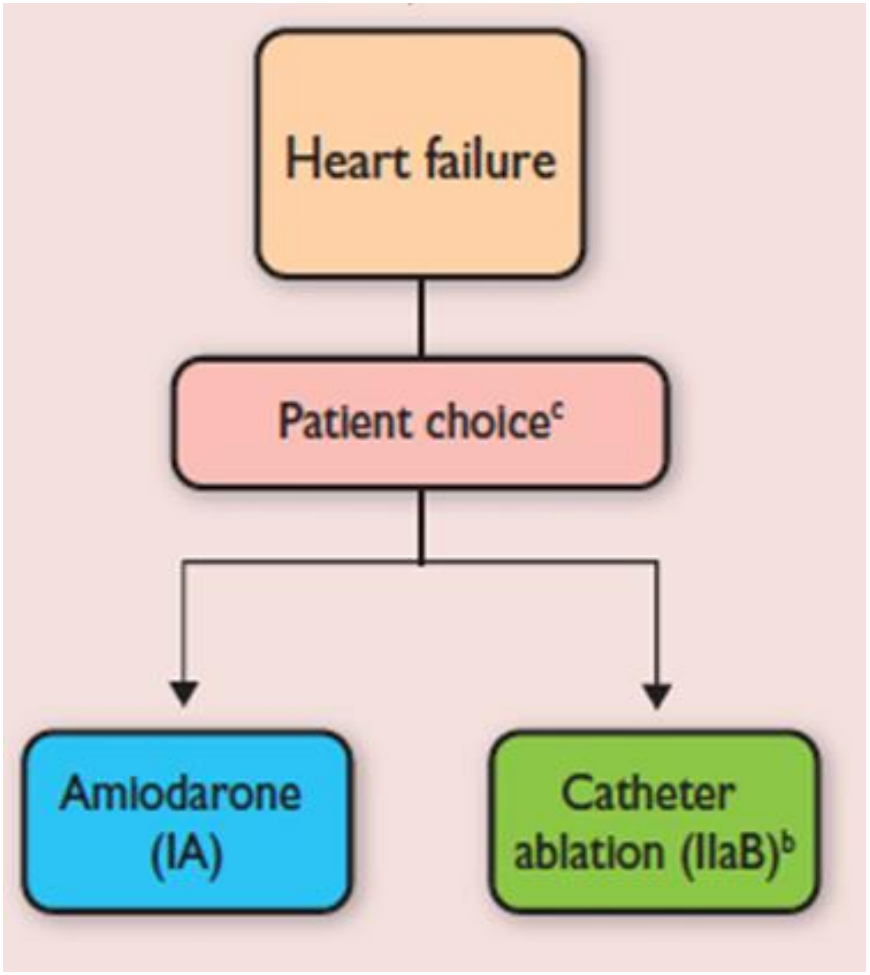



**Potential reversal of device indication in a large cohort of patients (RRR 60%, ARR 15%)**

Circ Arrhythm Electrophysiol 2014; 7: 1011-1018

# 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

**The Task Force for the management of atrial fibrillation of the European Society of Cardiology (ESC)**



# 2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

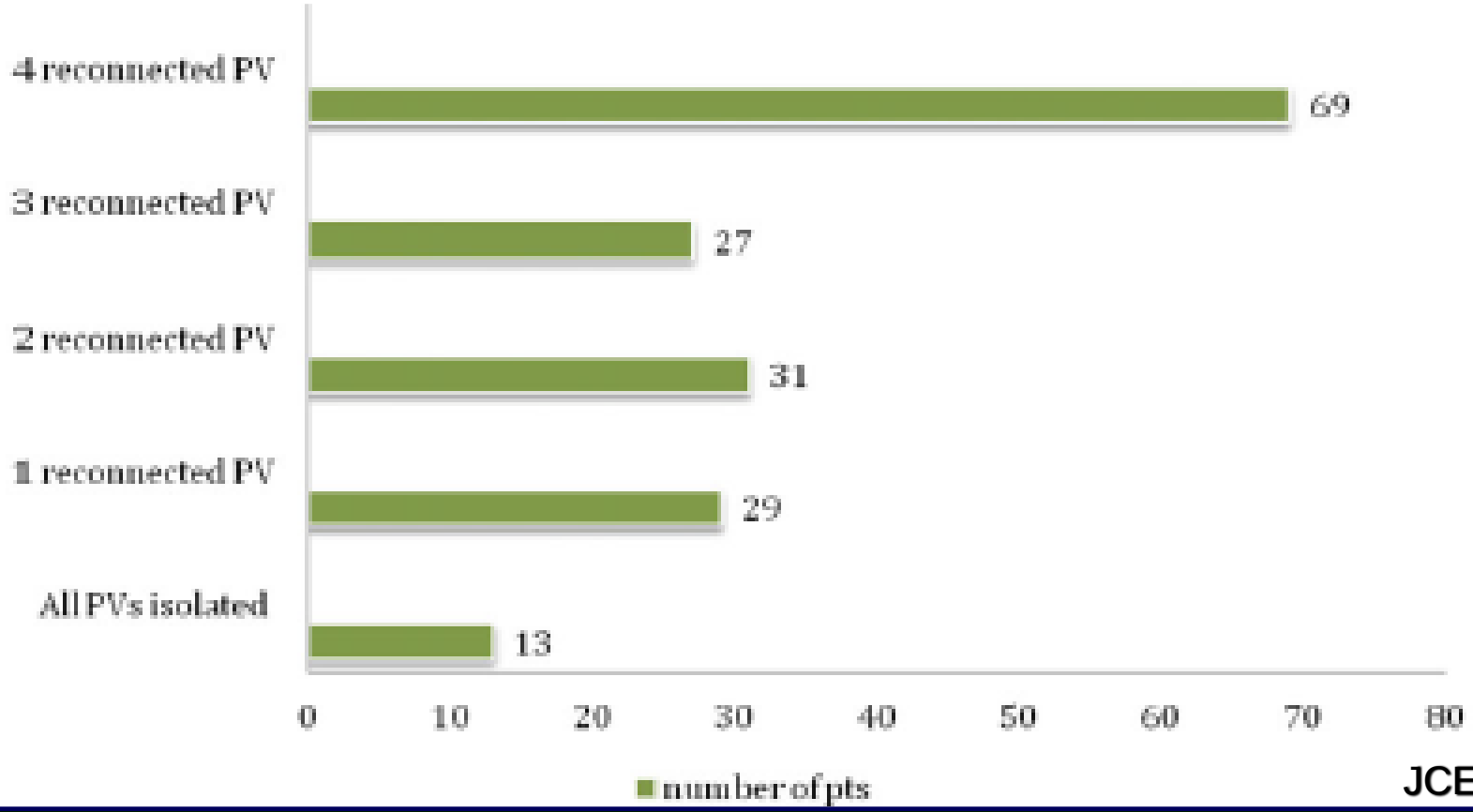
## The Task Force for the management of atrial fibrillation of the European Society of Cardiology (ESC)

