

ABLATION OF CHRONIC AF

A PISAPIA

ST JOSEPH HOSPITAL

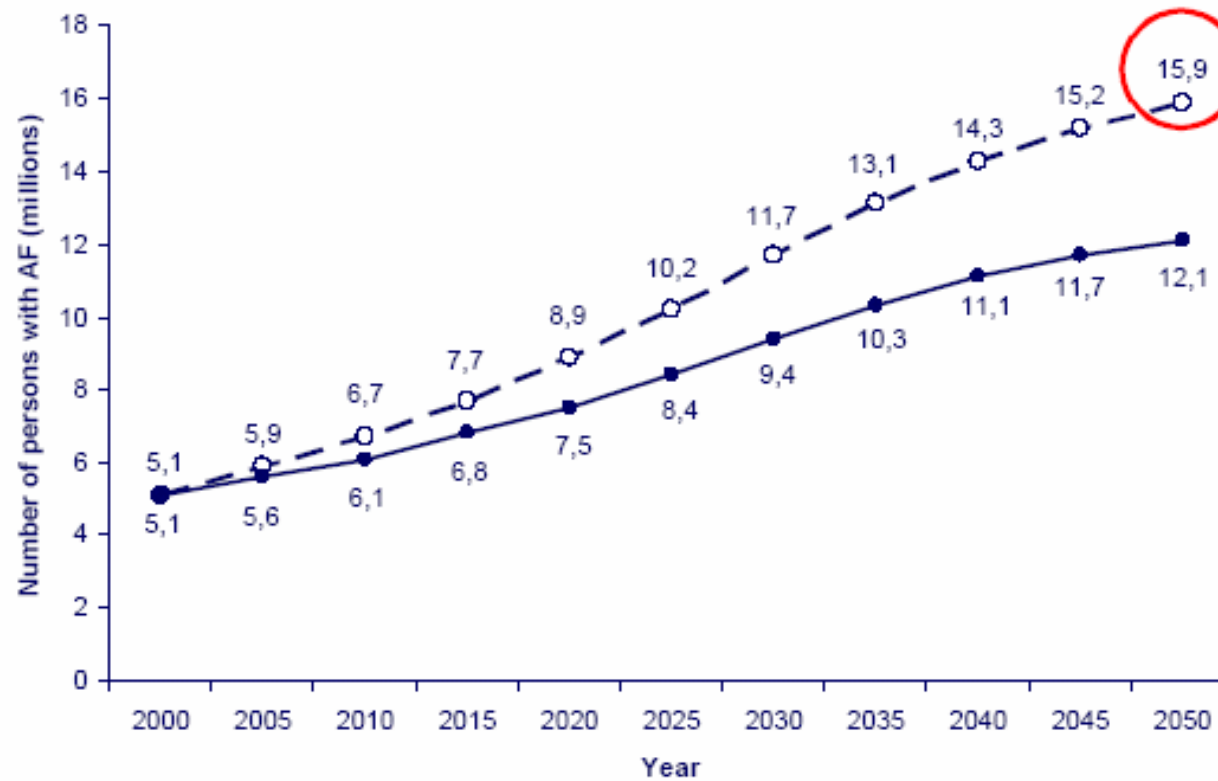
MARSEILLE

MEET 2008

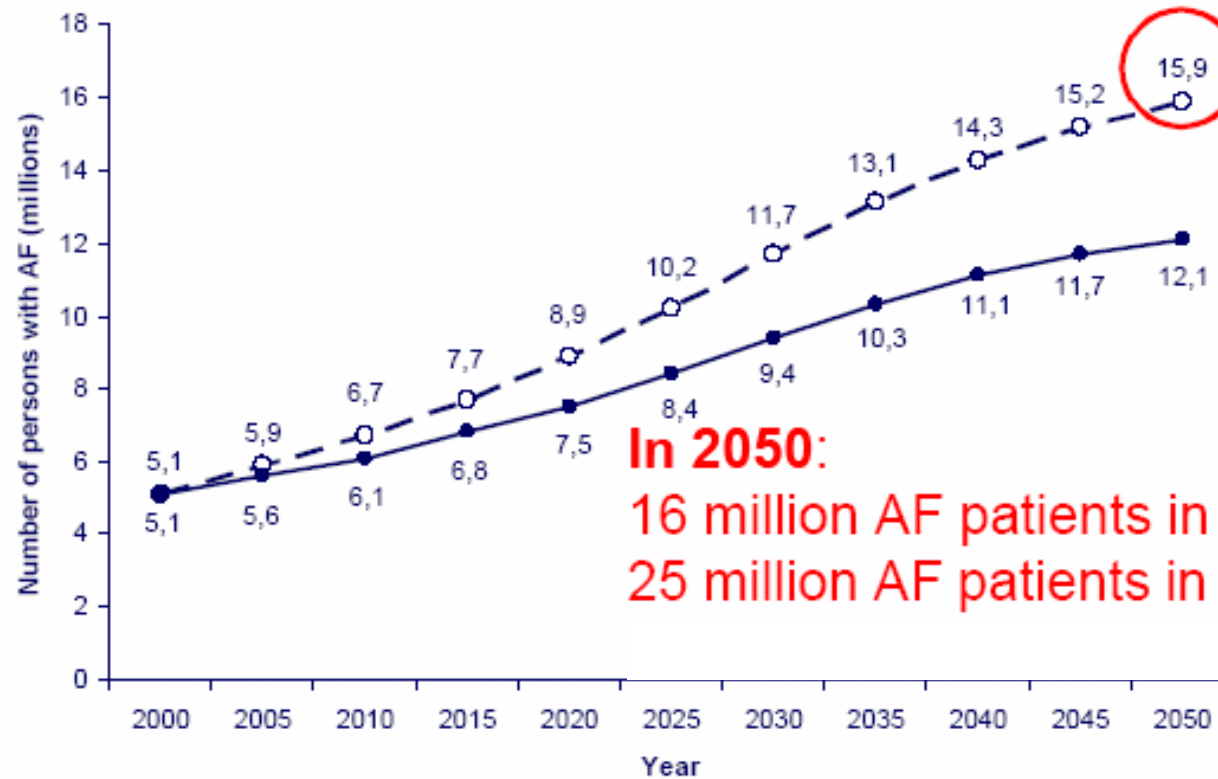
Atrial Fibrillation

- The most common significant heart rhythm disturbance
- Incidence increases with age and the development of structural heart disease
- Common cause of stroke (10-15% of all strokes)
- Associated with significant cardiovascular morbidity and mortality
- Tends to recur in at least half the patients treated with antiarrhythmic drug therapy

Prevalence of AF

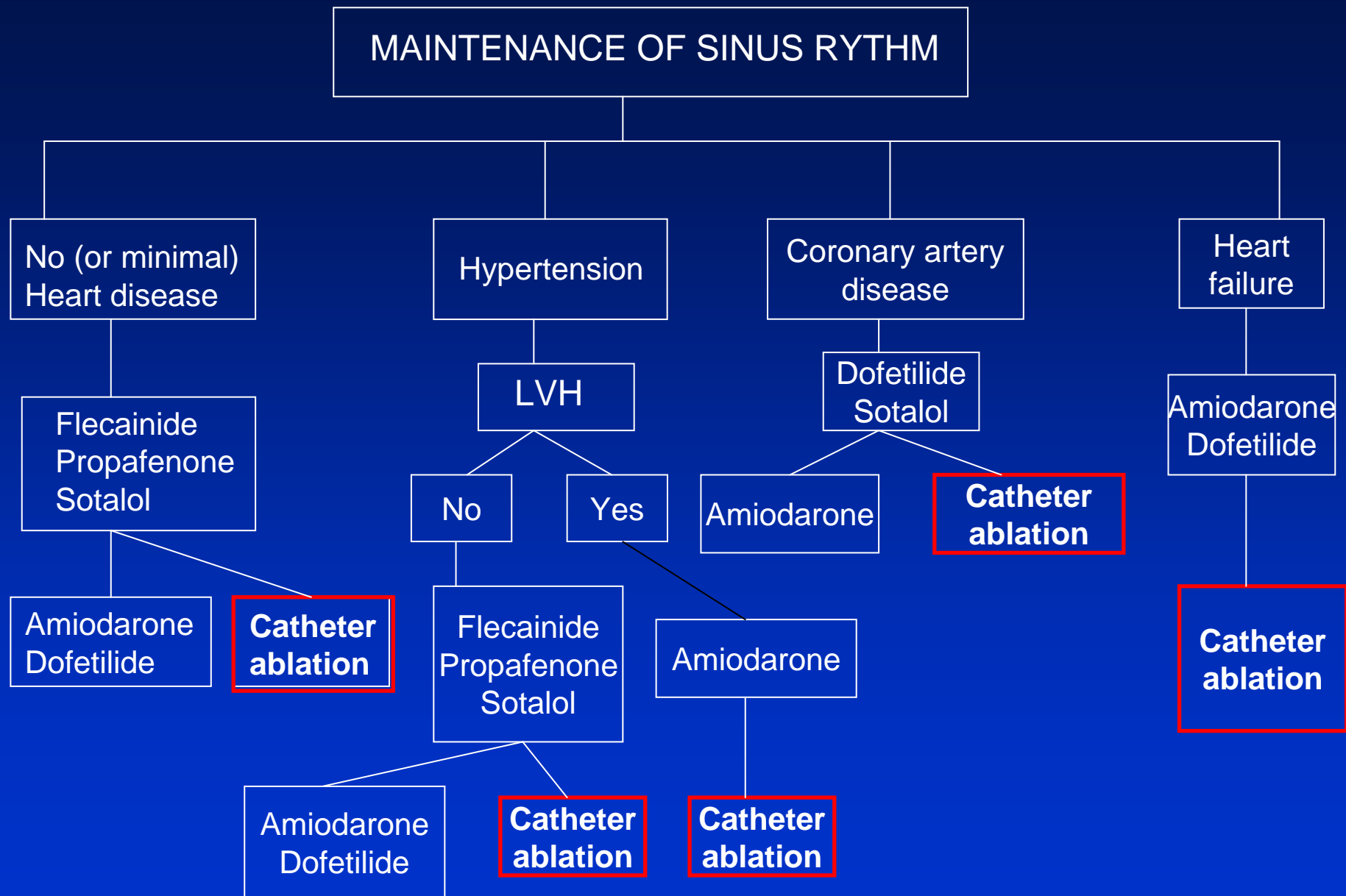


Epidemy of AF



Olmsted County study

Miyasaka Circulation 2006



ACC/AHA/ESC 2006 guidelines for the management of patients with AF

RECURRENT PERSISTANT AF

Minimal or no symptoms

Anticoagulation and rate control as needed

Disabling Symptoms in AF

Anticoagulation and rate control

AAD drug therapy

Electrical Cardioversion as needed

PERMANENT AF

Anticoagulation and rate control as needed

Continue anticoagulation as needed and therapy to maintain sinus rythm

Consider ablation for severely symptomatic recurrent AF failure of greater than or equal to 1 AAD plus rate control

