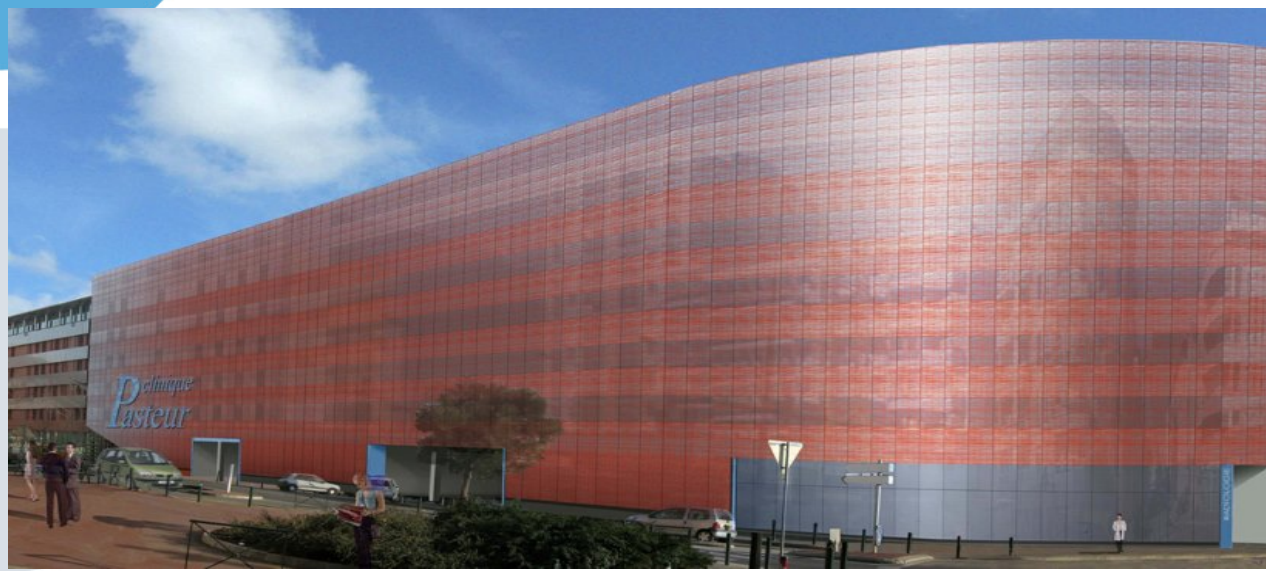


Isolation of pulmonary veins: what is the success rate with current technology?

Lisboa, 18/02/2017

sboveda@clinique-pasteur.com

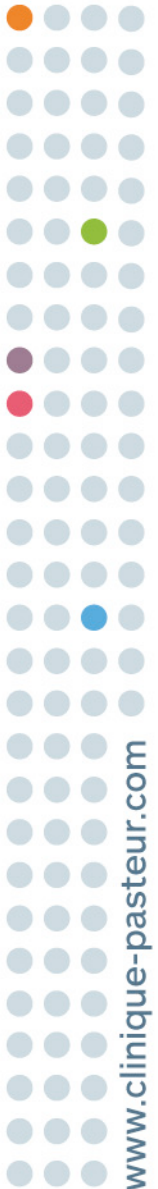
**VII Congresso
Novas Fronteiras
em Cardiologia**



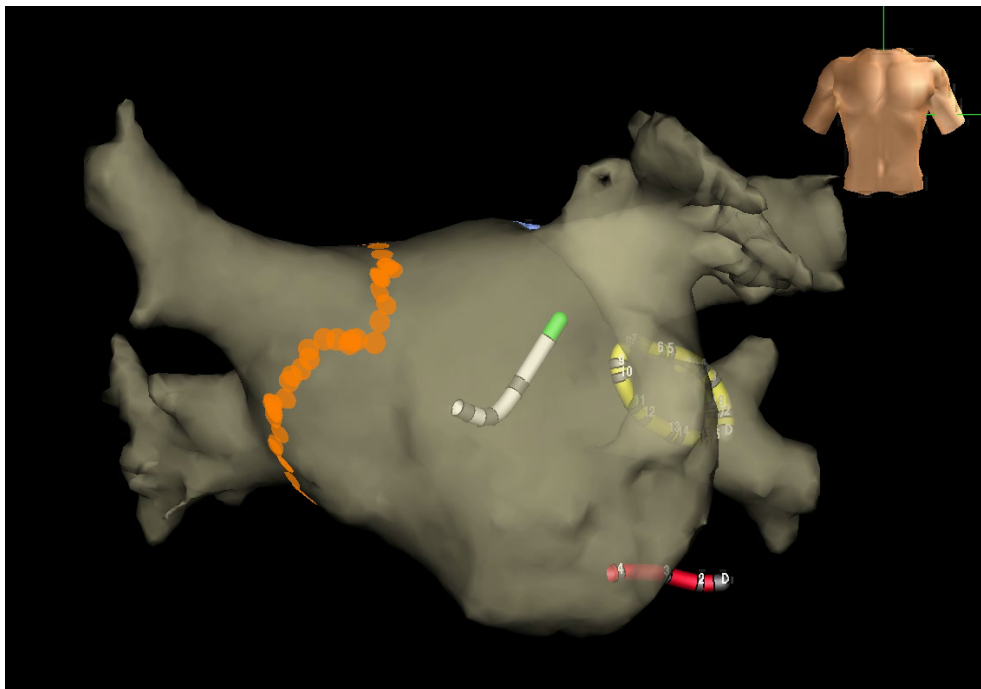
CP
CLINIQUE
Pasteur
TOULOUSE

Three questions in one...

- ***Acute success rate***
- ***Long-term success rate***
- ***Clinical success rate***

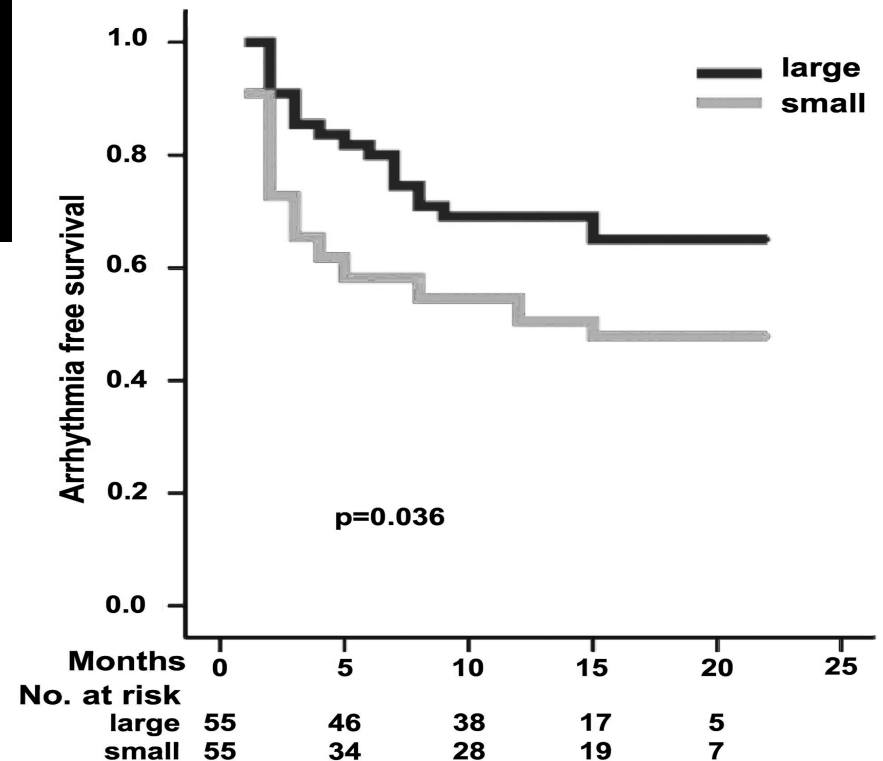


Circumferential PV Isolation



***The Larger...
the Better!!!***

Arentz T. Circulation 2007



PRINT REVIEW

TERM AFIB IN VEIN - ISO

PRINT REVIEW

V1

SPINAL 1

SPINAL 2

SPINAL 3

SPINAL 4

SPINAL 5

SPINAL 6

SPINAL 7

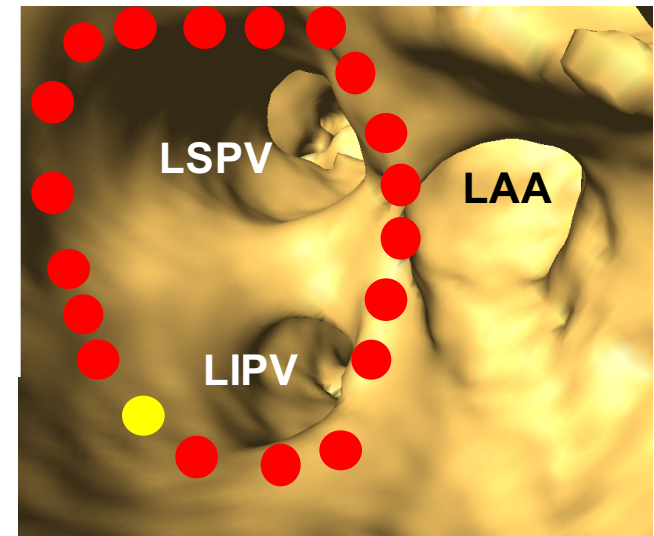
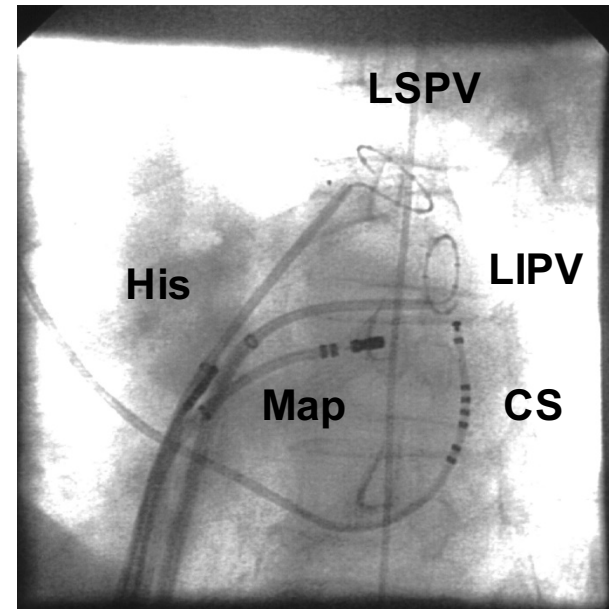
SPINAL 8