| | | | |
|---|---|---|---|
| Catheter ablation of symptomatic paroxysmal AF is recommended to improve AF symptoms in patients who have symptomatic recurrences of AF on antiarrhythmic drug therapy (amiodarone, dronedarone, flecainide, propafenone, sotalol) and who prefer further rhythm control therapy, when performed by an electrophysiologist who has received appropriate training and is performing the procedure in an experienced centre. | I | A | 585–587, 713, 727 |
| Ablation of common atrial flutter should be considered to prevent recurrent flutter as part of an AF ablation procedure if documented or occurring during the AF ablation. | IIa | B | 827 |
| Catheter ablation of AF should be considered as first-line therapy to prevent recurrent AF and to improve symptoms in selected patients with symptomatic paroxysmal AF as an alternative to antiarrhythmic drug therapy, considering patient choice, benefit, and risk. | IIa | B | 585 |
| All patients should receive oral anticoagulation for at least 8 weeks after catheter (IIaB) or surgical (IIaC) ablation. | IIa | B C | 727 |
| Anticoagulation for stroke prevention should be continued indefinitely after apparently successful catheter or surgical ablation of AF in patients at high-risk of stroke. | IIa | C | |
| When catheter ablation of AF is planned, continuation of oral anticoagulation with a VKA (IIaB) or NOAC (IIaC) should be considered during the procedure, maintaining effective anticoagulation. | IIb | B C | 760, 768 |
| Catheter ablation should target isolation of the pulmonary veins using radiofrequency ablation or cryothermy balloon catheters. | IIa | B | 585, 715, 716, 734, 735 |
| AF ablation should be considered in symptomatic patients with AF and heart failure with reduced ejection fraction to improve symptoms and cardiac function when tachycardiomyopathy is suspected. | IIa | C | 185, 226–228, 720, 777–779, 828 |
| AF ablation should be considered as a strategy to avoid pacemaker implantation in patients with AF-related bradycardia. | IIa | C | 829, 830 |
| Catheter or surgical ablation should be considered in patients with symptomatic persistent or long-standing persistent AF refractory to AAD therapy to improve symptoms, considering patient choice, benefit and risk, supported by an AF Heart Team. | IIa | C | 468, 735, 777, 831, 832, 1040 |

# Ablation protocol?

## Electrophysiologic Findings and Long-Term Outcomes in Patients Undergoing Third or More Catheter Ablation Procedures for Atrial Fibrillation