ABLATION OF AF :

RECOMMENDATIONS

Indication of ablation in 2nd intention after
Failure of AA treatment

No indication in chronic AF indication persistent
AF only if symptoms or heart failure

ABLATION OF CHRONIC AF

CHRONIC AF AND HEART FAILURE

AF AND HEART FAILURE

390 pts with serious HF : LVEF: 19%,19% of AF

At 8 months , 98 deaths with 56 sudden deaths :

	SR	AF	p
Mortality /year :	29%	48%	< 0,0013
Sudden death /year :	18%	31%	< 0,0013

Significant in pts less serious :

CPP < 15mmHg

Non significant in pts more serious :

CPP > 15 mmHg same mortality :

58% vs 57%

Middekrankl Circulation 1991

AF & Heart Failure :

Pronostic

Prognostic Significance of Atrial Fibrillation in Patients with Congestive Heart Failure

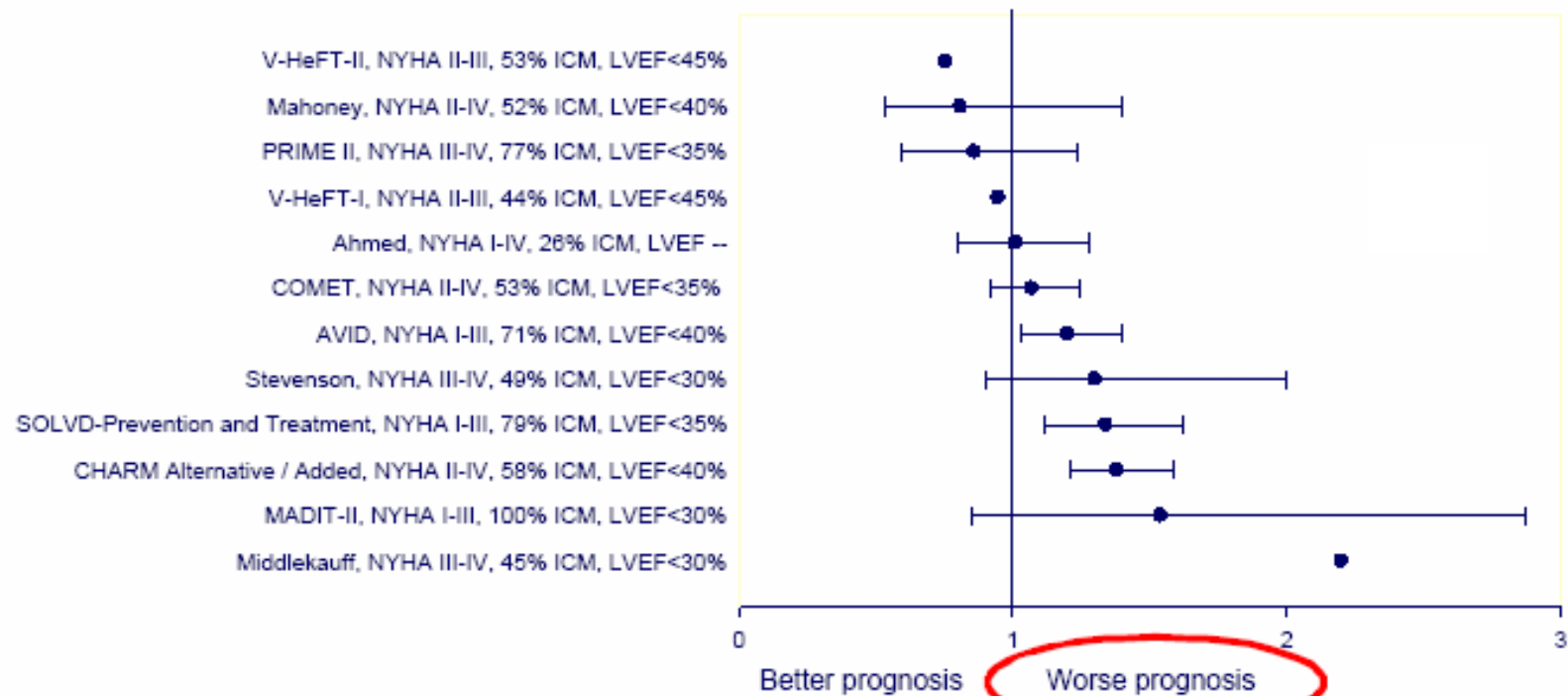
Study	Year	NYHA	No. of Pts.	Pts. in AF	Mean Follow-Up (months)	Mortality			P Value
						Overall	SR	AF	
Middlekauf (6)*	1991	III-IV	390	75	19	32%	29%	48%	0.0013
Carson (4)†	1993	II-III	795	107	24	25%	21%	20%	0.18
Bourassa (1)*	1993	II-III	6273	731	12	18%	NA	NA	<0.0001
Dries (16)*	1998	II-III	6517	419	30	27%	23%	34%	<0.001
Opasich (18)†	1998	I-IV	3327	755	12	16%	NA	NA	NS
Mahoney (15)†	1999	II-IV	234	62	13	19%	16%	23%	0.21
Crijns (83)*	2000	III-IV	427	84	40	50%	47%	60%	0.04
Mathew (84)*	2000	I-IV	7788	866	37	34%	32%	43%	0.0001

*Studies suggesting significantly increased mortality associated with atrial fibrillation (AF) in patients with congestive heart failure.

†Studies in which atrial fibrillation did not significantly increase mortality.

AF = atrial fibrillation; NA = not available; NYHA = New York Heart Association functional class; Pts. = patients; SR = sinus rhythm.

AF: independent predictor mortality in CHF?



Independent impact of AF on all cause mortality (hazard ratio [95% confidence interval])

AF Treatment – Objectives

Control the ventricular rate

Restore/maintain sinus rhythm

Prevent embolic complications

STRATEGY TO MANAGE AF-CHF PATIENTS

RATE CONTROL

OR

RYTHM CONTROL ?

Rate Control – Potential Advantages

Avoid potential proarrhythmic effects of antiarrhythmic drug therapy

Avoid other adverse effects of antiarrhythmic drugs

Avoid frequent recurrence of AF due to drug inefficacy

Decrease compliance problems

Lower cost of treatment

Maintaining Sinus Rhythm

Potential Advantages

Better rate control

Atrial contribution to cardiac output maintained

Better exercise tolerance

Possibility of reduced thromboembolic risk

STRATEGY TO MANAGE AF-CHF PATIENTS

RATE CONTROL

DRUGS AND AF

Rate control :

		Rest	Effort
Roth	digoxine (0,250 à 0,375mg/j	86+/- 12	170+/- 20
	diltiazem (360mg/j)	79 +/- 17	136 +/- 25
Pomfret	verapamil (240 mg /j)	87+/- 7	142 +/- 11
Lang	verapamil (240 mg/j)	86+/- 20	122 +/- 23
David	timolol (20 à 30 mg/j)	76 +/- 15	110 +/- 11

**The rate control is a necessity
recommandations ACC/AHA/ESC
target : rate <90 at rest & <110 at moderate stress**

AV Nodal-blocking Drugs Daily Dosage (mg)	Mean Heart Rate (beats/min)	
	Rest	Exercise
0	102	174
Digoxin 0.25	88	164
Digoxin 0.5	82	145
Diltiazem 240	88	142
Verapamil 240	86	141
Digoxin 0.25 + diltiazem 240	68	140
Digoxin 0.25 + verapamil 240	72	133
Atenolol 50	—	130
Digoxin ("home dose") + nadolol 87	73	126
Digoxin 0.25 + atenolol 50	—	126
Digoxin 0.25 + celiprolol 600	77	118
Digoxin 0.5 + verapamil 240	75	114

Bjerregaard P et al. Am J Cardiol
2004; 93: 329-32

DRUGS AND AF

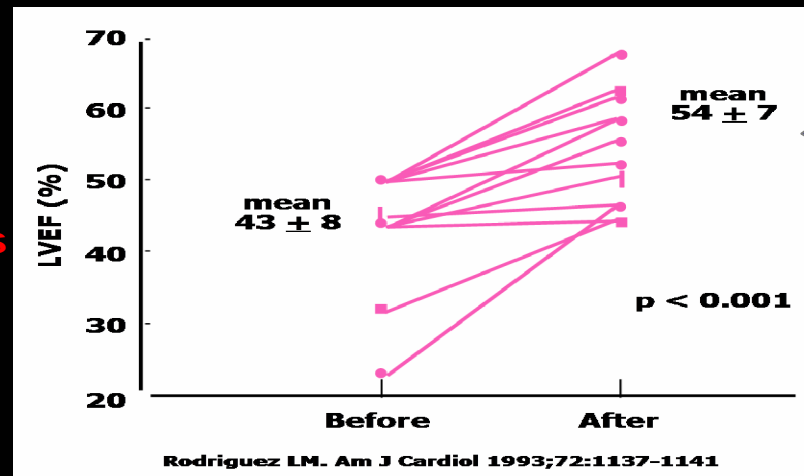
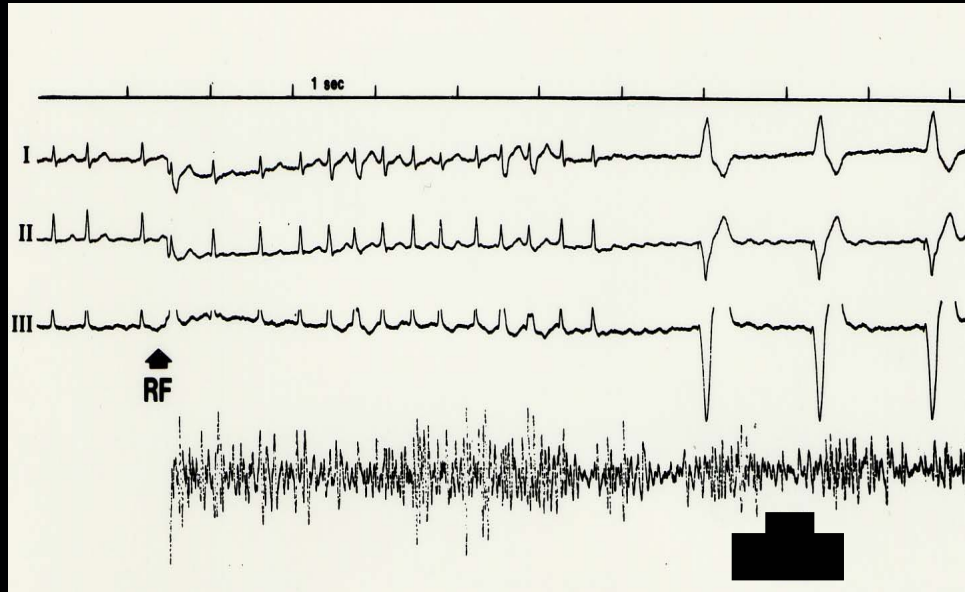
INOTROPIC EFFECT AND AAD