SPINAL 9

SPINAL 10

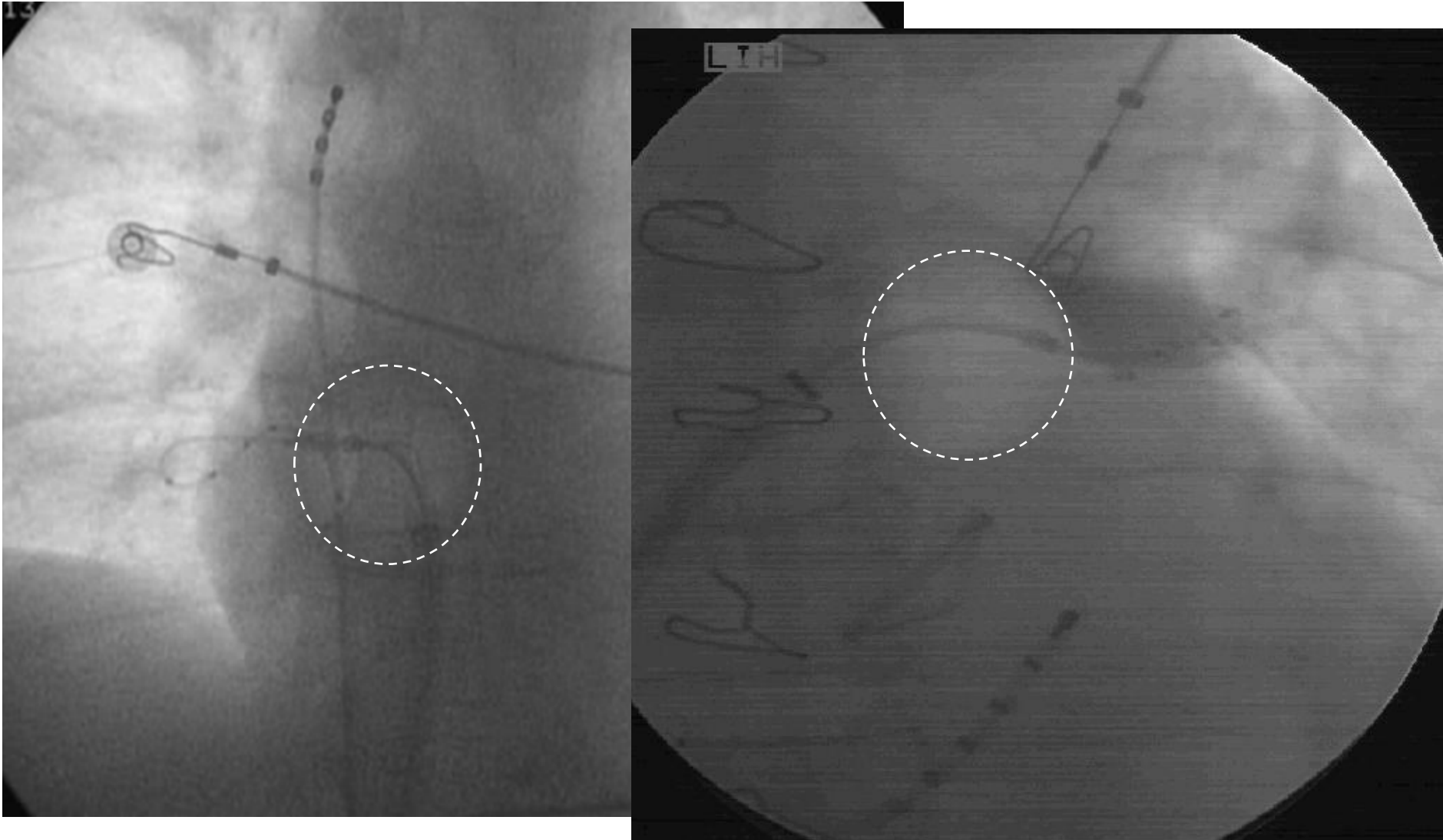
SPINAL 11

SPINAL 12

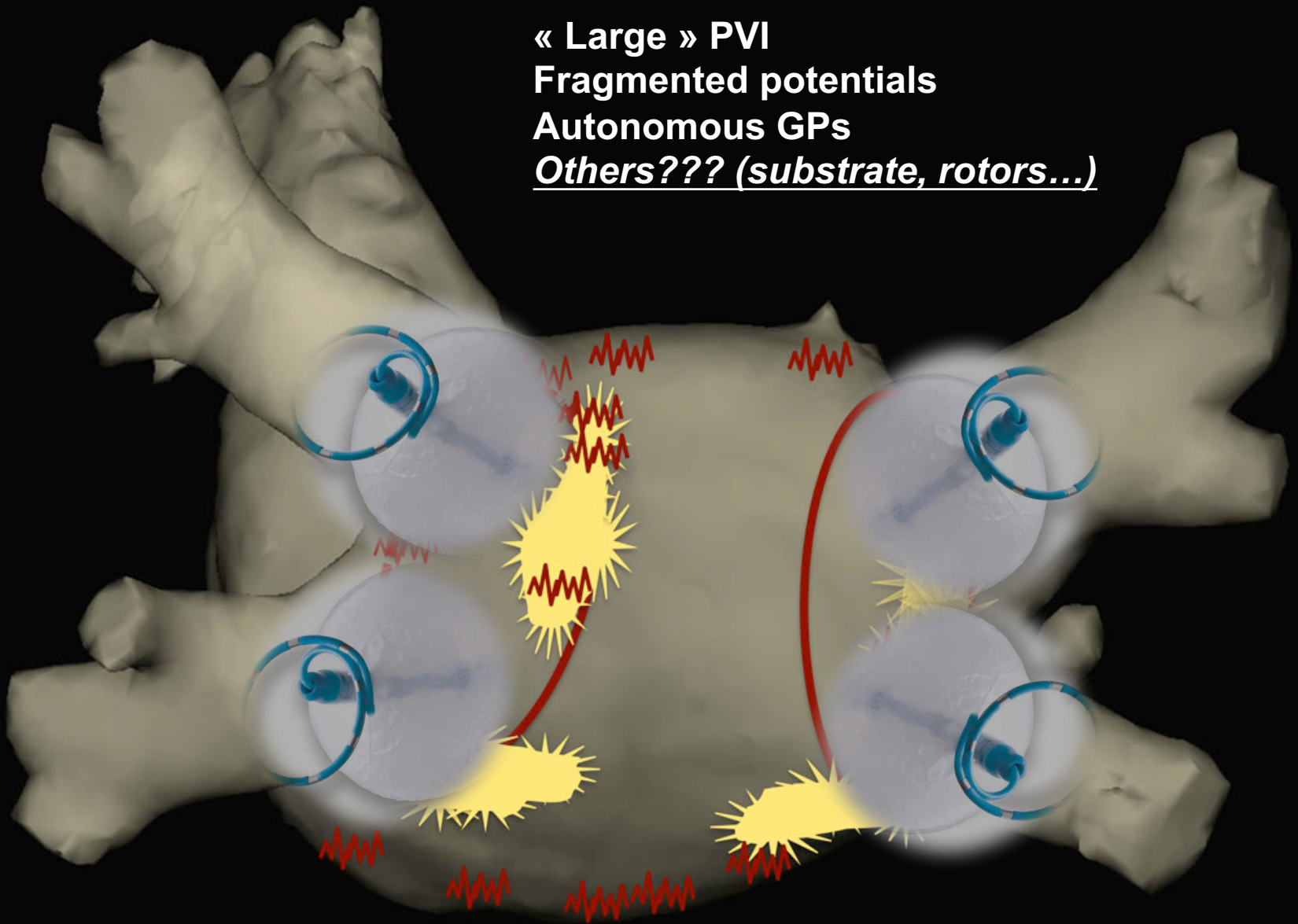


Ouyang F et al. (Circulation 2004;110:2090–2096)

Circumferential PVI by Big Cryoballoon



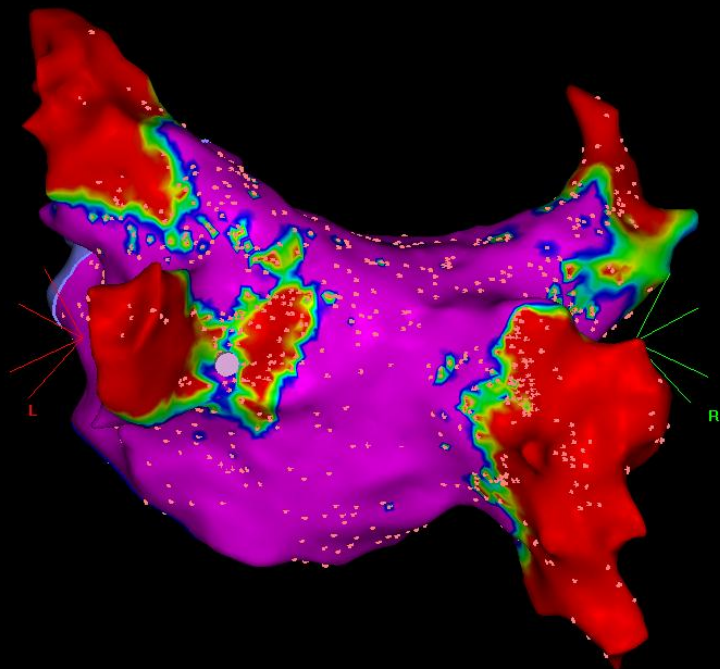
« Large » PVI
Fragmented potentials
Autonomous GPs
Others??? (substrate, rotors...)