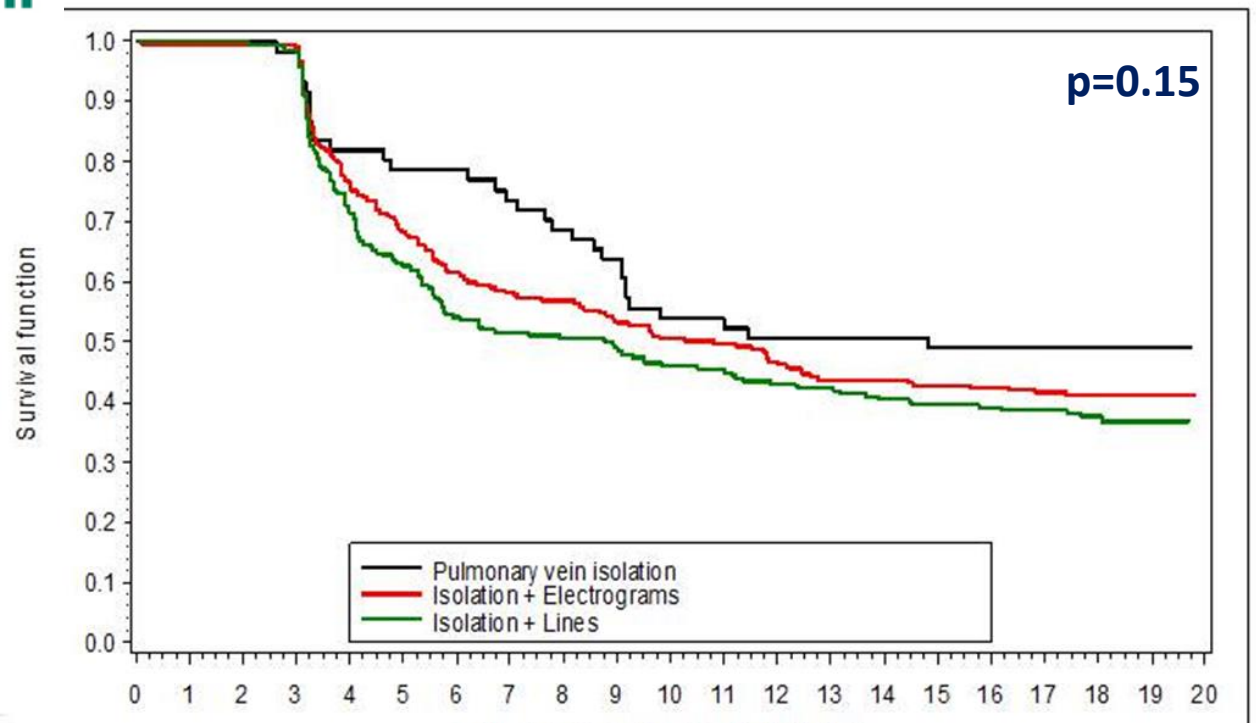
DAVID LIN, M.D., PASQUALE SANTANGELI, M.D., ERICA S. ZADO, P.A-C., RUPA BALA, M.D., MATHEW D. HUTCHINSON, M.D., MICHAEL P. RILEY, M.D., PH.D., DAVID S. FRANKEL, M.D., FERMIN GARCIA, M.D., SANJAY DIXIT, M.D., DAVID J. CALLANS, M.D., and FRANCIS E. MARCHLINSKI, M.D.




JCE 2015

# Ablation protocol?

STARAF II




**No. at Risk**

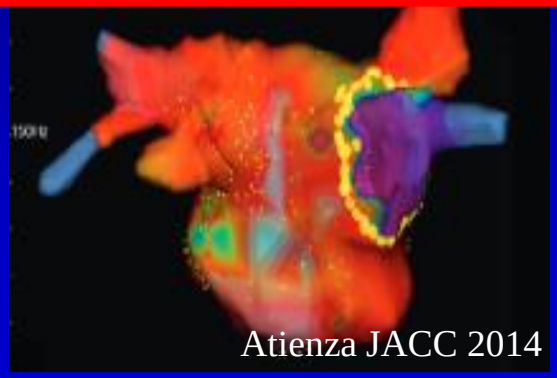
| | | | | | | |
|---|---|---|---|---|---|---|
| Pulmonary vein isolation | 61 | 60 | 50 | 41 | 36 | 23 |
| Isolation + Electrograms | 244 | 242 | 161 | 137 | 124 | 72 |
| Isolation + Lines | 244 | 240 | 152 | 133 | 115 | 57 |

Documented AF > 30 seconds after <u>one</u> procedure with or without AAD

Verma et al. NEJM 2015

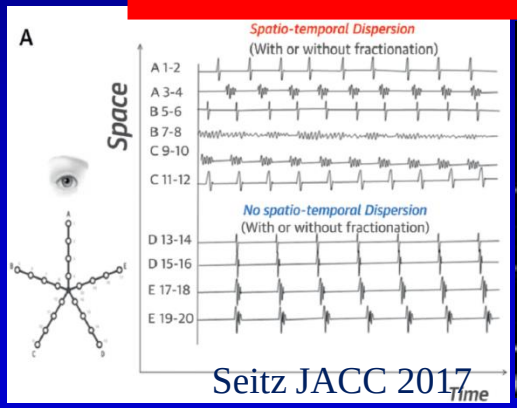
# Ablation protocol?