<u>Classe thérapeutique</u>	<u>Antiarythmique</u>	<u>Effet inotrope négatif</u>	<u>Cotation de l'inotropisme négatif</u>
la	Quinidine	+1	+1 = faible
	Disopyramide	+2	+2 = moyen
lb	Méxilétine	0 / +1	+3 = fort
lc	Flécaïnide	+2	
	Propafénone	+2	
	Cibenzoline	+1 / +2	
II	Sotalol	+2	
III	Amiodarone	0 / +1	
IV	Vérapamil	+2	
Digoxine		0	

Rate control is a necessity

recommandations ACC/AHA/ESC

target : rate <90 at rest & <110 at moderate effort



Improve quality of life
Improve tolerance at stress
Increase LVEF

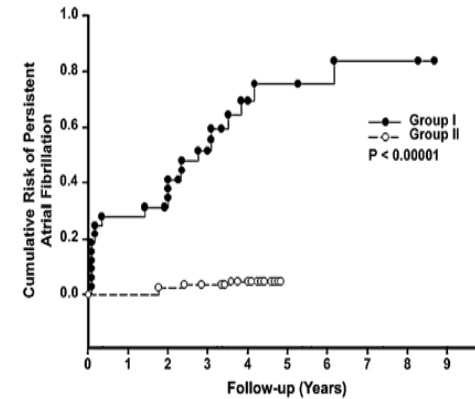
ABLATION OF AF

comparative study with AV junction ablation (elderly)

	AV junction ↓	AF ↓	
	Group 1 (N = 32)	Group 2 (N = 37)	P Value
Age (years)	73 ± 5	72 ± 4	0.67
Male, n (%)	26 (81)	34 (92)	0.29
Duration of AF (years)	5 ± 5	4 ± 4	0.39
Cardiovascular diseases, n (%)	27 (84)	23 (62)	0.07
Hypertension	22 (69)	20 (54)	
Coronary artery disease	12 (38)	8 (22)	
Cardiomyopathy	0	2 (5)	
Heart failure, n (%)	10 (31)	8 (21)	0.53
NYHA functional class	1.4 ± 0.7	1.2 ± 0.4	0.25
Atrial enlargement, n (%)	18 (57)	14 (39)	0.20
Left atrial dimension (mm)	40 ± 8	37 ± 5	0.19
Left ventricular end-diastolic dimension (mm)	50 ± 6	49 ± 4	0.30
Left ventricular ejection fraction (%)	51 ± 10	49 ± 10	0.43
Number of antiarrhythmic drugs used before ablation	2.0 ± 0.8	2.4 ± 1.0	0.06
Follow-up (months)	58 ± 30	52 ± 6	0.23

Data are presented as mean ± 1 SD or number (%).

Hsieh MH et al. J Cardiovasc Electrophysiol 2005;16:457-61



Clinical Outcomes at the End of Follow-Up

	Group 1 (N = 32)	Group 2 (N = 37)	P Value
Free of symptomatic AF, n (%)	32 (100)	30 (81)	0.013
Persistent AF, n (%)	22 (69)	3 (8)	<0.001
Heart failure, n (%)	17 (53)	9 (24)	0.001
NYHA function class	1.7 ± 0.9	1.3 ± 0.6	0.02
Cerebral infarction, n (%)	1 (3)	1 (3)	1.0
Atrial enlargement, n (%)	24 (74)	16 (43)	0.02
Left atrial dimension (mm)	42 ± 9	37 ± 7	0.07
Left ventricular end-diastolic dimension (mm)	53 ± 6	51 ± 8	0.46
Left ventricular ejection fraction (%)	44 ± 8	46 ± 10	0.46
Death, n (%)	5 (16)	3 (8)	0.47
Cardiac causes, n (%)	2 (6)	0	0.21

Data are presented as mean ± 1 SD or number (%).

STRATEGY TO MANAGE AF HF :

Recent studies favourable to rate control and not rhythm control :

- AFFIRM 2004
- RACE
- AF-CHF 2007

AFFIRM Trial

Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM)

Sponsored by National Heart, Lung, and Blood Institute of the National Institutes of Health

Randomized evaluation of treatment of AF by 1 of 2 strategies (rate control versus rhythm control and anticoagulation)

Total of 4,160 patients followed for an average of 2.6 years

AFFIRM Objectives

Primary Endpoint

Total mortality in rate control versus rhythm control

Secondary Endpoints

Composite endpoints of total mortality, disabling stroke and disabling anoxic encephalopathy

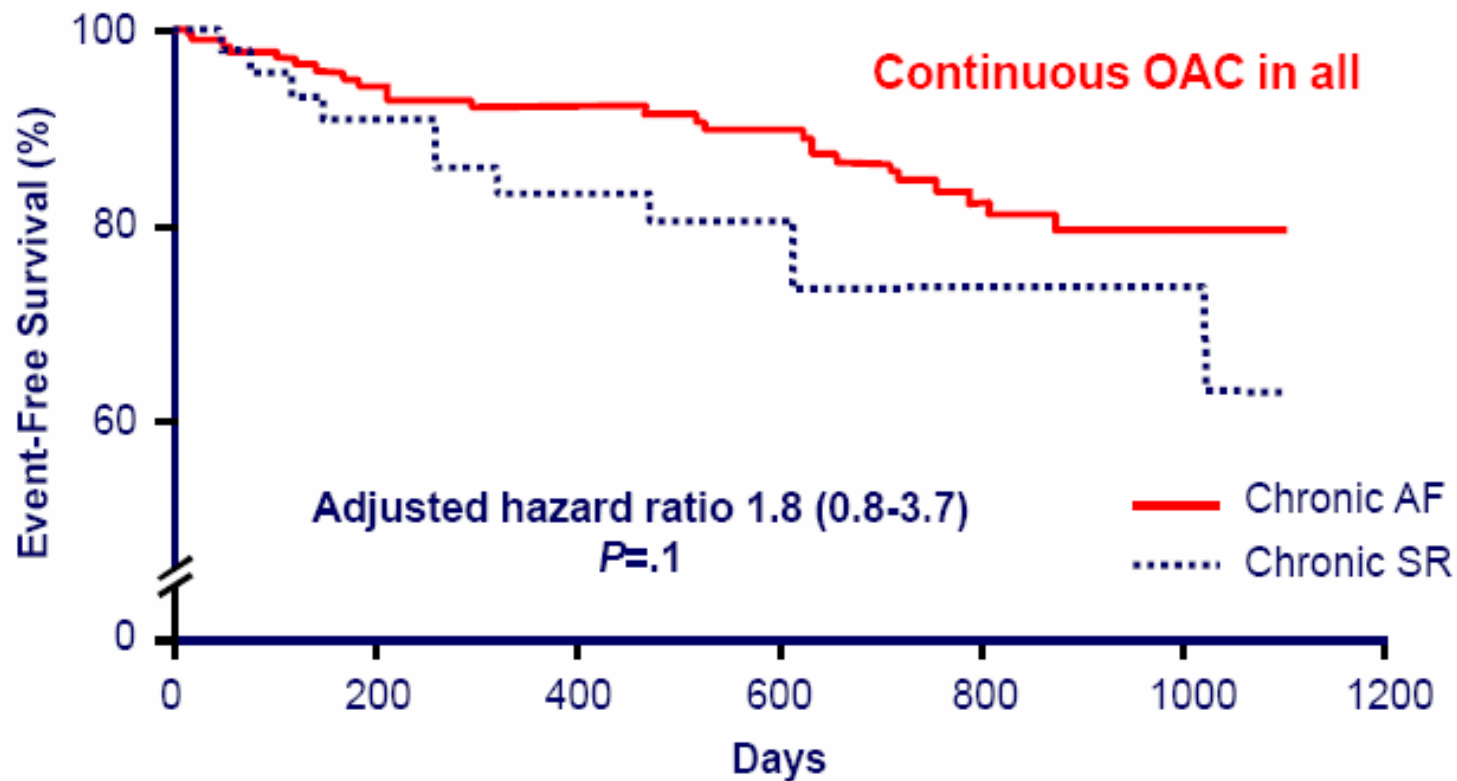
Functional status, quality of life and cost effectiveness

AFFIRM Trial

CONCLUSION

Use of rhythm control strategy in patients with AF is not superior to rate control

RACE: Mending the Rhythm *Primary End Point**



*Primary end point=composite of death from CV cause, heart failure, thromboembolic complications, bleeding, severe adverse effects of antiarrhythmic drugs, and need for pacemaker implantation.

Rienstra et al. Eur Heart J 2006

AFFIRM

At inclusion + 50% of patients were in sinus rhythm

The difference between the groups was only 30%

Sinus rhythm is deciding factor of survival

AA drugs : the beneficial effect is counterbalanced by their deleterious effect

AF-CHF STUDY

AHA : 2007

- To determine whether restoring and maintaining sinus rhythm significantly reduces cardiovascular mortality compared with a rate control in patients with both AF and CHF
- 1376 patients May 2001- June 2005
- 67+/-11 years , 82% men
- Coronary disease in 48% ,
- AF in 69%
- LVEF 27+/- 6%
- NYHA III-IV in 31%

AF-CHF STUDY

	Rythm control	Rate control
Cardiac mortality	26,7%	25,2%
Global Mortality	31,8%	32,9%
Stroke	2,6%	3,6%
HF	27,6%	30,8%