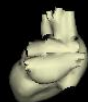
➔ 28 mm balloon

I-Map (1800, 0)

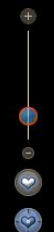
0.01 mV Bi 9.04 mV
0.20 0.50



Redo post RF



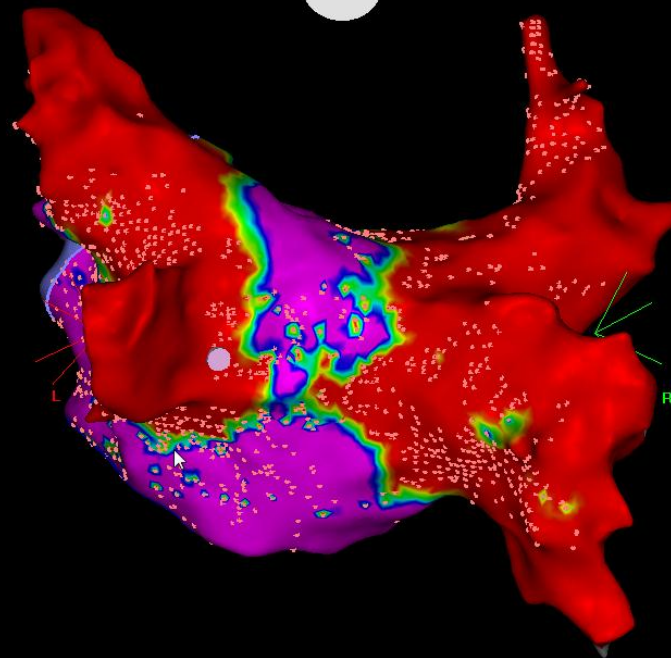
1.50



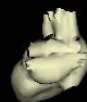
AP PA LAO RAO LL RL INF SUP

I-2-POSCRIO (2917, 0)

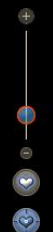
0.01 mV Bi 6.45 mV
0.20 0.50



Post Cryo 28mm



1.36

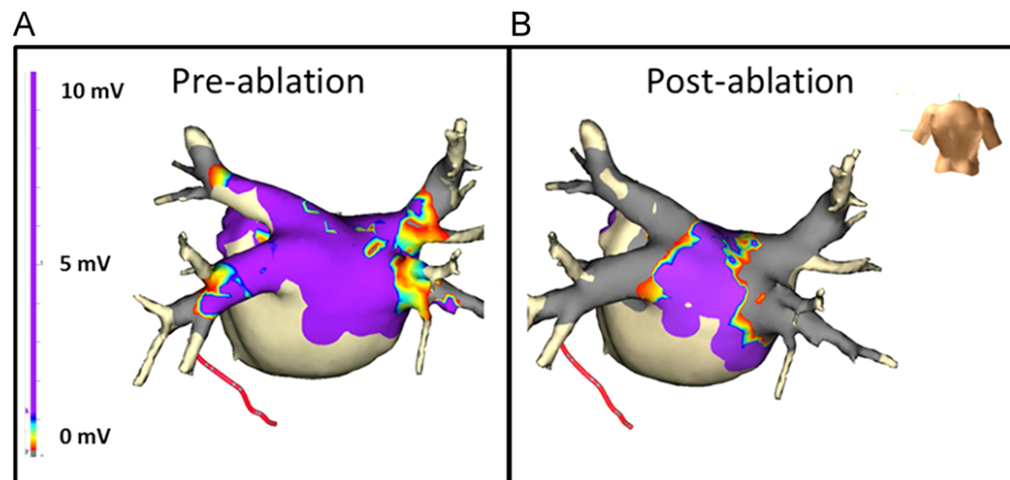


AP PA LAO RAO LL RL INF SUP

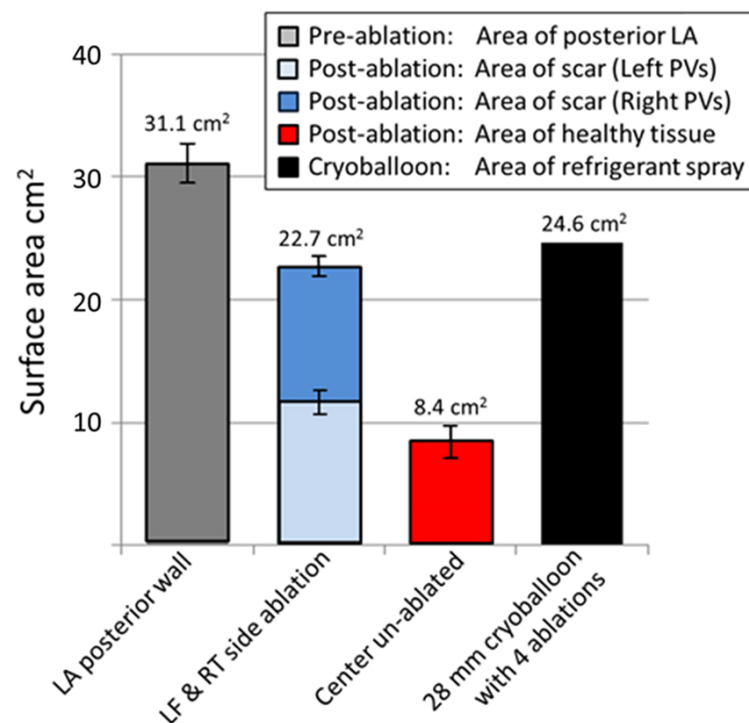
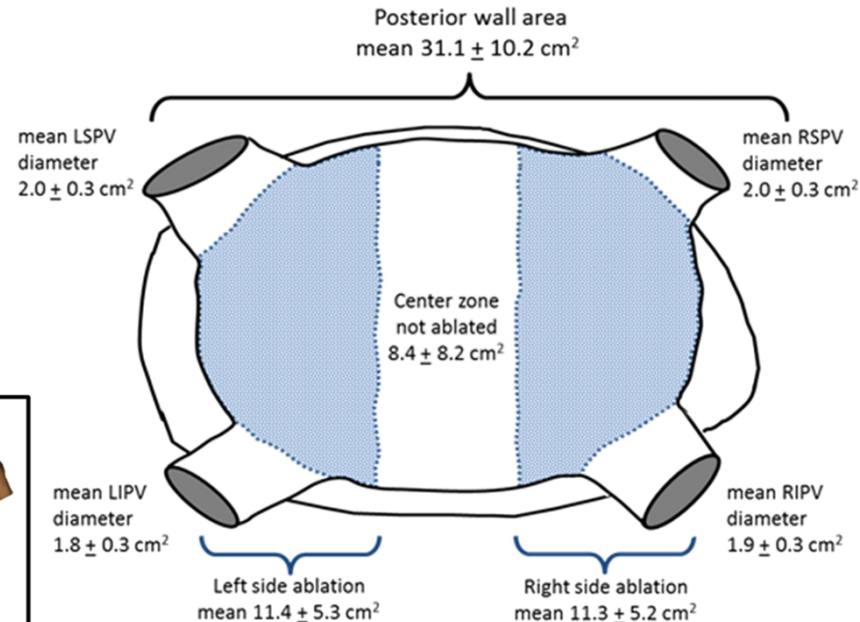
None

Sta Marta 2016

Quantification of the cryoablation zone demarcated by pre- and postprocedural electroanatomic mapping in patients with atrial fibrillation using the 28-mm second-generation cryoballoon ^{CP}