## High-density **dominant frequency mapping**

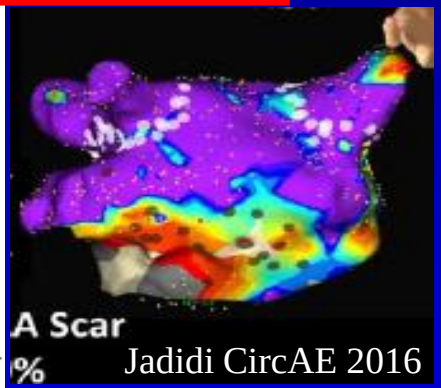


Atienza JACC 2014

## **Spatio-temporal dispersion** and **low voltage**

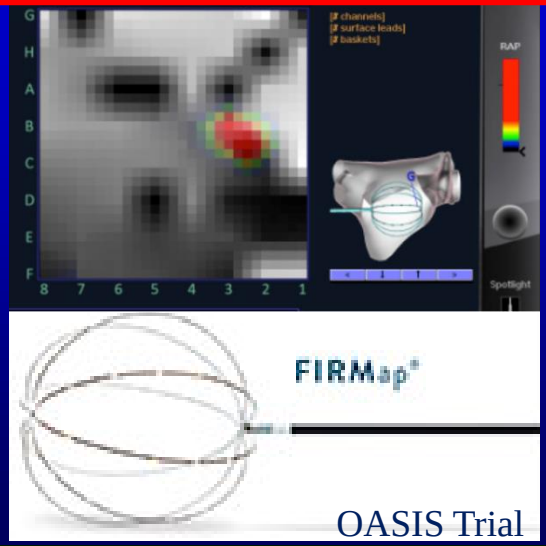



Seitz JACC 2017



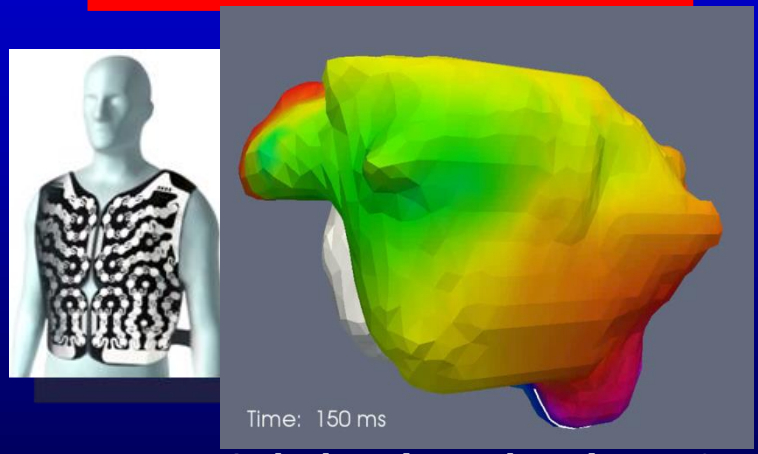

Jadidi CircAE 2016

## **Rotor Ablation**

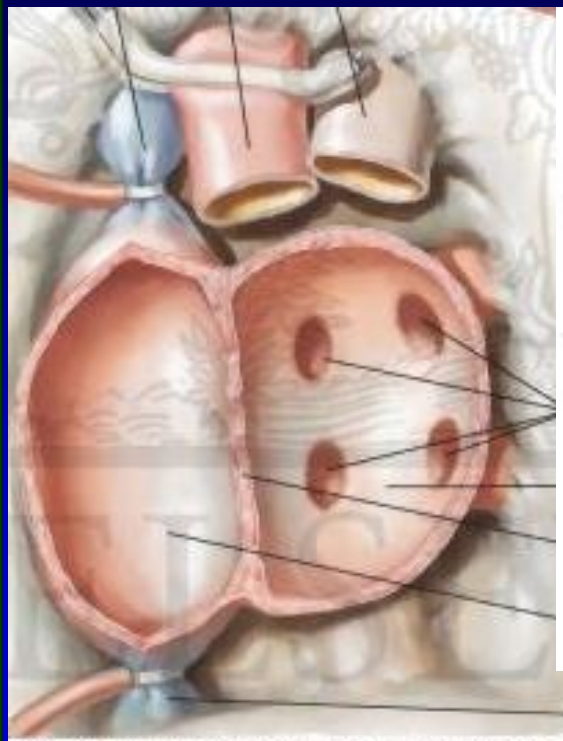



OASIS Trial

## **Body surface phase mapping**

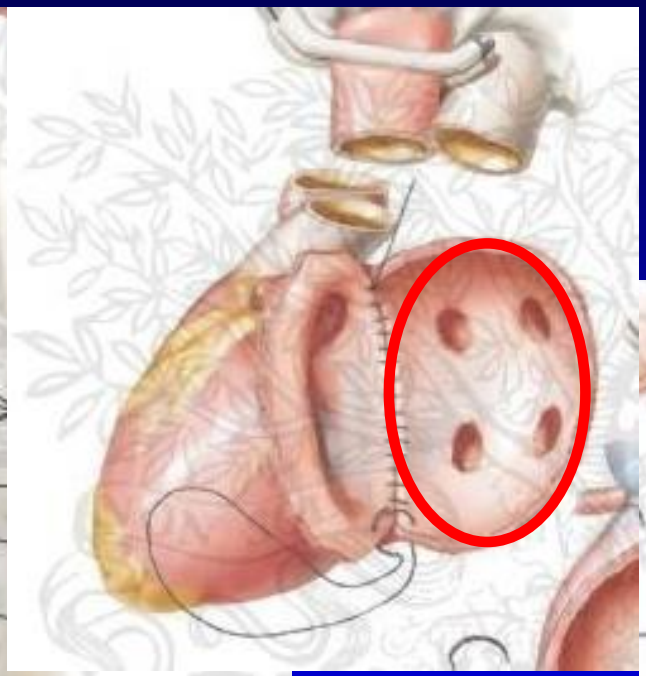


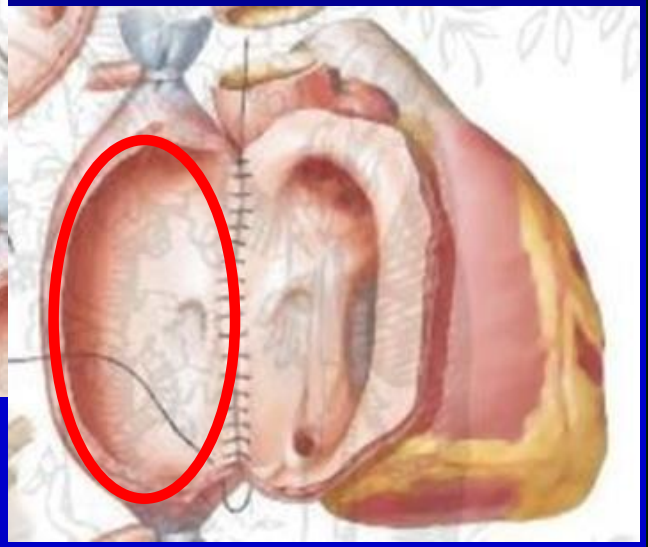

Haïssaguerre Arrhythm Electrophysiol Rev 2015




D. Portion of atria and great vessels remaining in recipient after removal of heart