AF CHF STUDY

Rhythm control does not improve CV mortality when compared to rate control

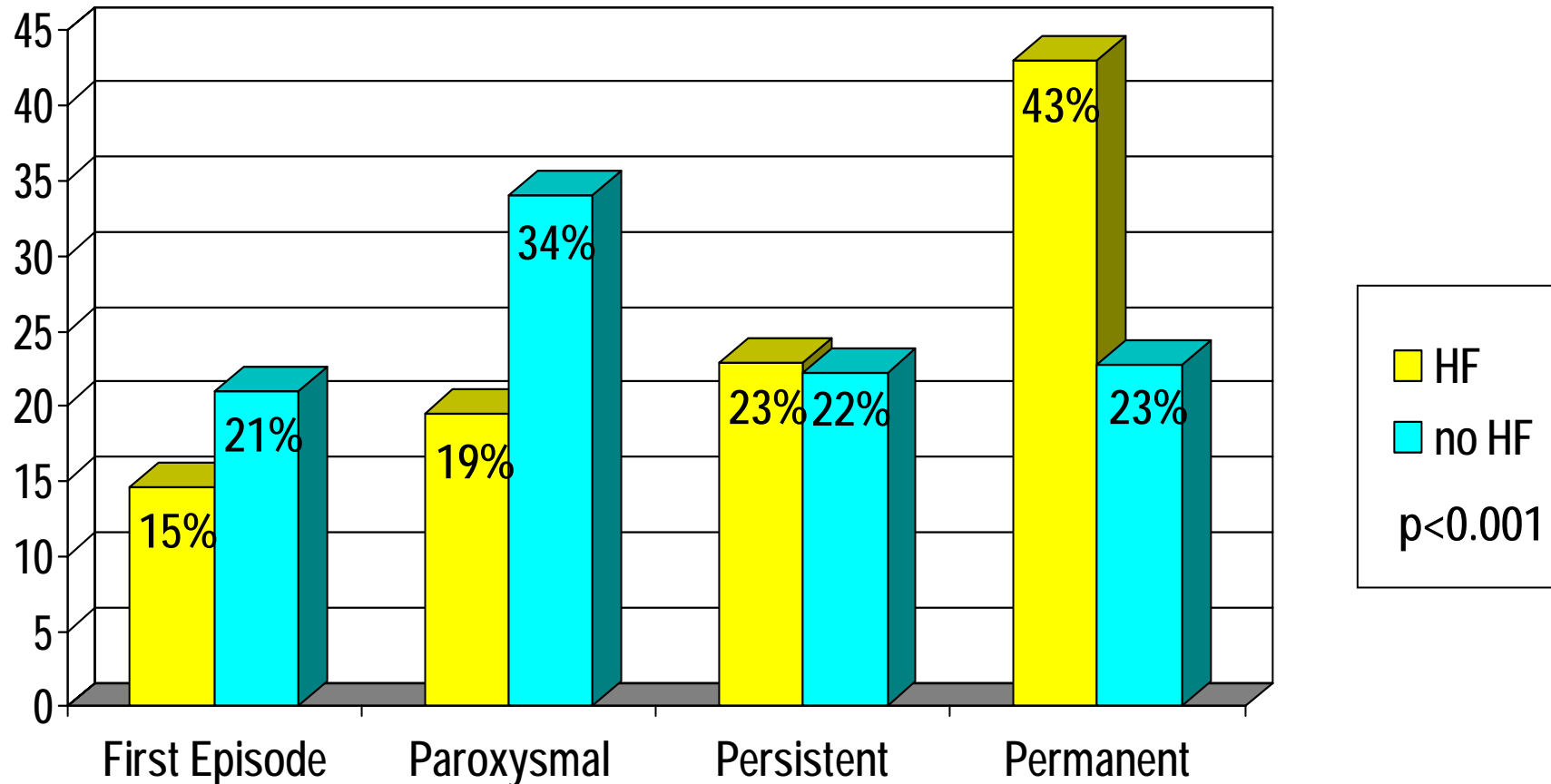
The results of the trial do not suggest that a strategy of rhythm control should be advocated for patients with AF and CHF

AF-CHF STUDY

Difficulties to analyse results :

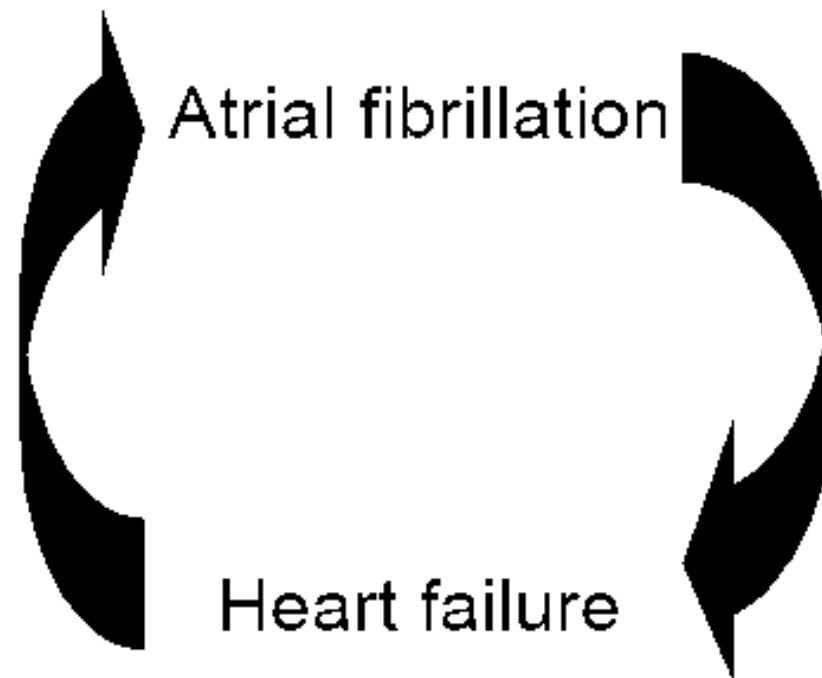
- among patients in group control rhythm only 75% were in SR
- in patients with rate control several patients were in SR

AF and Heart Failure Epidemiology



The different types of AF at entry in the registry in relation to the presence of HF or not

AF begets HF, and HF begets AF



AF AND HEART FAILURE

AF decreases cardiac outflow :

- loss of atrial systole
- shortening of diastole
- irregularity of ventricular cycle
- difficulty with valve closure

AF worsens coronary disease :

- tachycardia increases O₂ consumption
- shortening of diastole

AF worsens heart failure :

- dilated cardiomyopathy

STRATEGY TO MANAGE AF-CHF PATIENTS

Are there non – pharmacological
rhythm control treatment options ?

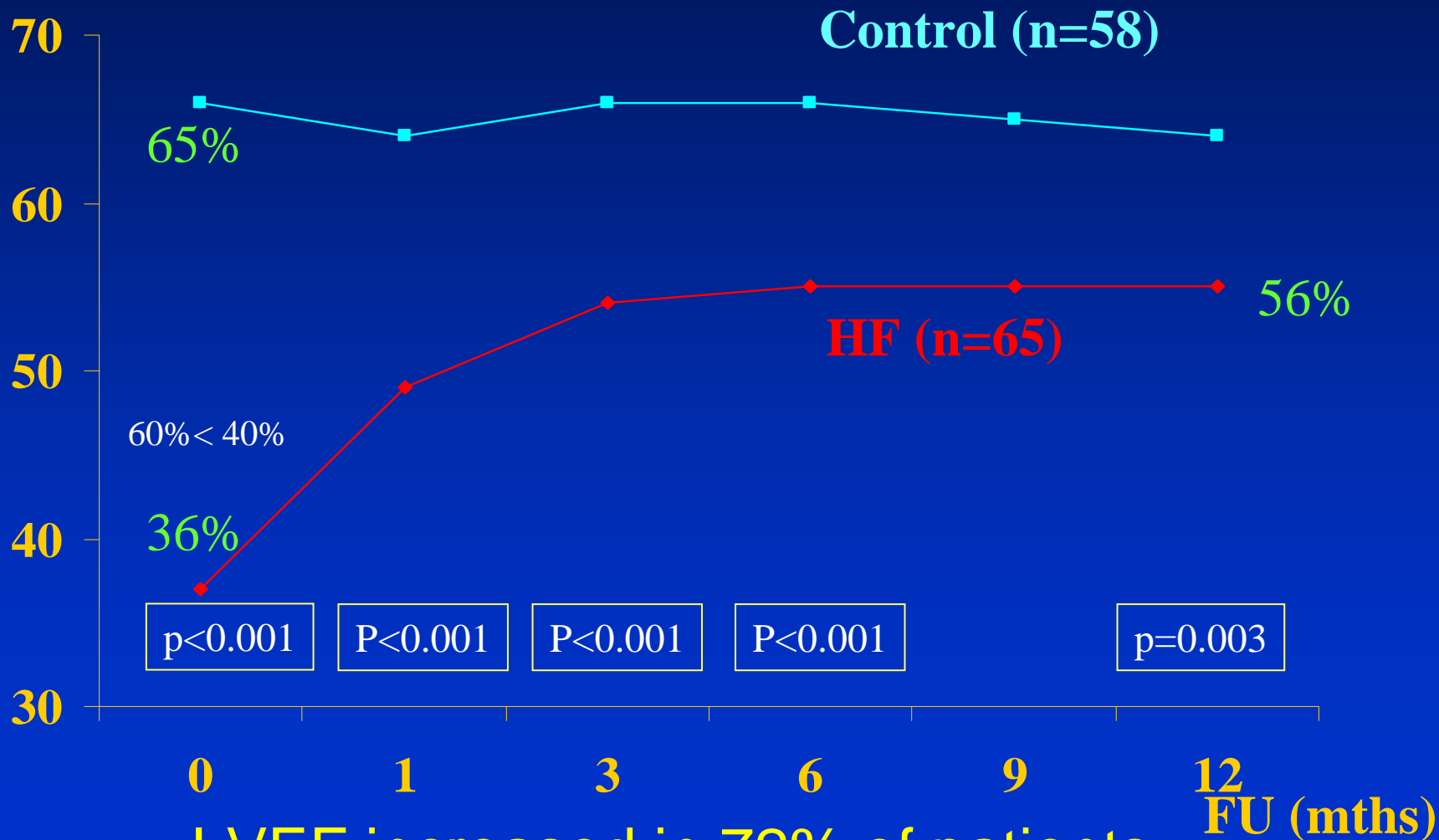
ABLATION OF AF :

Catheter ablation for atrial fibrillation :