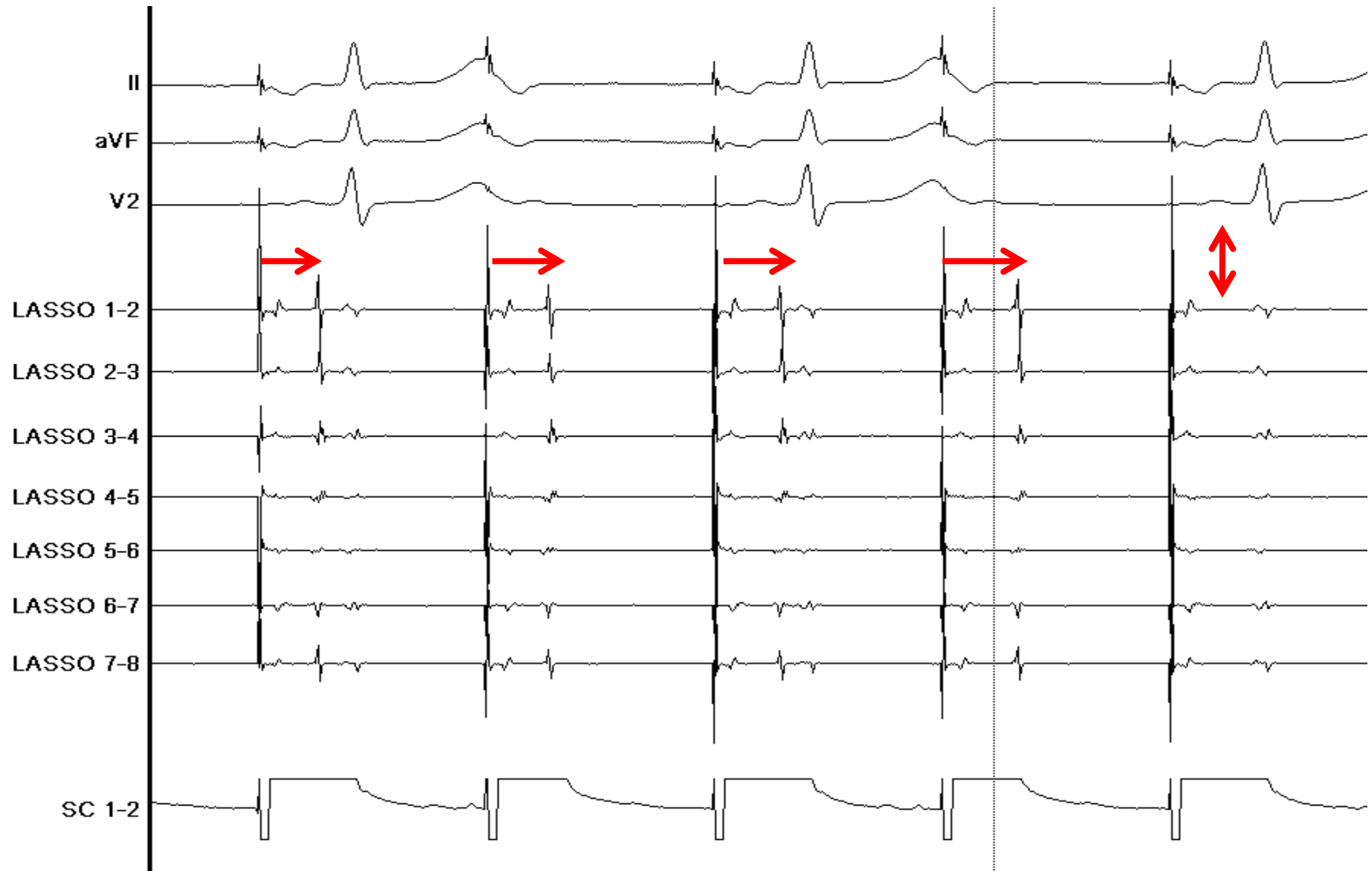


- ***The area of the posterior LA wall ablation with the Cryoballoon is wide and antral***
- ***The resulting posterior LA wall debulking could be a part of the cryoballoon efficacy beyond discrete PV isolation***



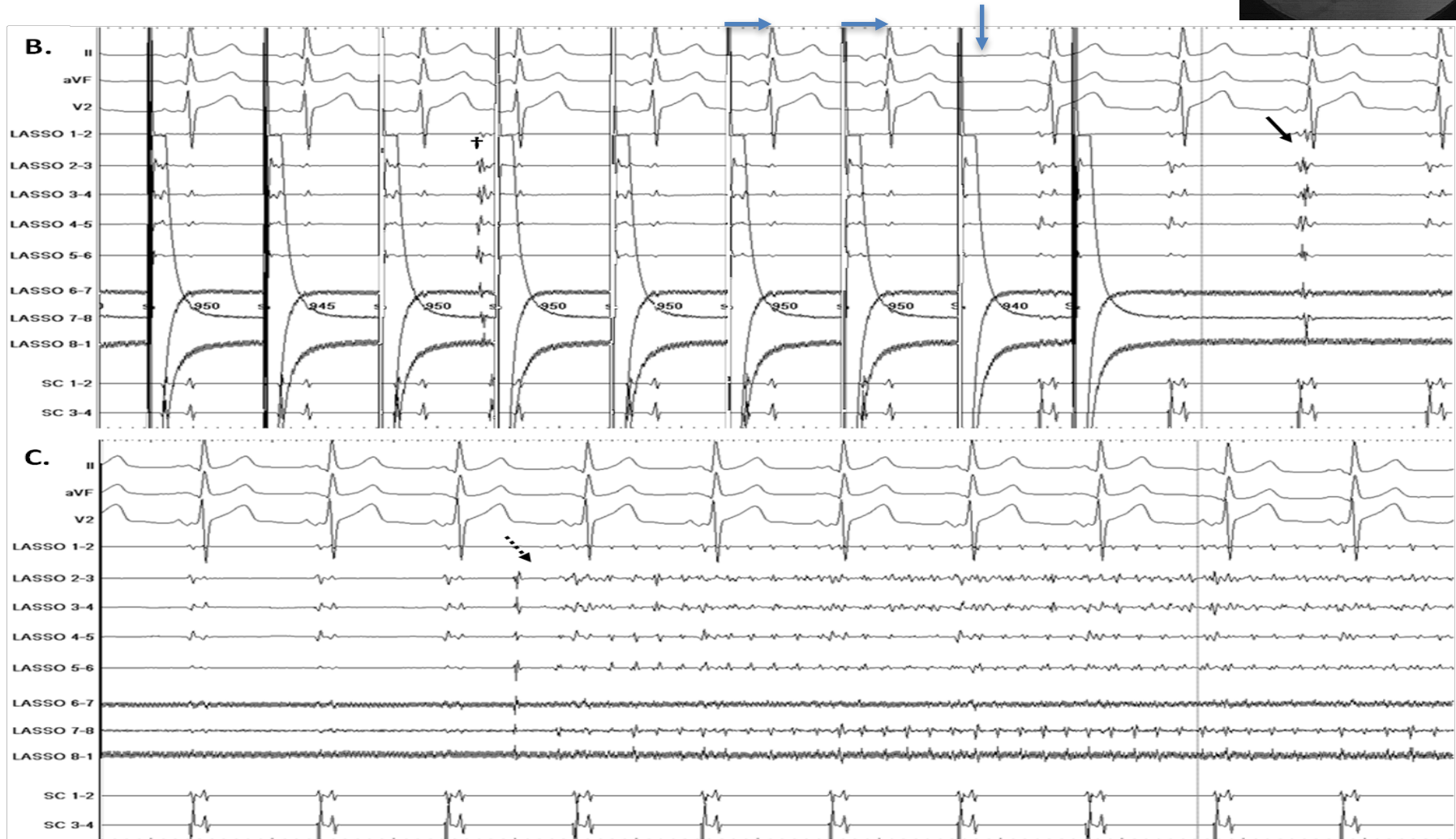
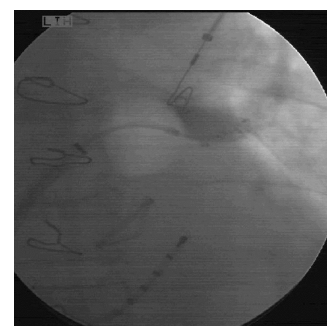
Acute Success Rate