ELSEVIER

The Journal of Heart and Lung Transplantation

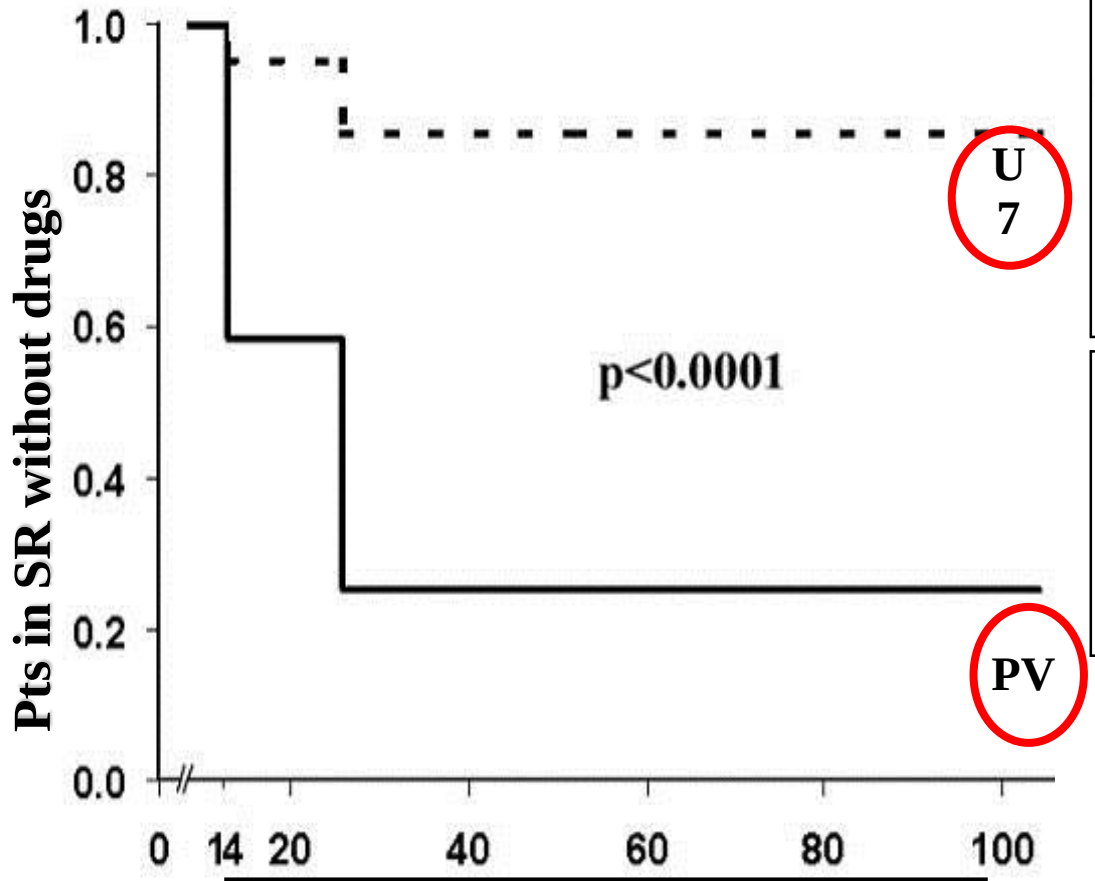
http://www.jhltonline.org

AF

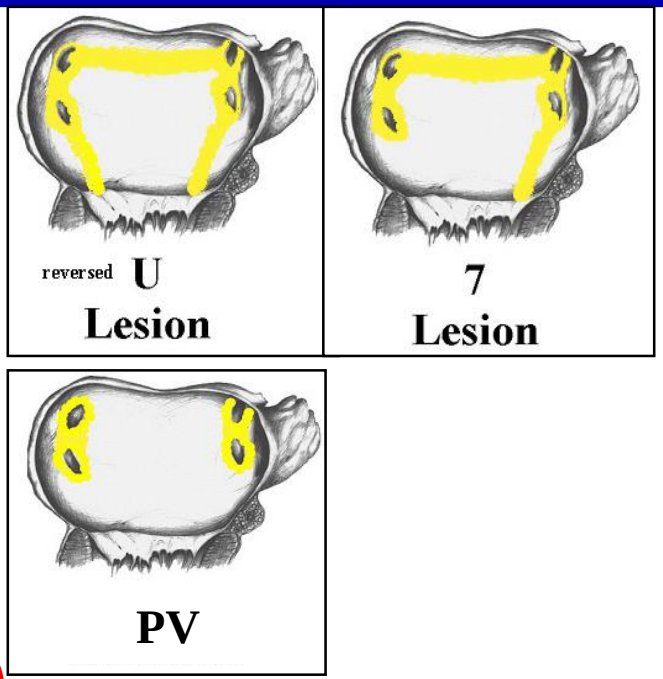
# The Registry of the International Society for Heart and Lung Transplantation: Thirty-second Official Adult Heart Transplantation Report—2015;

# Surgical AF ablation in structural heart disease

## Is sinus rhythm utopian?




105 pts (3 groups of 35 pts)




Gaita et al, Circulation 2005

# Surgical AF ablation in structural heart disease
# Is long-term sinus rhythm utopian?

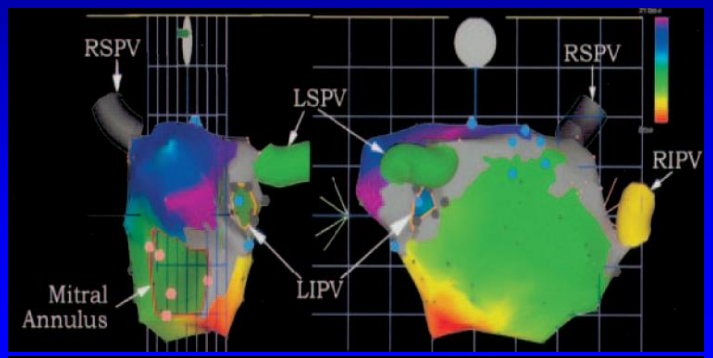