Hsu LF et col ,N Engl J Med 2004 dec2;
351(23): 2373-83

LVEF improvement

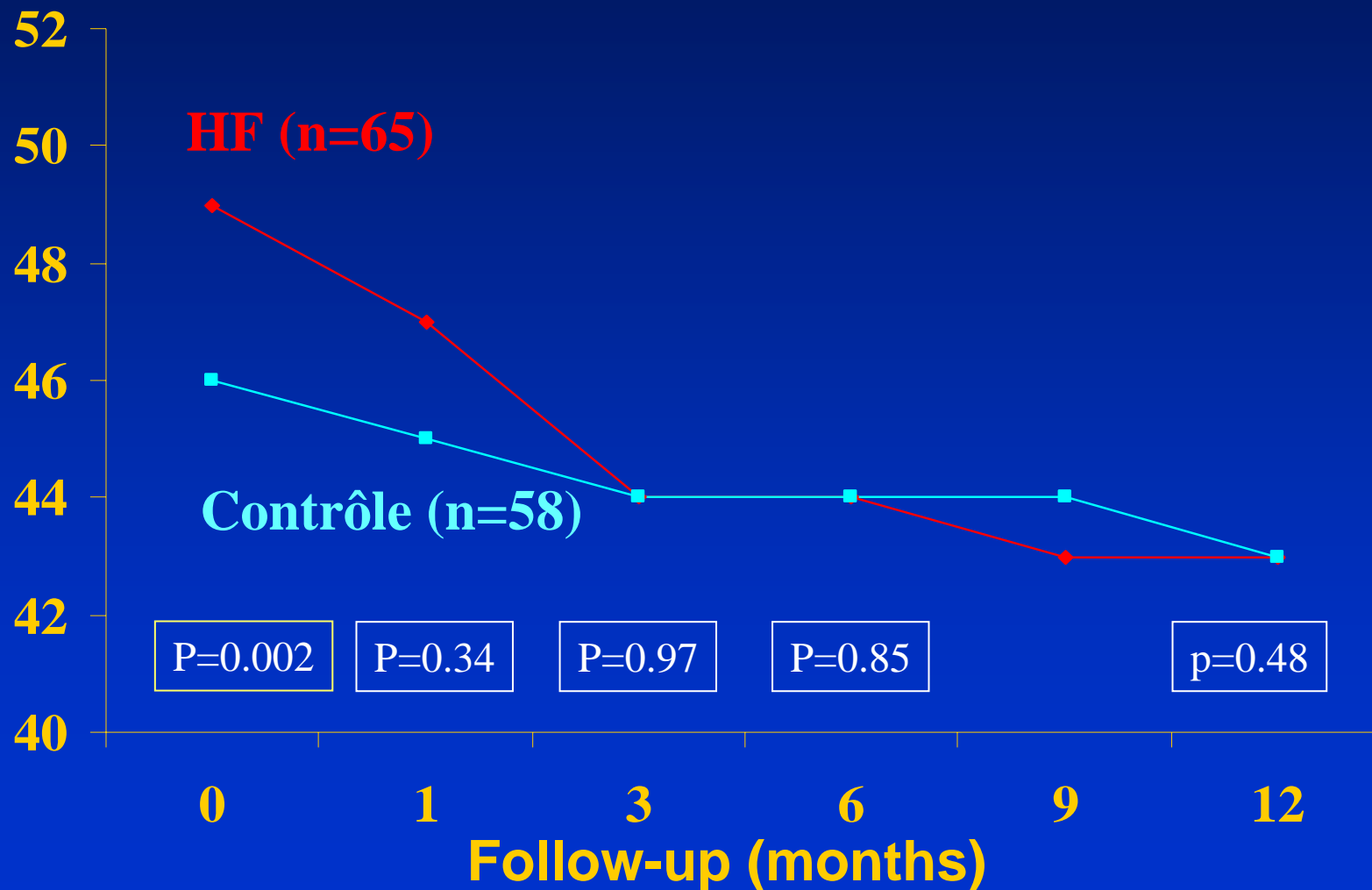
LVEF (%)



LVEF increased in 72% of patients

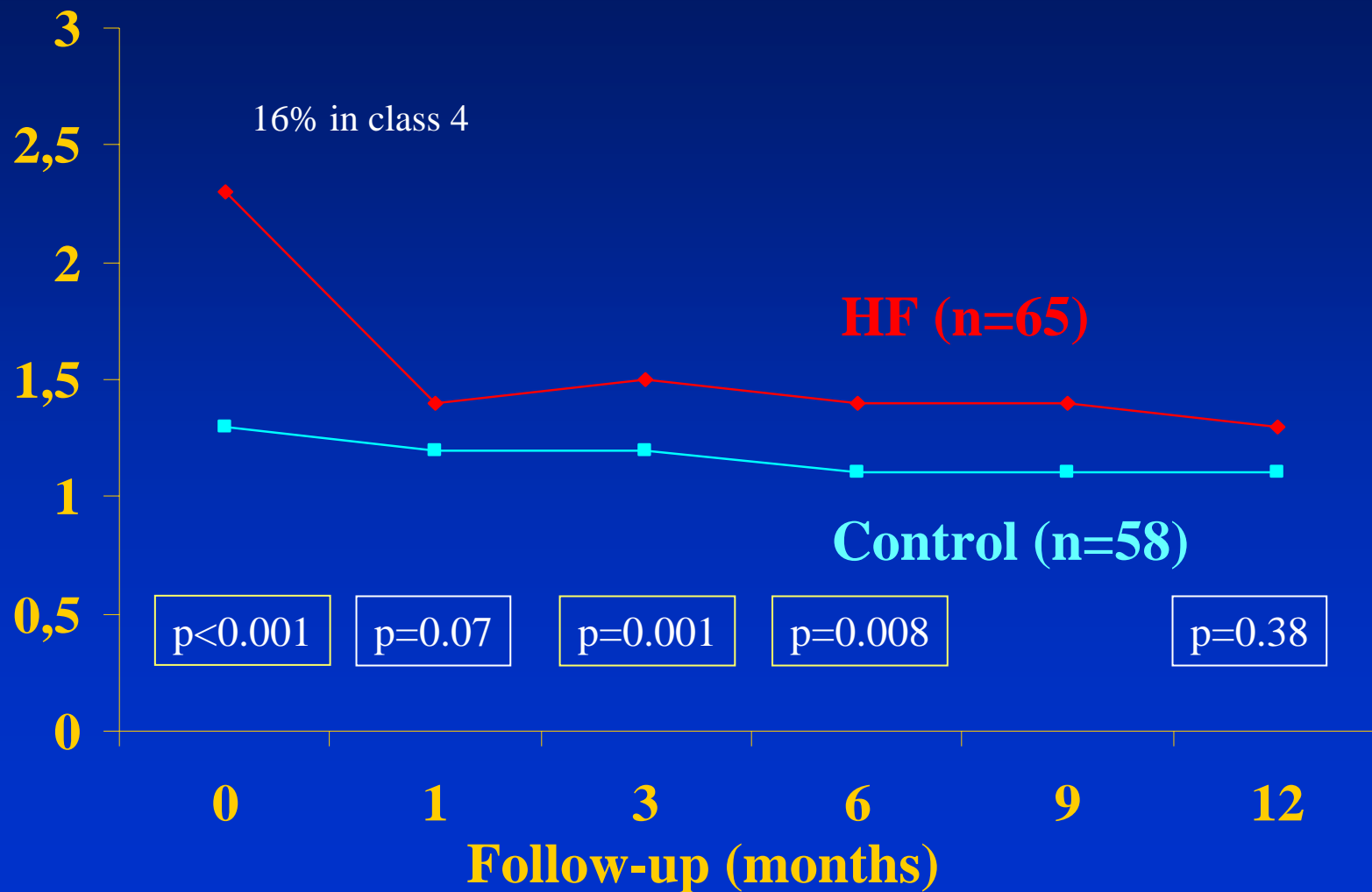
Decrease of LA size

LA parasternal
dimension (mm)



NYHA score improvement

NYHA class



CONCLUSION

1. Curative ablation of AF is feasible in patients with CHF and coexisting heart disease
2. It results in dramatic improvements in symptoms, cardiac function (35 ± 9 to $50 \pm 15\%$), exercise capacity and quality of life
3. AF ablation offers the unique opportunity to assess the effect of persisting sinus rhythm without the deleterious effects of antiarrhythmics

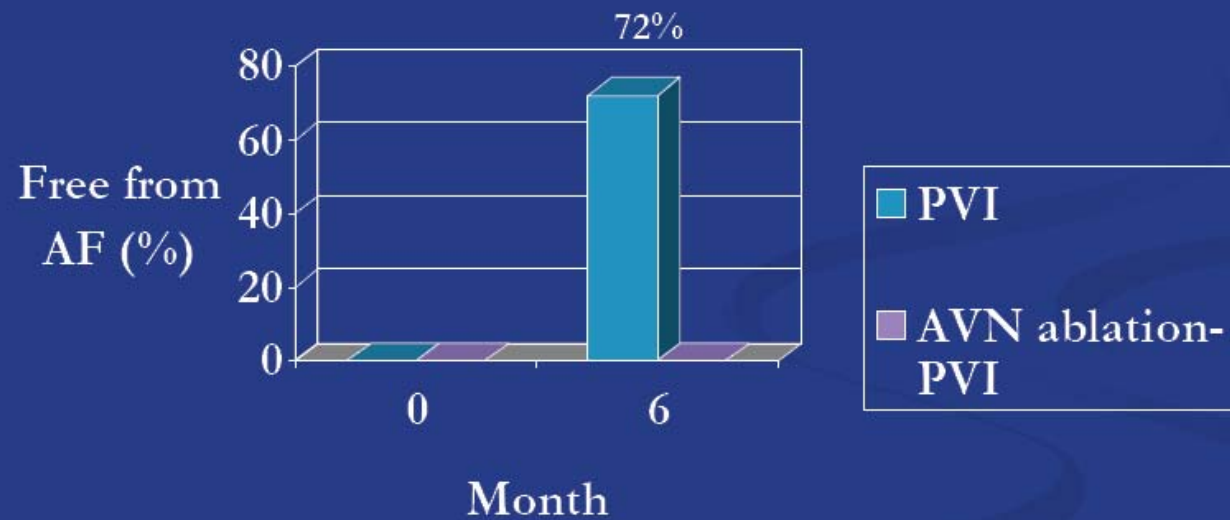
CONCLUSION II

4. Tachycardia related cardiomyopathy may not be an adequate terminology as the improvement is also observed in presence of good rate control prior to AF ablation (EF $34 \pm 9\%$ \rightarrow $51 \pm 16\%$)
5. These results suggest that AF has an important negative impact on heart function, which can be reversed after catheter ablation and maintenance of sinus rhythm without antiarrhythmic drugs

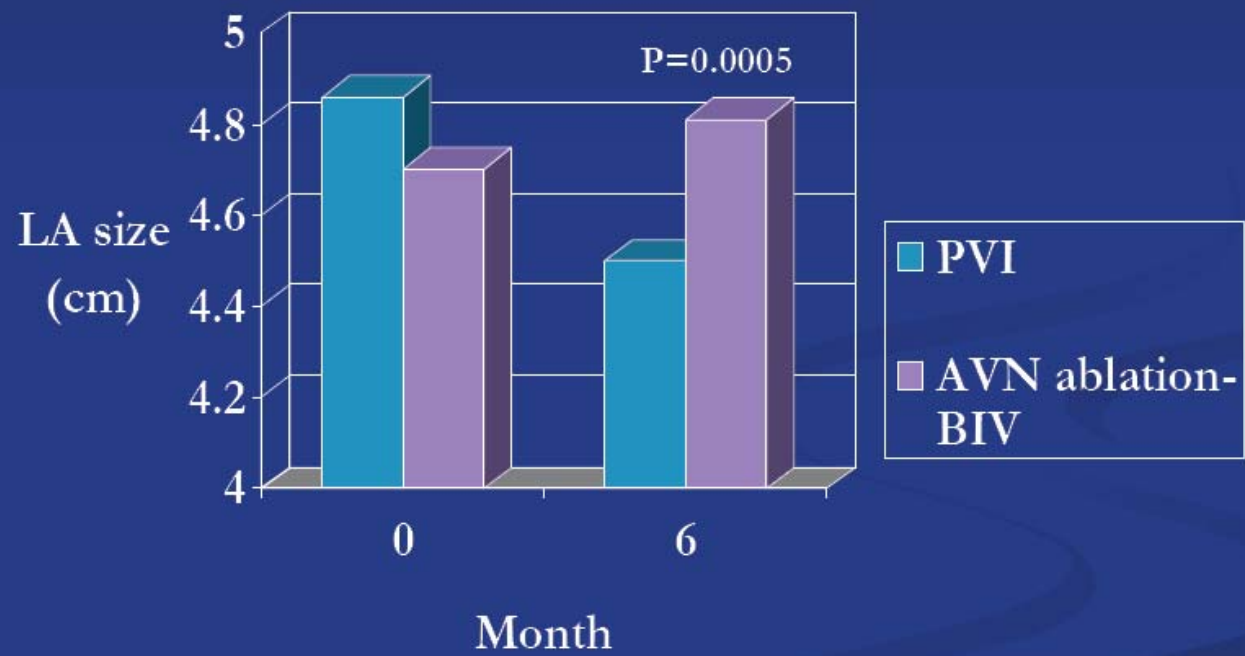
**Results of randomized controlled trial of
Pulmonary Vein Antrum Isolation vs. AV
Node Ablation with Bi-Ventricular Pacing
for Treatment of Atrial Fibrillation in
patients with Congestive Heart Failure
(PABA CHF)**