VP SG PER CRYO



Real-time assessment of bidirectional block during pulmonary vein cryoablation

Serge Boveda*, Rui Providência, and Jean-Paul Albenque

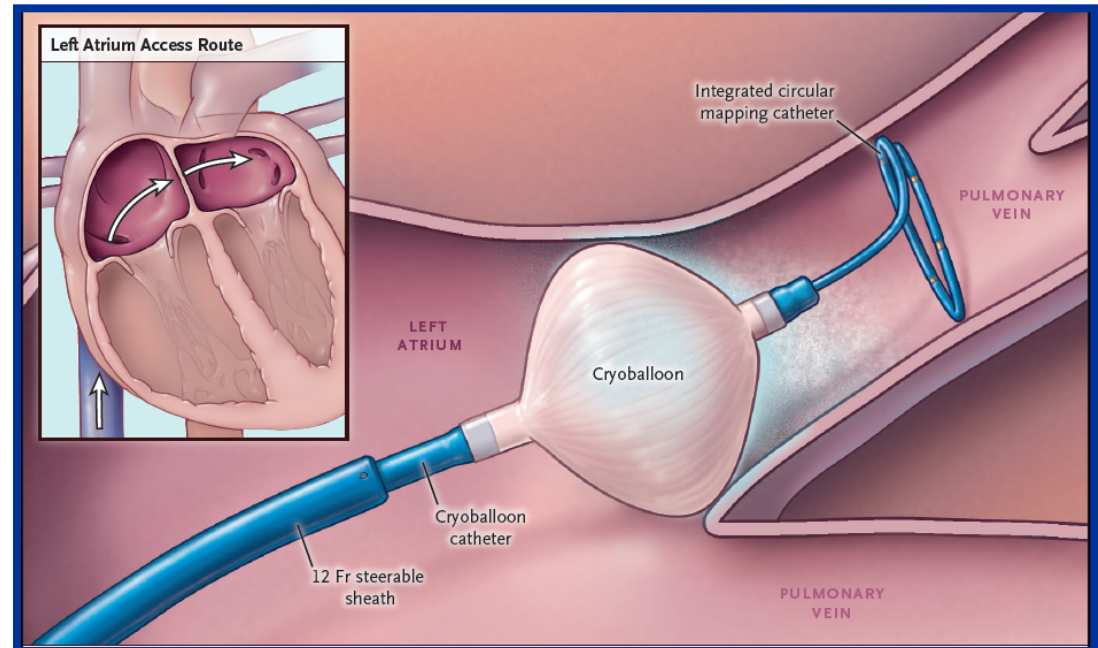
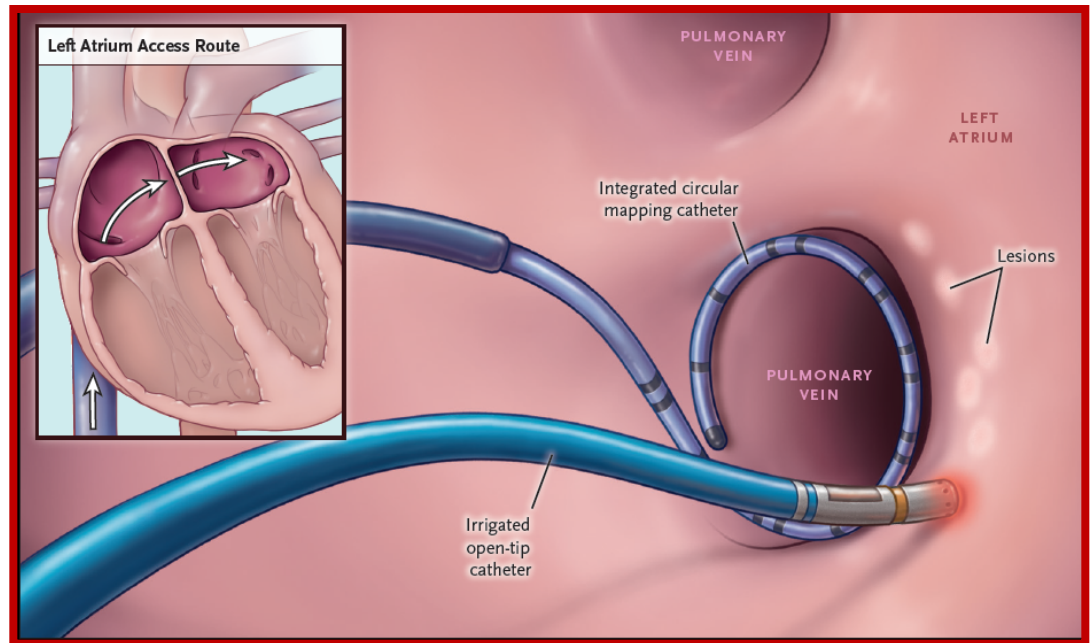


Cryoballoon or Radiofrequency Ablation for Paroxysmal Atrial Fibrillation

Karl-Heinz Kuck, M.D., Josep Brugada, M.D., Alexander Fürnkranz, M.D., Andreas Metzner, M.D., Feifan Ouyang, M.D., K.R. Julian Chun, M.D., Arif Elvan, M.D., Ph.D, Thomas Arentz, M.D., Kurt Bestehorn, M.D., Stuart J. Pocock, Ph.D., Jean-Paul Albenque, M.D., Ph.D., and Claudio Tondo, M.D., Ph.D., for the FIRE AND ICE Investigators*

“During the procedure, complete isolation was achieved in 97.9% of PVs in the RF group and in 98.9% of PVs in the cryoballoon group.”

+/- 100%...



Mid/Long-Term Success Rate

- 302 patients ablated 158 ER
- 143 2nd ablations
- 1.6±1.3PVs reconnected

Lellouche N, JCE 2008

TABLE 3

Characteristics of Second Ablation (n = 143)

Indication for redo ablation	
AF (%)	50
AT (%)	46
Incessant ectopies (%)	4
PV reconnection (%)	59
Mean number of reconnected PV (n)	1.6
CTI reconnection (%)	19
Continuous electrical activity ablation (%)	37
Mitral line (%)	32
Roof line (%)	34

Mid/Long-Term Success Rate

GENERAL ANESTHESIA REDUCES THE PREVALENCE OF PULMONARY VEIN RECONNECTION DURING REPEAT ABLATION WHEN COMPARED TO CONSCIOUS SEDATION: RESULTS FROM A RANDOMIZED STUDY

257 patients, 2 groups, < 12 months post RF

PV reconnection after first procedure

Forty (31%) patients in group 1 and 15 (12%) patients in group 2 had recurrence after the first procedure. All of these patients chose to undergo a second procedure. Two patients in group 1 and 3 patients in group 2 had common left-sided PV ostia. At the repeat procedure, 42% (66 of 158) of PVs in group 1 had recovered conduction, compared with 19% (11 of 57) in group 2 ($P = .003$).

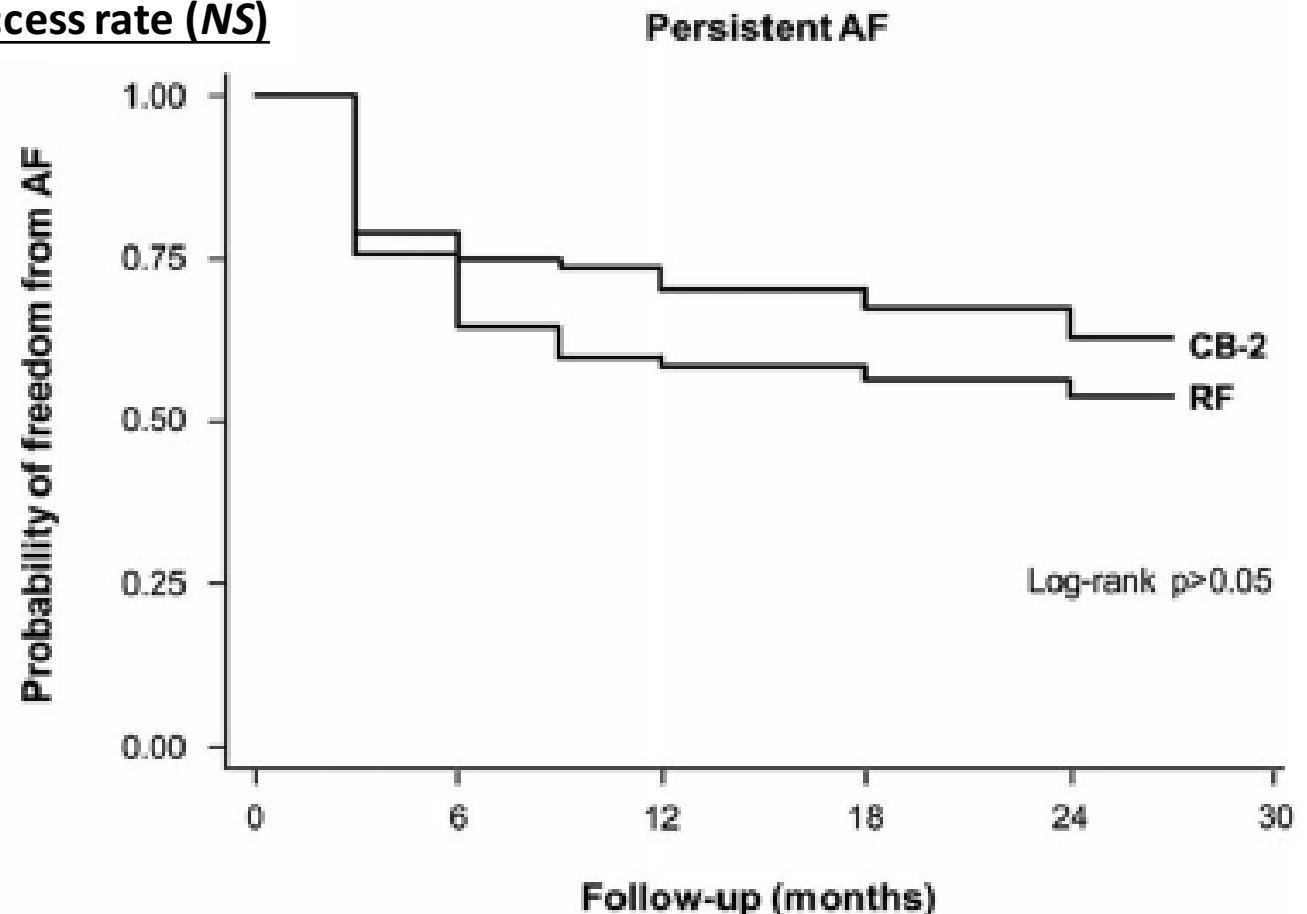
Cryo? CF?....

Di Biase L, HR 2011

Acute and Long-Term Outcomes of Catheter Ablation of Atrial Fibrillation Using the Second-Generation Cryoballoon versus Open-Irrigated Radiofrequency: A Multicenter Experience

- 1196 total / 287 persistent pts
- Cryo vs RF Multicentric registry
- Retrospective non-randomized
- Mean FU 12 months
- 72% vs 59% clinical success rate (NS)

2nd Gen Cryoballoon Artic Front Advance...