## Very Long-Term Results of Surgical and Transcatheter Ablation of Long-Standing Persistent Atrial Fibrillation

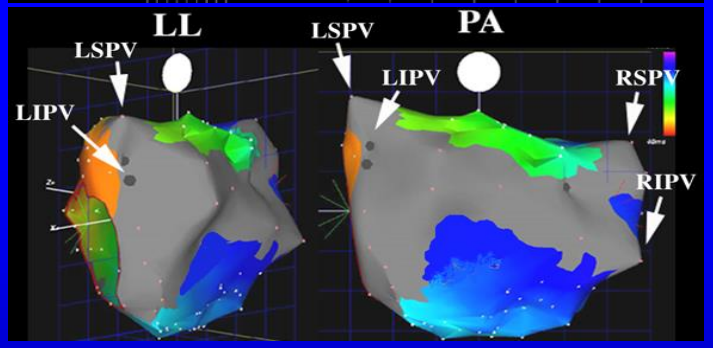
Fiorenzo Gaita, MD, Elisa Ebrille, MD, Marco Scaglione, MD, Domenico Caponi, MD, Lucia Garberoglio, MD, Laura Vivalda, MD, Alessandro Barbone, MD, PhD, and Roberto Gallotti, MD

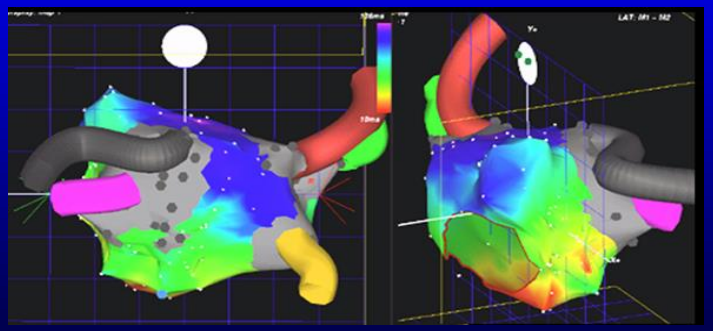
- **33 patients** with **long-standing persistent AF** and valvular disease
- valve surgery + cryoablation + percutaneous radiofrequency ablation (**hybrid approach**, in case of lesion incompleteness)
- follow-up **10.7** ± 3.1 **years**