Mohammed N. Khan MD, Pierre Jais MD, Jennifer Cummings MD, Prashanthan Sanders MD, Josef Kautzner MD, PhD, Steven Hao MD, Sakis Themistoclakis MD, Raffaele Fanelli MD, Domenico Potenza MD, Oussama Wazni MD, Paul Wang MD, Amin Al-Ahmad MD, Salwa Beheiry RN, Ennio Pisano MD, Pietro Santarelli MD, Randall Starling MD, Johannes Brachmann MD, Jens Gunther MD, Aldo Bonso MD, Antonio Raviele MD, Michel Haissaguerre MD, Andrea Natale MD

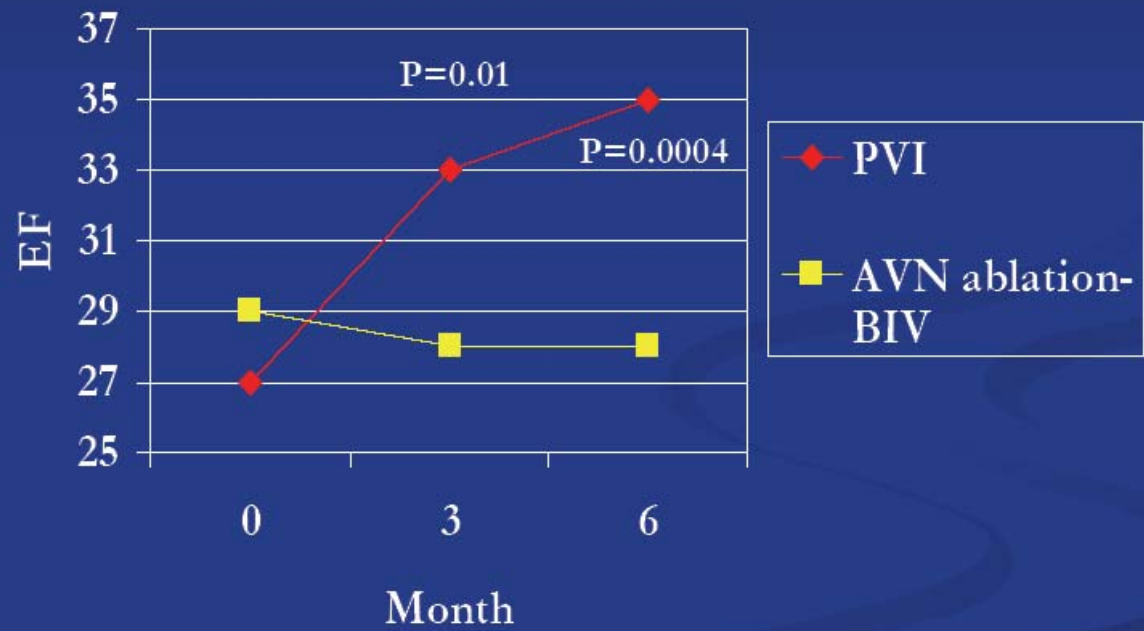
Freedom from Atrial Fibrillation Without Anti-Arrhythmic Medications and More Than One Procedure



Left Atrial Size



Ejection fraction



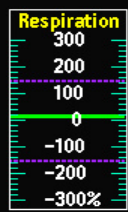
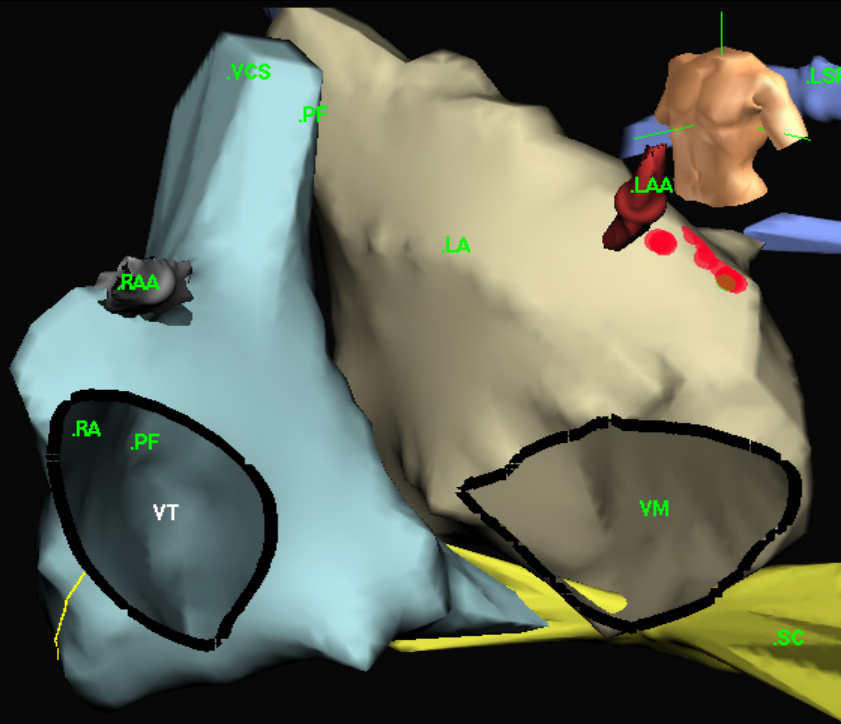
Conclusion

- 72% freedom from AF and AAD medications in the PVI group at 6 months with more than one procedure
- PVI group vs. AVN ablation with BiV at 6 mo
 - Higher EF
 - Higher 6-minute walk scores
 - Better MLHF scores
- No difference in complications

ABLATION OF AF :

TECHNIC

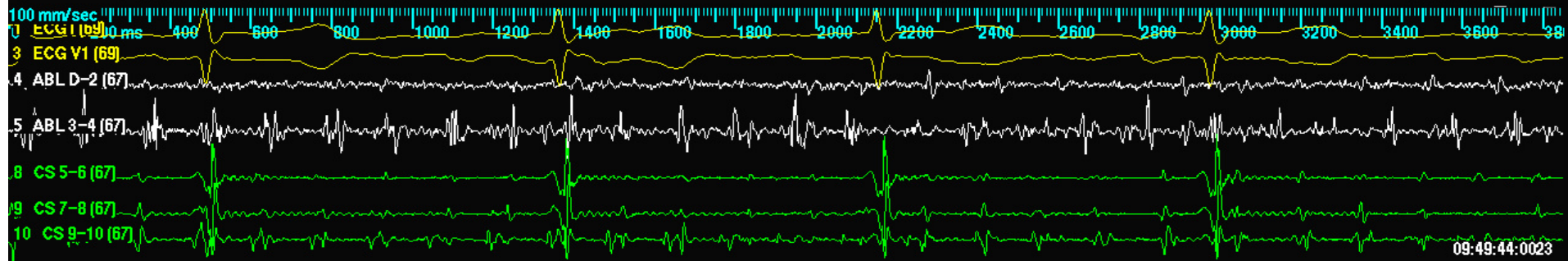
RESULTS



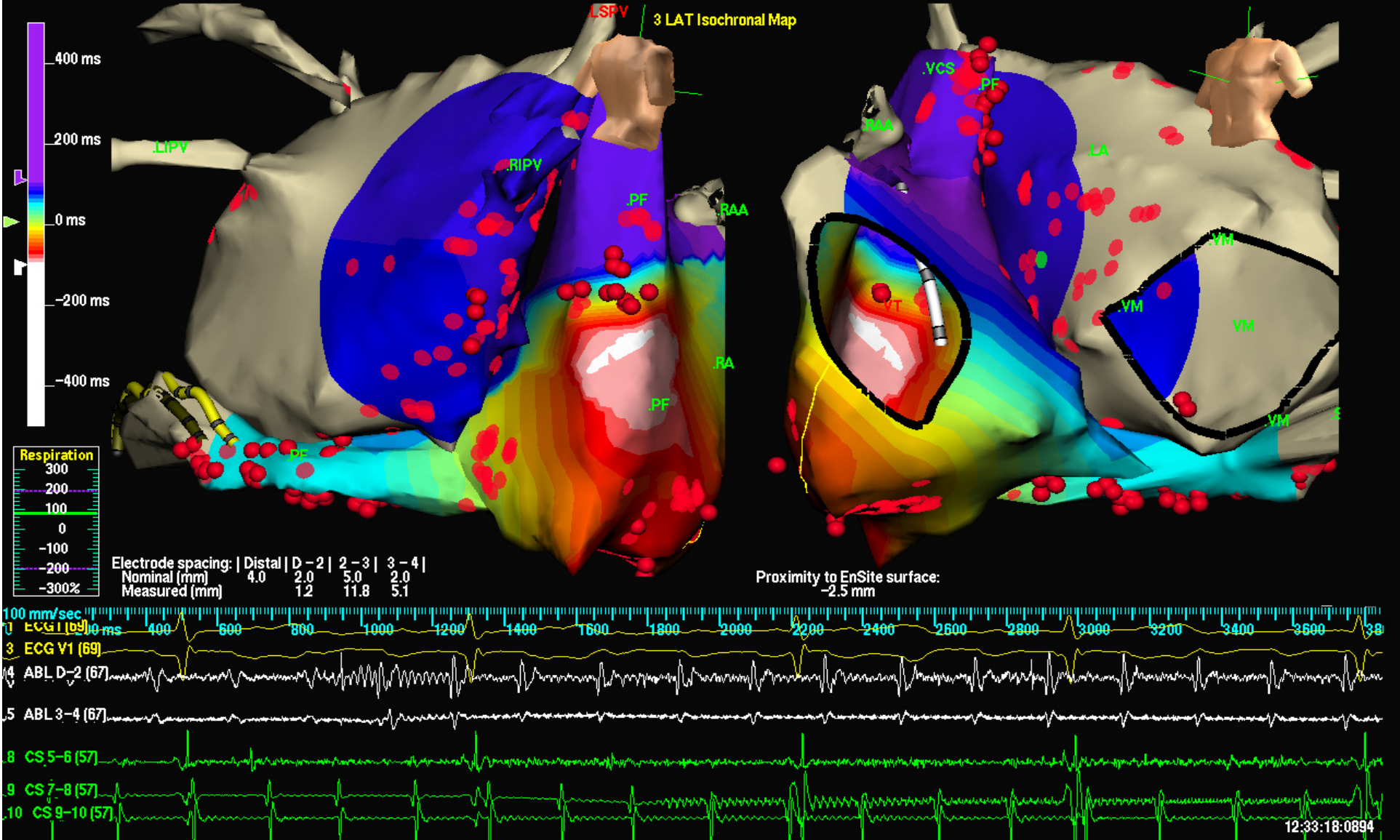
Electrode spacing:	Distal	D-2	2-3	3-4
Nominal (mm)	4.0	2.0	5.0	2.0
Measured (mm)		1.7	5.5	2.3