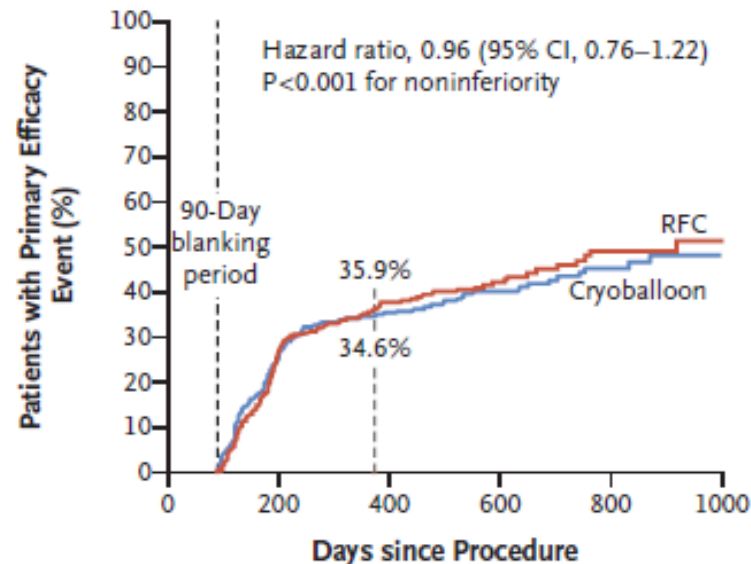


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- ***Cryoballoon ablation noninferior to RF with respect to efficacy for the treatment of patients with drug-refractory paroxysmal atrial fibrillation***
- ***No significant difference between the two methods with regard to overall safety...***

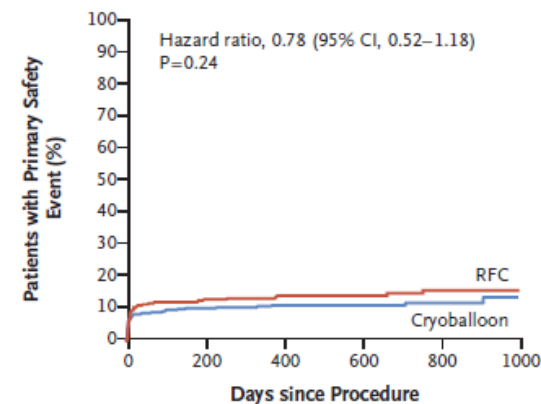
A Primary Efficacy End Point



No. at Risk
Cryoballoon
RFC

374	338	242	194	165	132	107	70	57	34	12
376	350	243	191	149	118	93	58	44	25	12

C Primary Safety End Point



No. at Risk
Cryoballoon
RFC

374	323	298	261	229	189	159	117	94	55	21
376	315	292	247	215	176	146	110	87	52	27

« CF catheters » vs Cryo Gen II ?

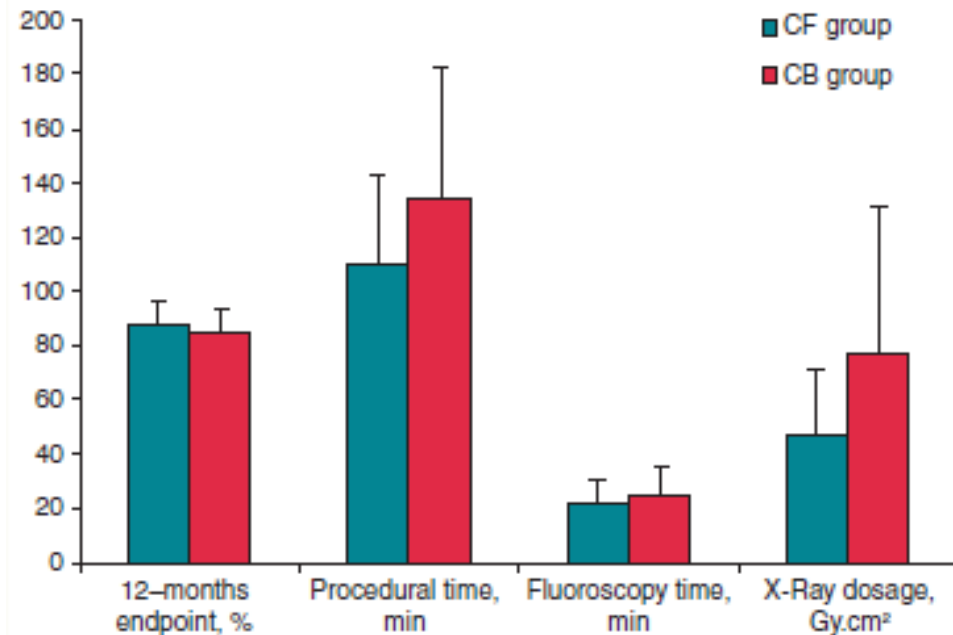
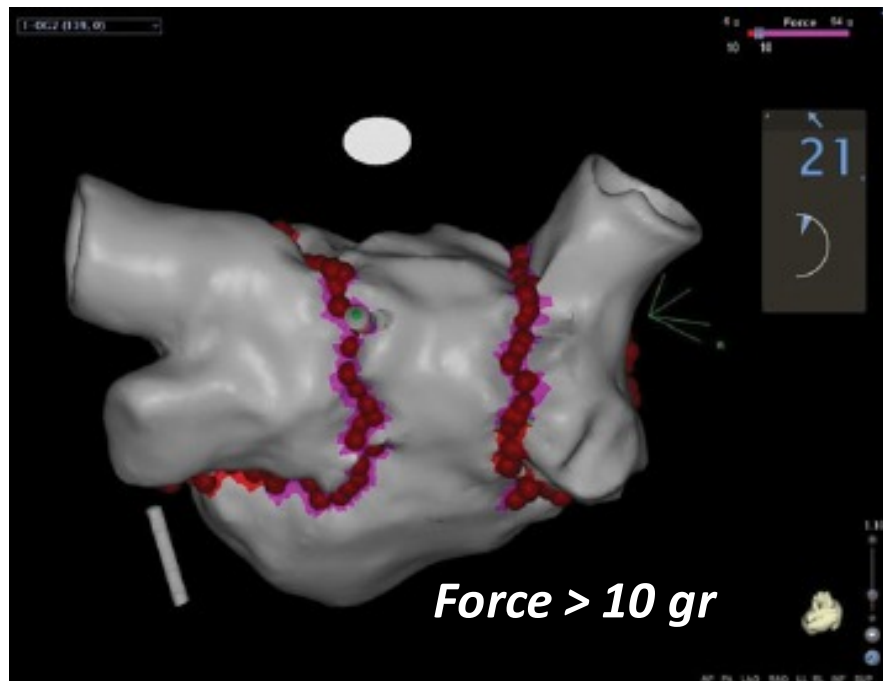


SmarTouch™, BioSense Webster

Contact-force guided radiofrequency vs. second-generation balloon cryotherapy for pulmonary vein isolation in patients with paroxysmal atrial fibrillation—a prospective evaluation

Jourda F, Europace 2015

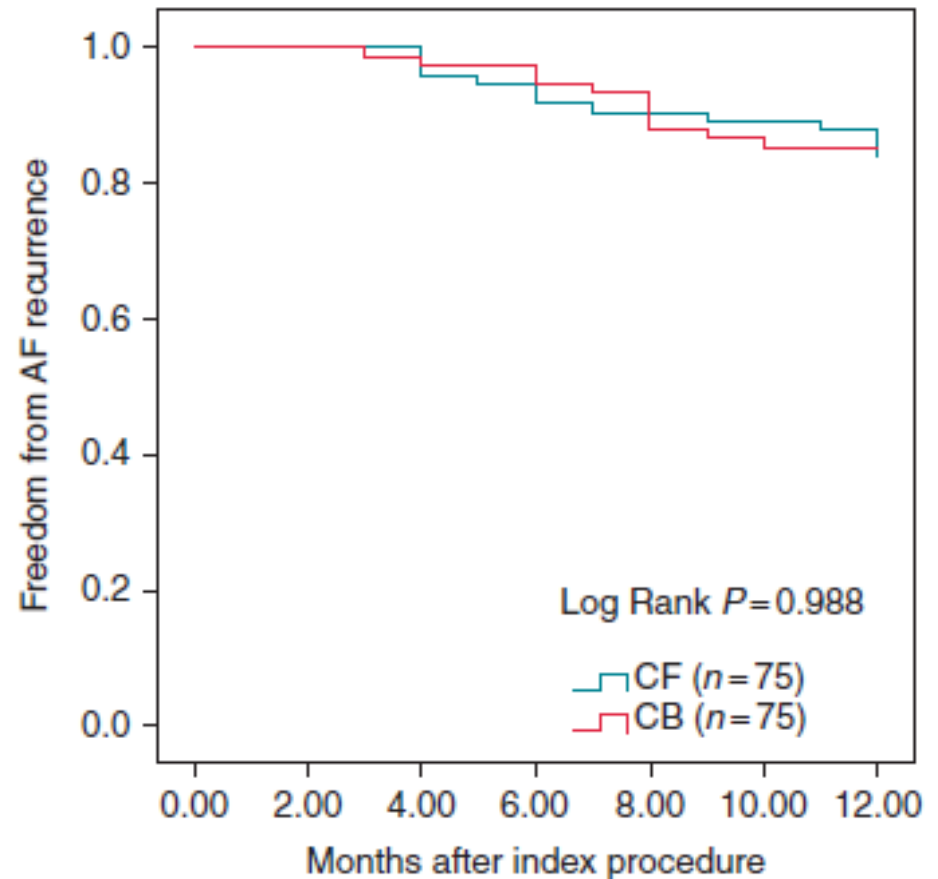
	Overall (n = 150)	CF group (n = 75)	CB group (n = 75)	P
Age, years	61.2 ± 9.9	62.5 ± 8.9	59.9 ± 10.6	0.111
Female gender	25.3% (38)	24.0% (18)	26.7% (20)	0.707
BMI	27.4 ± 4.3	26.5 ± 3.9	28.2 ± 4.6	0.015
AF duration, years	4.1 ± 4.0	4.4 ± 4.1	3.8 ± 4.0	0.321
HF	4.7% (7)	2.7% (2)	6.7% (5)	0.246
HTN	41.3% (62)	48.0% (36)	34.7% (26)	0.097
DM	6.0% (9)	4.0% (3)	8.0% (6)	0.302
Stroke/TIA	7.3% (11)	10.7% (8)	4.0% (3)	0.117
Vascular disease	10.0% (15)	9.3% (7)	10.7% (8)	0.785
CHADS ₂	0.8 ± 0.9	0.9 ± 0.9	0.7 ± 0.9	0.162
CHA ₂ DS ₂ -VASc	1.4 ± 1.3	1.5 ± 1.3	1.3 ± 1.3	0.308