Gaita et al, Ann Thorac Surg 2013

# Surgical AF ablation in structural heart disease
## Is long-term sinus rhythm utopian?



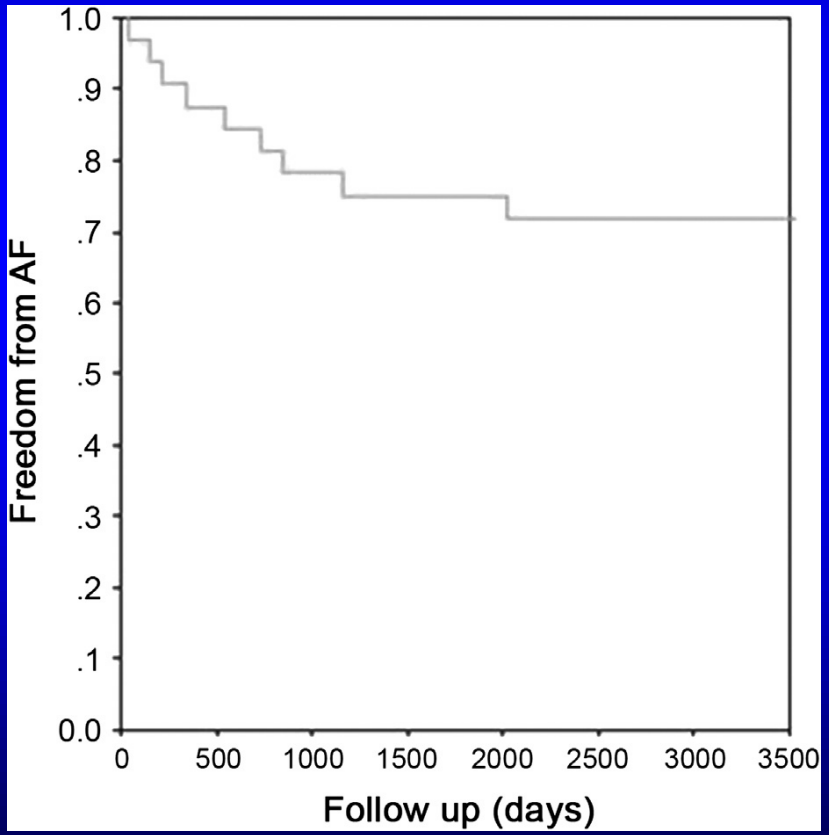
In **35%** of the pts undergoing **"7 lesion"** the surgically intended lesions were **not achieved**

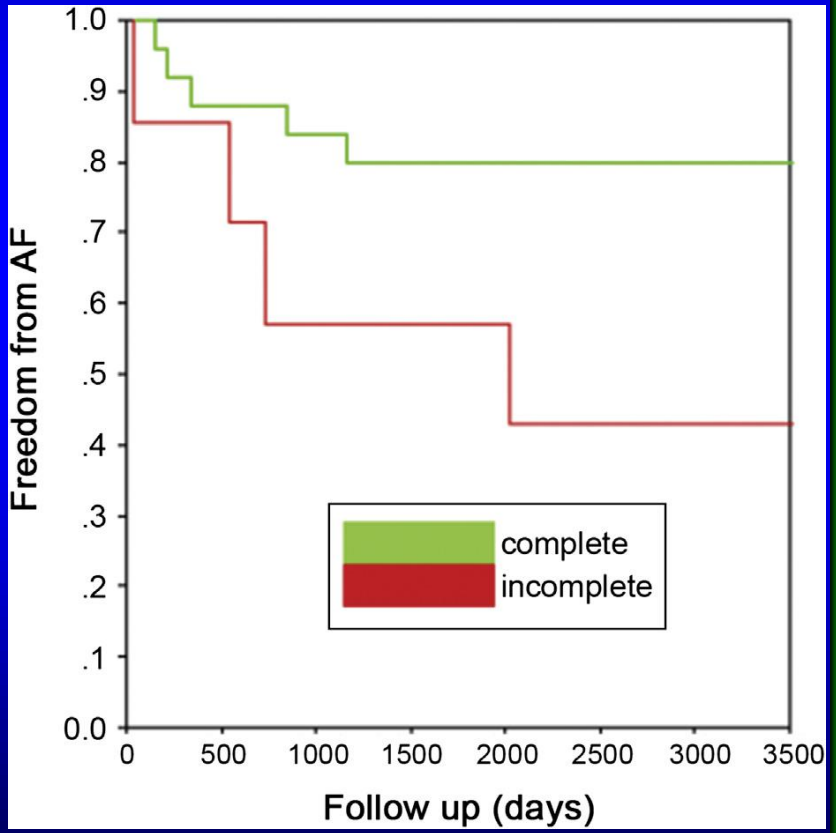
The **line between RIPV-MA** was **missing in all "U lesion"pts**; all patients show instead a **"7 lesion"** pattern, **incomplete in 41%**

**PV potentials** were present at least in one vein in **29% of pts**

# Surgical AF ablation in structural heart disease
# Is long-term sinus rhythm utopian?

73% of patients were in sinus rhythm at the end of follow-up
(**81%** of patients with **complete** and **43%** with **incomplete** scheme)




Gaita et al, Ann Thorac Surg 2013

# AF recurrences in CHF patients after TC ablation

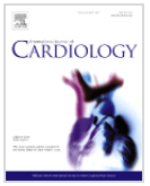
## *Active role for pulmonary veins?*

ELSEVIER

International Journal of Cardiology

Available online 22 February 2017

In Press, Accepted Manuscript — Note to users




Conduction recovery following catheter ablation in patients with recurrent atrial fibrillation and heart failure

Matteo Anselmino[a], Mario Matta[a], T. Jared Bunch[b], Martin Fiala[c], Marco Scaglione[d], Georg Nölker[e], Pierre Qian[f], Thomas Neumann[g], Federico Ferraris[a], Fiorenzo Gaita[a],

165

Age

Persistent AF: 101 (**61%**)