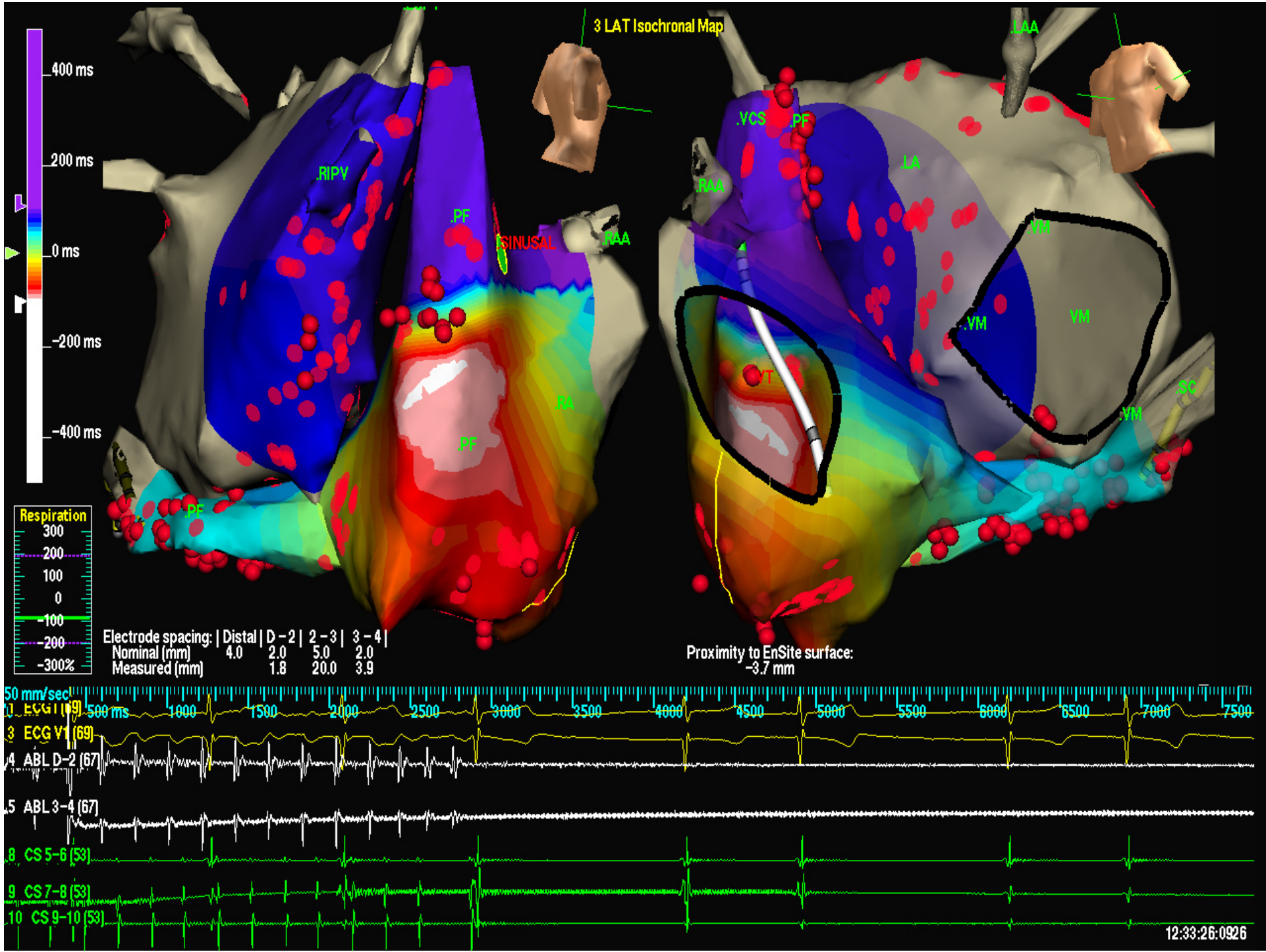
Proximity to EnSite surface:
-3.1 mm

09:49:44:0023

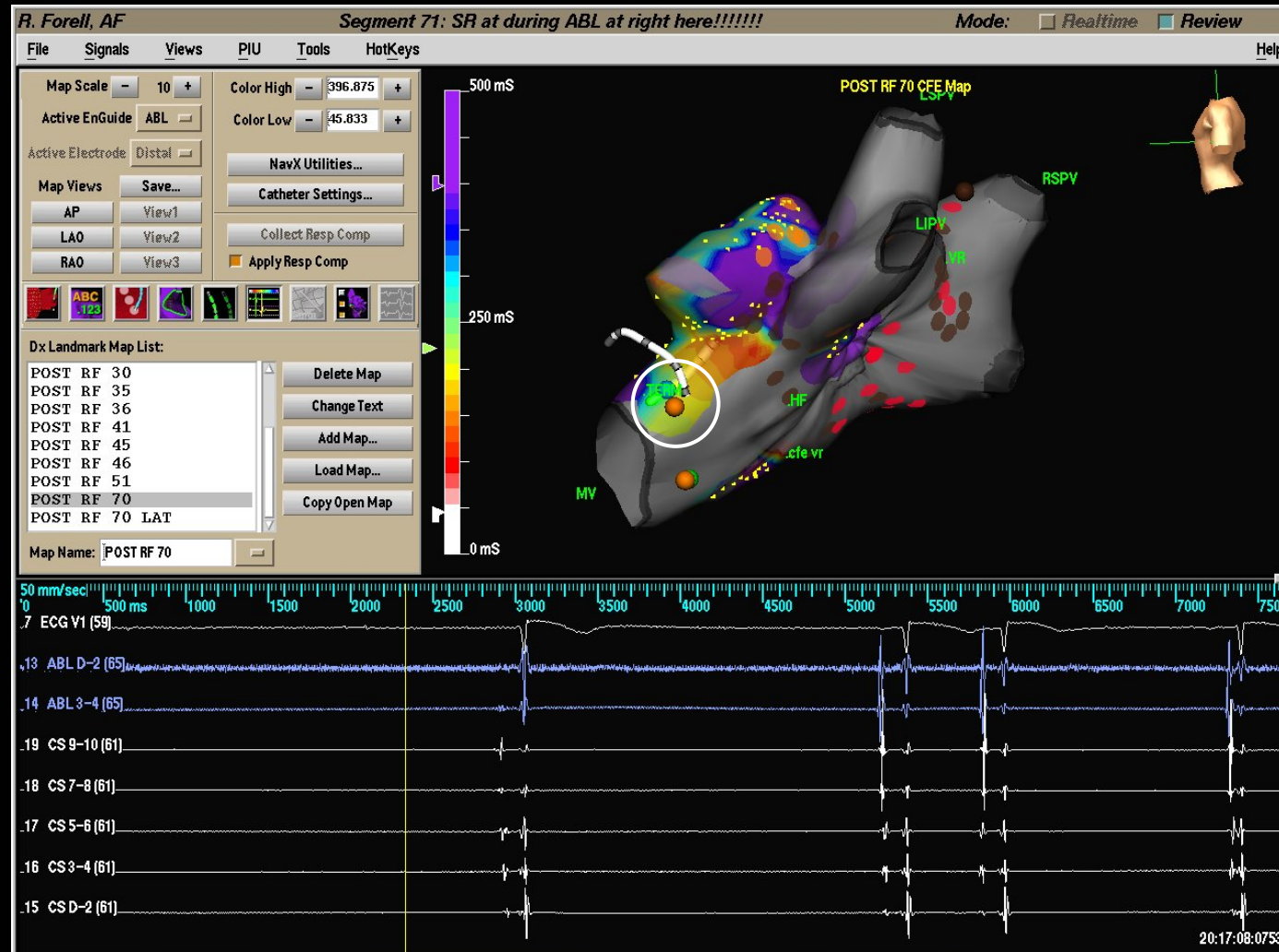


09:49:44:0023

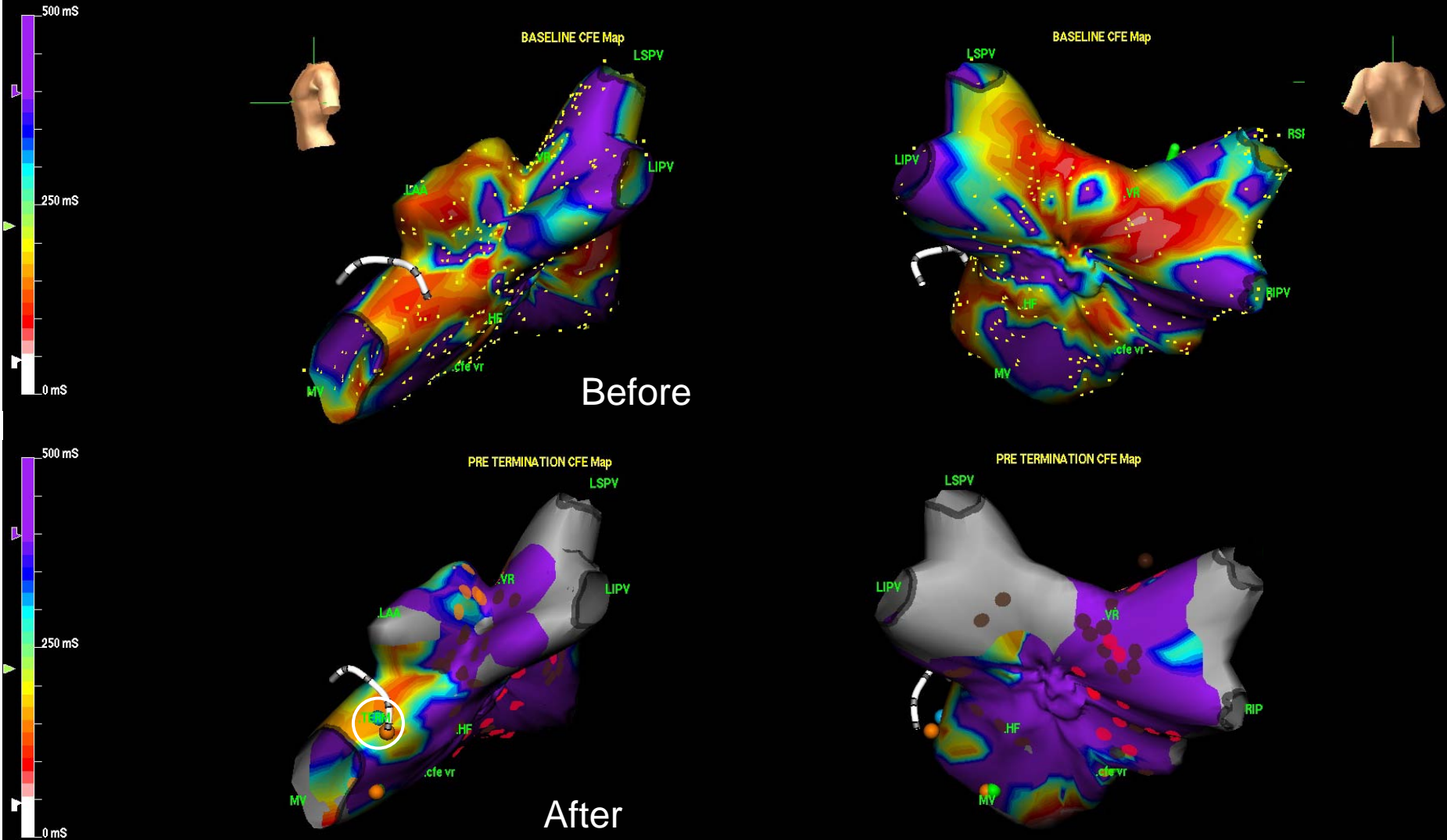




SR on mitral isthmus



CFE before/After defragmentation

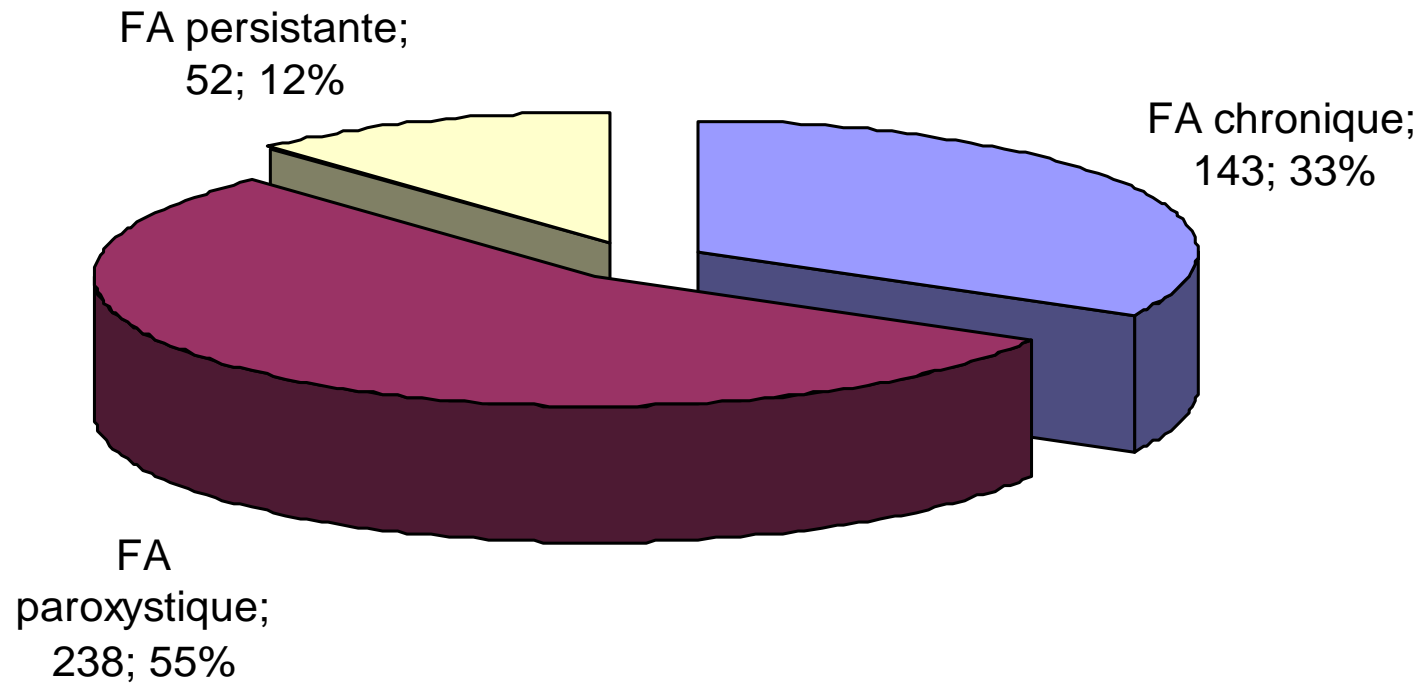


Discussion sur le projet d'une étude Ablation AVN + CRT vs Ablation FA

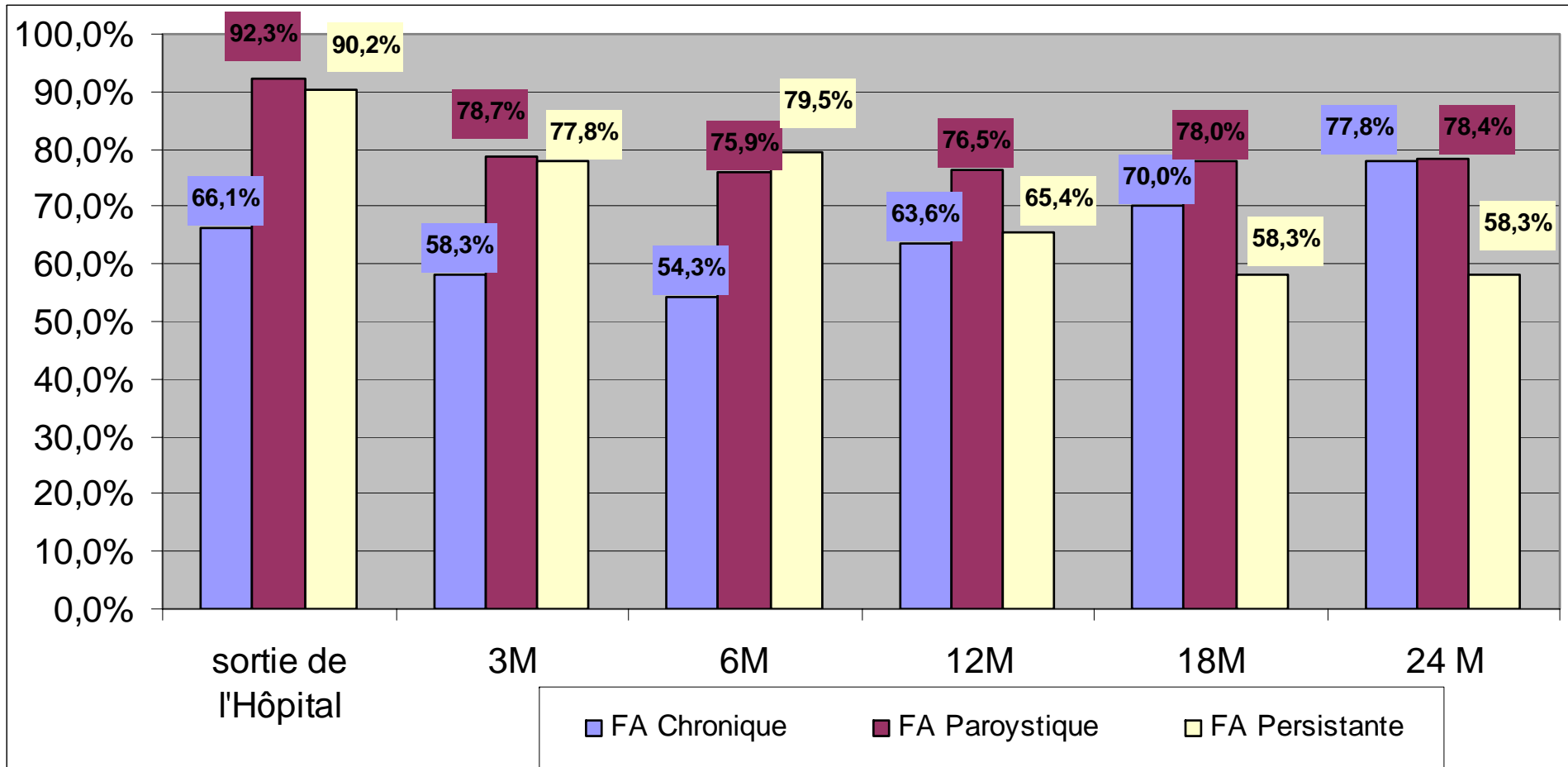
- Intérêt ?
- Rationnel ?
- Faisabilité ?
- Design ?

433 PATIENTS : MAY 2005 - OCTOBER 2007

REPARTITION DE LA POPULATION EN FONCTION DU TYPE DE FA



RESTORATION OF SR DEPENDING OF AF TYPE AFTER RF ABLATION



ACTIF: 2007

Subgroup: Paroxysmal vs. Chronic AF

Acute Success

	N Valid answers	POST ABLATION
Paroxysmal AF	280	95.4 %
Chronic AF	139	82.0 %

12 Lead ECG

Paroxysmal AF	N Valid answers	PRE ABLATION	N Valid answers	3MFU	N Valid answers	6MFU
Sinus Rhythm	270	76.7 %	145	75.9 %	175	79.4 %
Atrial Fibrillation	270	12.2 %	145	13.8 %	175	13.1 %
Atrial Flutter	270	2.6 %	145	4.8 %	175	5.1 %
Other	270	8.5 %	145	5.5 %	175	3.4 %

Chronic AF	N Valid answers	PRE ABLATION	N Valid answers	3MFU	N Valid answers	6MFU
Sinus Rhythm	131	9.9 %	72	47.2 %	71	63.4 %
Atrial Fibrillation	131	84.0 %	72	41.7 %	71	22.5 %
Atrial Flutter	131	3.8 %	72	6.9 %	71	11.3 %
Other	131	2.3 %	72	4.2 %	71	2.8 %

STRATEGY TO MANAGE AF CHF PATIENTS

CONCLUSION :

- AF is an independent factor of morbidity and mortality
In particular in cases of heart failure
- The pharmacological treatments are limited in patients with heart failure : class I AA are not indicated due to their arrhythmogenic effect and only amiodarone is possible , limited by extracardiac events

STRATEGY TO MANAGE AF CHF PATIENTS

CONCLUSION :

- . The ideal situation is to maintain sinus rhythm without AA treatment
- . RF ablation is the best strategy with attractive results in the first studies
- . A study comparing strategy of rhythm control by RF ablation and rate control is now a necessity