Contact-force guided radiofrequency vs. second-generation balloon cryotherapy for pulmonary vein isolation in patients with paroxysmal atrial fibrillation—a prospective evaluation

Jourda F, Europace 2015

- *Almost 85% SR at 12 months*
- *Our preliminary findings suggest that CF-guided radiofrequency and cryotherapy present very similar performances in the setting of paroxysmal AF catheter ablation*



	3 months	6 months	9 months	12 months
CF	75	69	67	66
CB	74	71	63	62

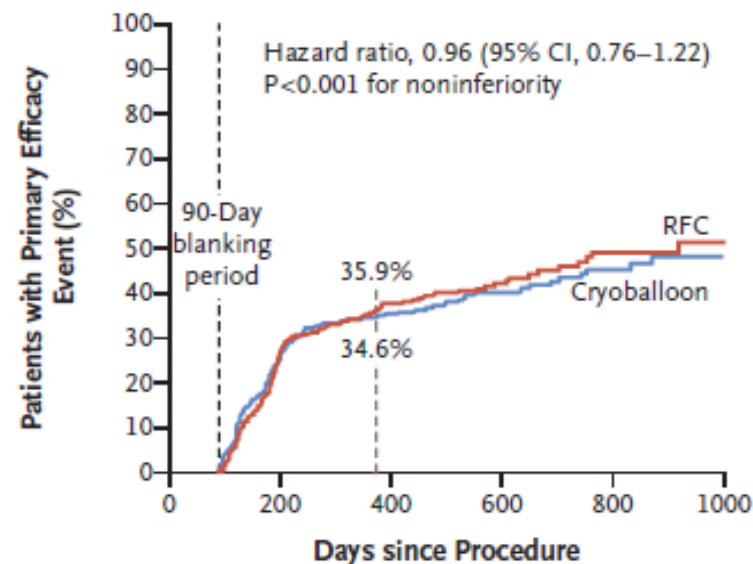
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65% only???

***Standard follow-up
+
Weekly transtelephonic
ECG recording during the
study and ECGs
transmission whenever
symptoms***

A Primary Efficacy End Point



No. at Risk
Cryoballoon
RFC

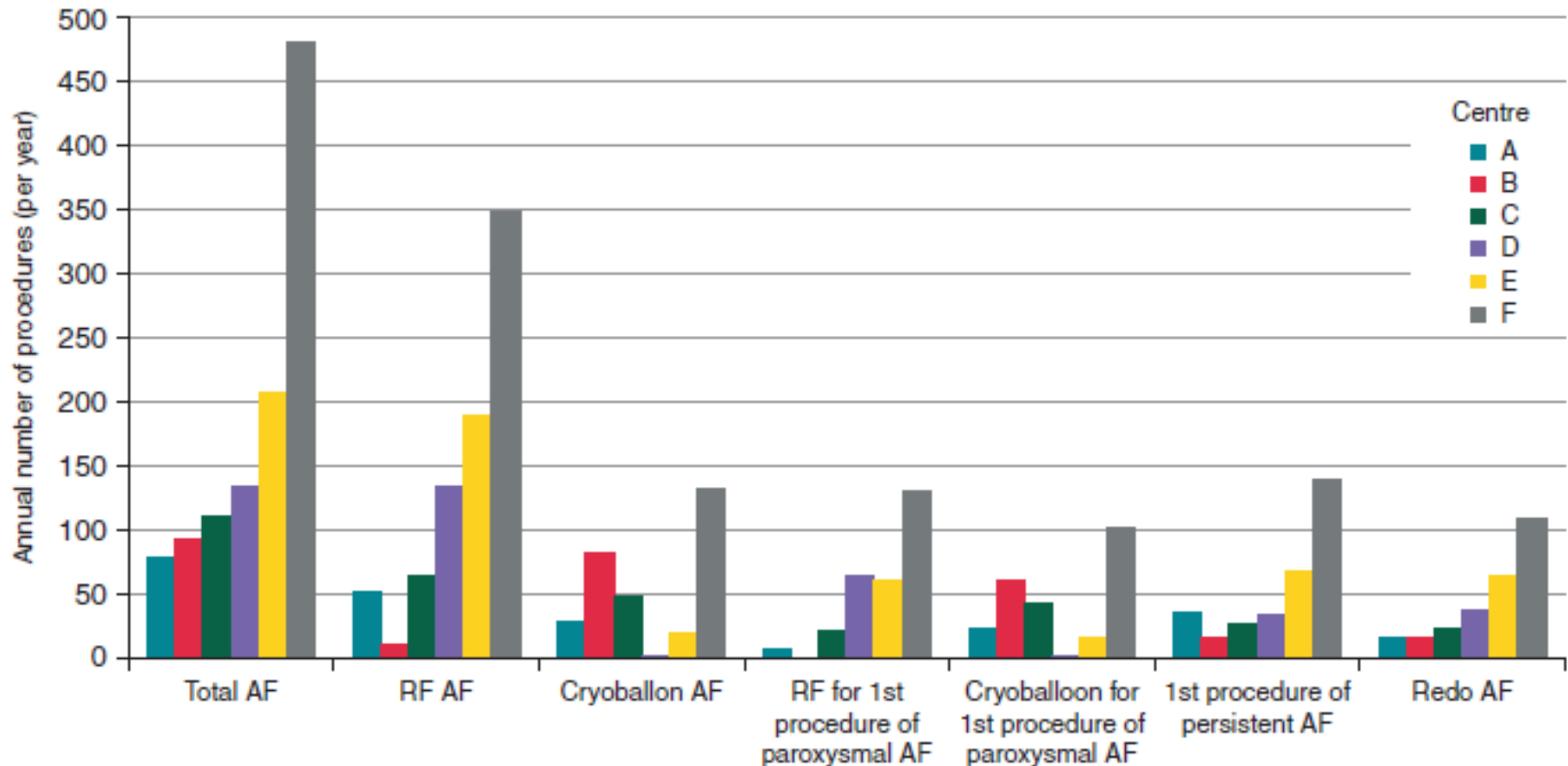
374	338	242	194	165	132	107	70	57	34	12
376	350	243	191	149	118	93	58	44	25	12

Results from a multicentre comparison of cryoballoon vs. radiofrequency ablation for paroxysmal atrial fibrillation: is cryoablation more reproducible?

Europace, 2016

Rui Providencia^{1,2*}, Pascal Defaye³, Pier D. Lambiase², Dominique Pavin⁴, Jean-Pierre Cebron⁵, Franck Halimi⁶, Frédéric Anselme⁷, Neil Srinivasan², Jean-Paul Albenque¹, and Serge Boveda¹

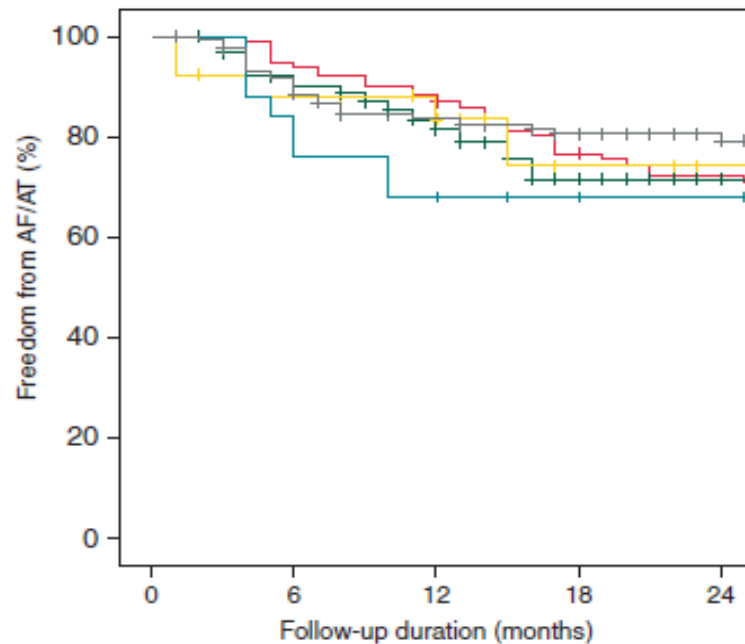
Prospective, multicentre, 860 pts, 467 RF, 393 Cryo, FU 14 months (8-23)