Mean LA volume: 121 ml

Mean LVEF: **41%**

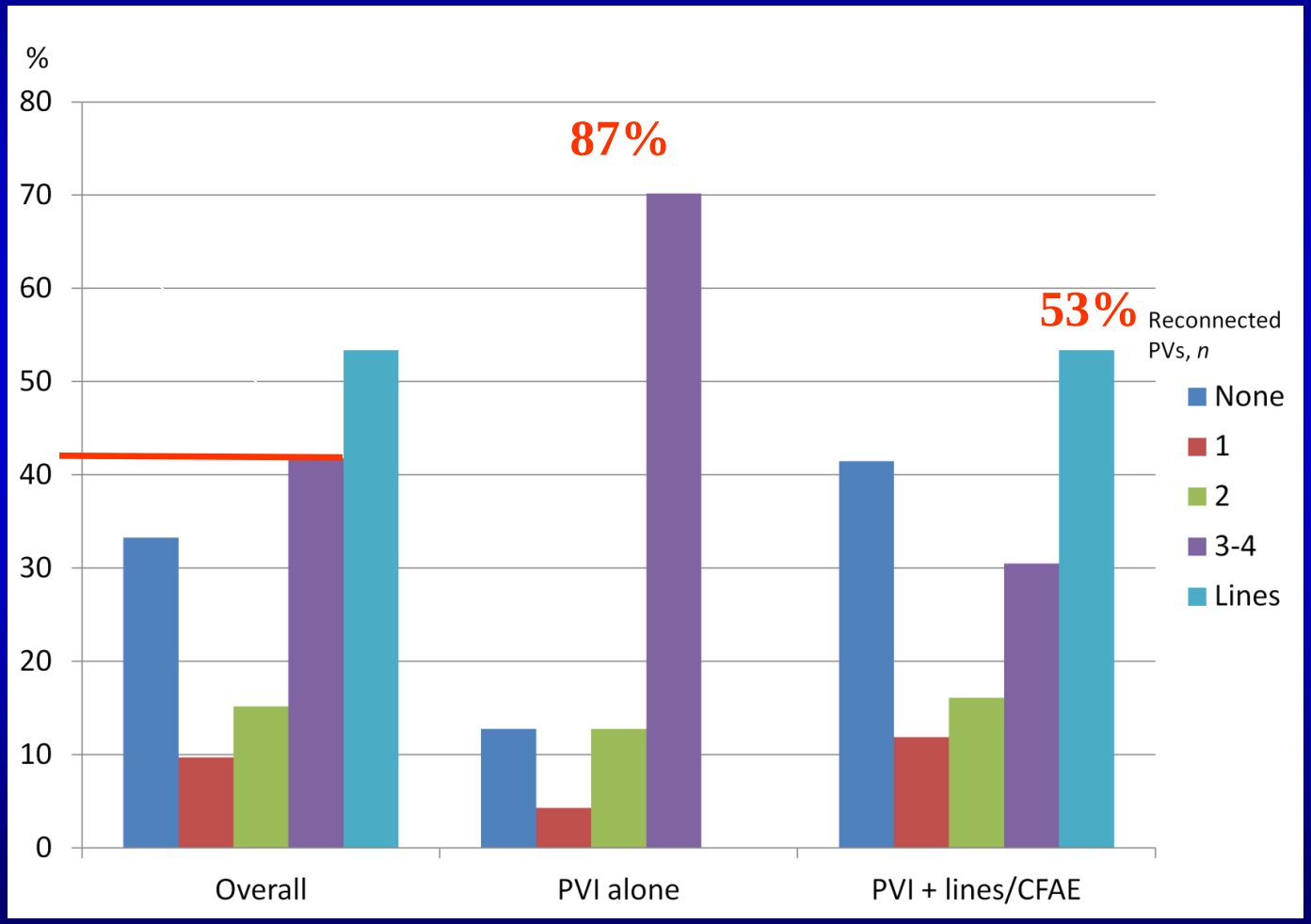
First procedure: 28% PVI alone, 72% PVI + lines/CFAE

**Complications 1.8%**

Int J Cardiol 2017

# Reconnected PVs and lines at redo

## *Active role for reconnection?*




Anselmino et al. Int J Cardiol 2017

# Role of reconnections

## *Atrial fibrillation recurrences despite PVI*

| | OR | 95% CI | p-value |
|---|---|---|---|
| **AF type, paroxysmal vs. persistent** | 0.772 | 0.171-3.494 | 0.737 |
| **LA volume, III tertile** | 5.090 | 1.192-26.188 | 0.048 |
| **LVEF, III tertile** | 1.078 | 0.351-3.307 | 0.896 |
| **PVI alone vs. lines/CFAE** | 8.127 | 0.119-35,212 | 0.499 |

***LA volume, III tertile* (>120 ml) predicts**

**AF recurrences despite absence of PVs reconnection**

***Active role for non-PVs mechanisms!***

# In conclusion

**Drug rhythm control strategy (Amiodarone) is to date the first and most used approach but achieves worse results**

**Rhythm control by AF ablation: improves LVEF and quality of life, is recommended by current guidelines, needs to be increasingly considered (especially at "early" stage)**

**The ideal TC ablation protocol needs to be further investigated (dedicated to the specific patient and atria)**


*Thanks for your attention!*