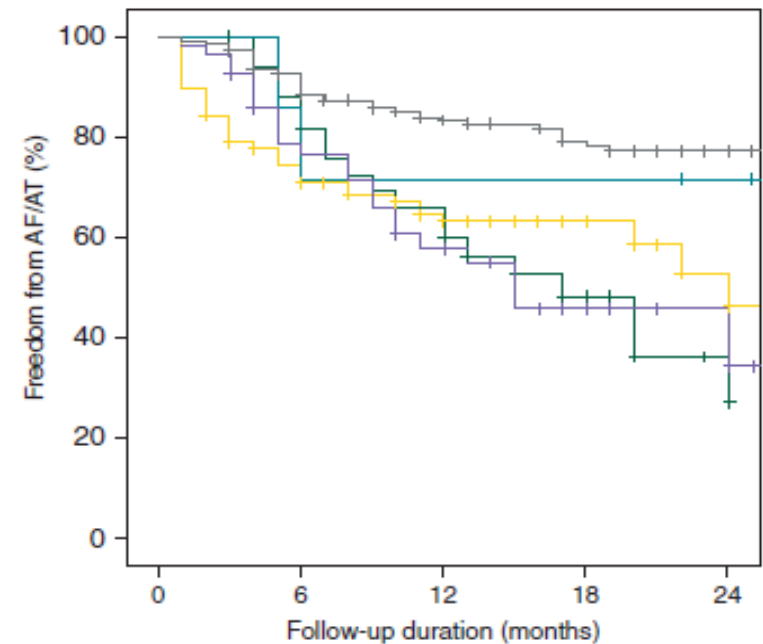
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	0	6	12	18	24
A	25	20	17	15	13
B	100	95	88	67	62
C	72	55	43	15	4
D	0	0	0	0	0
E	26	21	19	4	2
F	170	153	132	89	53



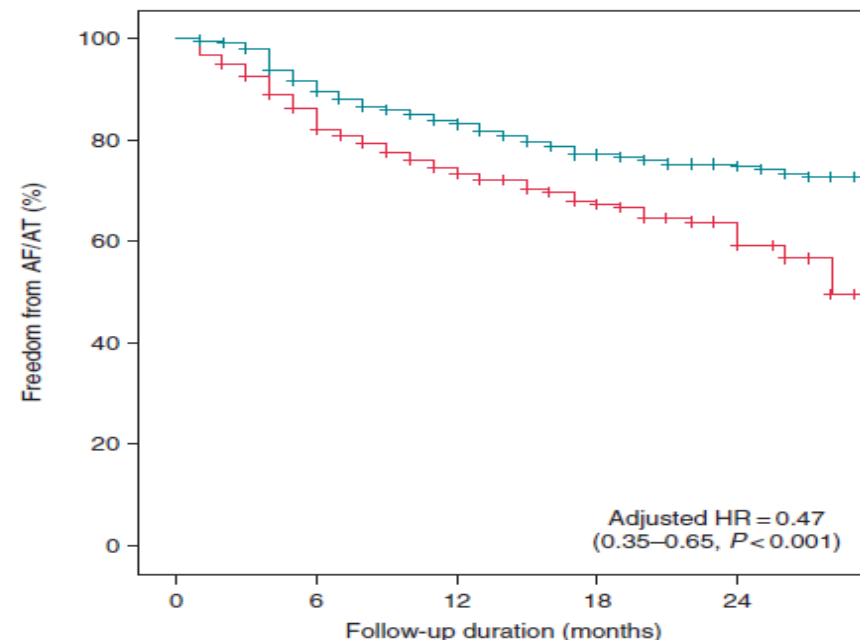
	0	6	12	18	24
7	6	5	5	4	
0	0	0	0	0	0
34	29	21	10	4	
107	33	21	13	8	
100	64	47	16	8	
219	198	139	87	32	

“Cryoballoon seems to be less operator-dependent and more reproducible than RF in the setting of paroxysmal AF ablation”

Results from a multicentre comparison of cryoballoon vs. radiofrequency ablation for paroxysmal atrial fibrillation: is cryoablation more reproducible?

Rui Providencia^{1,2*}, Pascal Defaye³, Pier D. Lambiase², Dominique Pavin⁴, Jean-Pierre Cebron⁵, Franck Halimi⁶, Frédéric Anselme⁷, Neil Srinivasan², Jean-Paul Albenque¹, and Serge Boveda¹

Europace, 2016

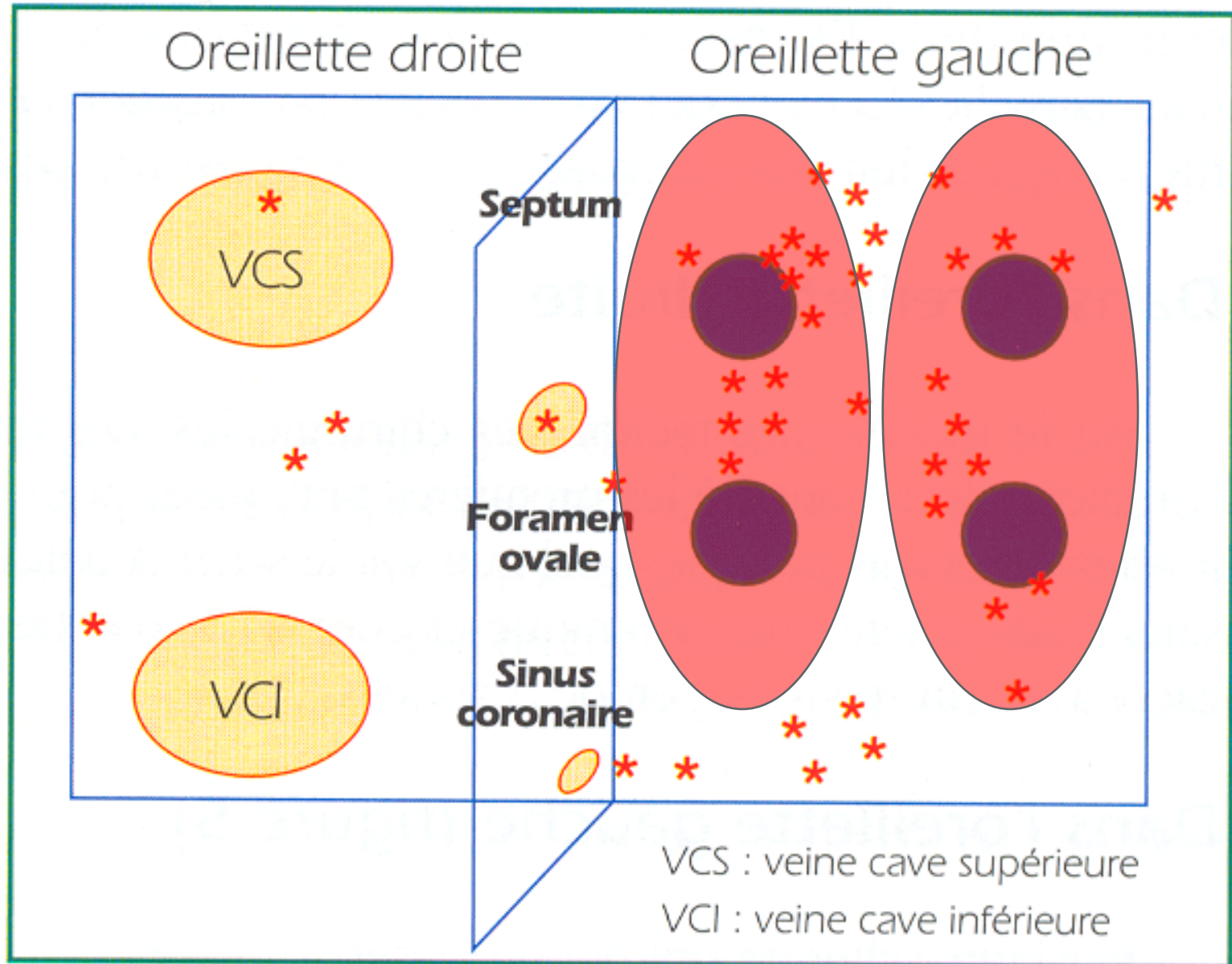


	0	6	12	18	24
RF	467	330	233	131	56
Cryoballoon	393	345	299	190	134

Table 5 Predictors of freedom from AF/atrial tachycardia—global sample

Variable	Univariate Cox regression		Multivariate Cox regression	
	HR (95% CI)	P	HR (95% CI)	P
Age (per year)	1.01 (0.99–1.02)	0.456	—	—
♀	0.99 (0.74–1.32)	0.934	—	—
BMI (per kg/m ²)	0.99 (0.96–1.02)	0.616	—	—
AF duration (per year)	1.02 (0.98–1.06)	0.409	—	—
CHA ₂ DS ₂ -VASc (per point)	0.95 (0.84–1.07)	0.417	—	—
HAS-BLED (per point)	0.98 (0.79–1.21)	0.835	—	—
LA dilation	1.06 (0.80–1.39)	0.698	—	—
LVEF <50%	0.85 (0.42–1.73)	0.660	—	—
Per 100 AF Abl/year	0.87 (0.81–0.94)	<0.001	0.87 (0.80–0.96)	0.003
Use of CF-sensing catheter	0.53 (0.33–0.86)	0.010	0.52 (0.29–0.90)	0.020
Use of Cryoballoon	0.59 (0.45–0.78)	0.003	0.47 (0.35–0.65)	<0.001
Class I or III AADs at discharge	1.37 (1.04–1.80)	0.027	—	—
Relapse during blanking	4.59 (3.42–6.17)	<0.001	4.52 (3.35–6.10)	<0.001

Why still so much recurrences ?



Take Home Message

- ***2 very efficient techniques: Cryo and RF***
- ***With similar short-term results and outcomes***
- ***Acute success rate is about 100%***
- ***Long-term success rate is... more difficult to evaluate***
- ***Clinical success rate is between 65 and 80% at 12 months for both... in big volume centres...***

