AF Ablation: How can we do better?

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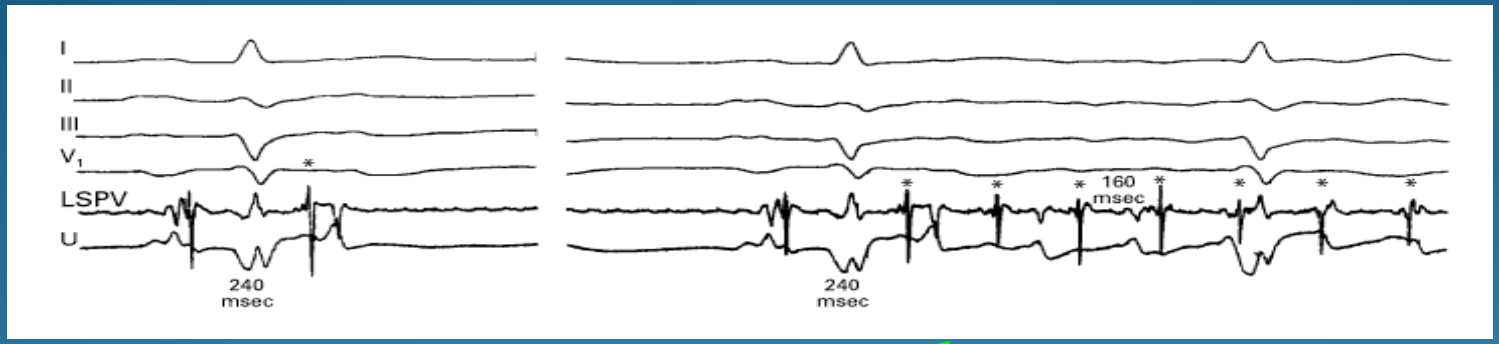
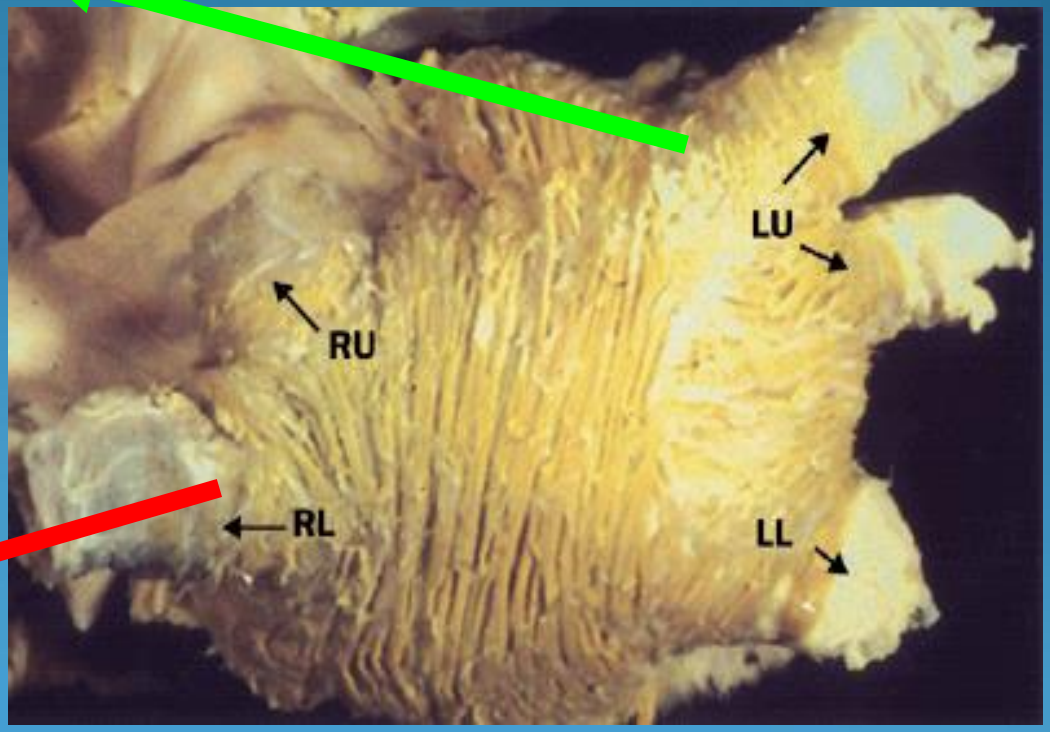
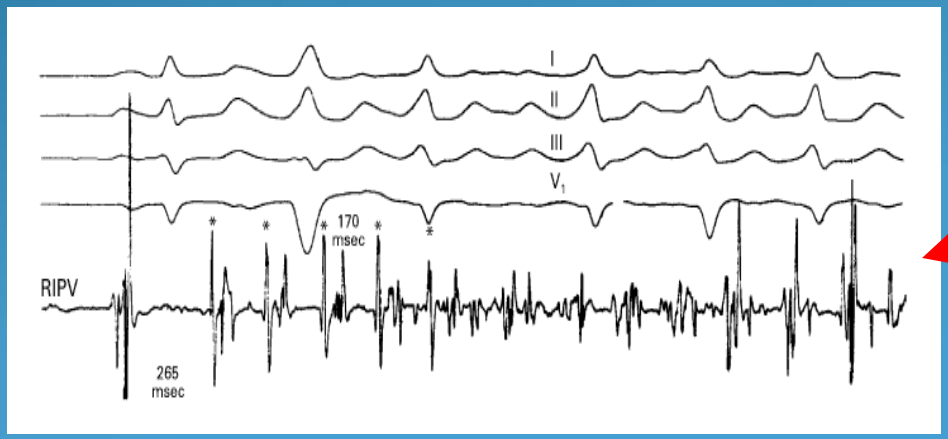
Specialist in Cardiology

Trigger for AF

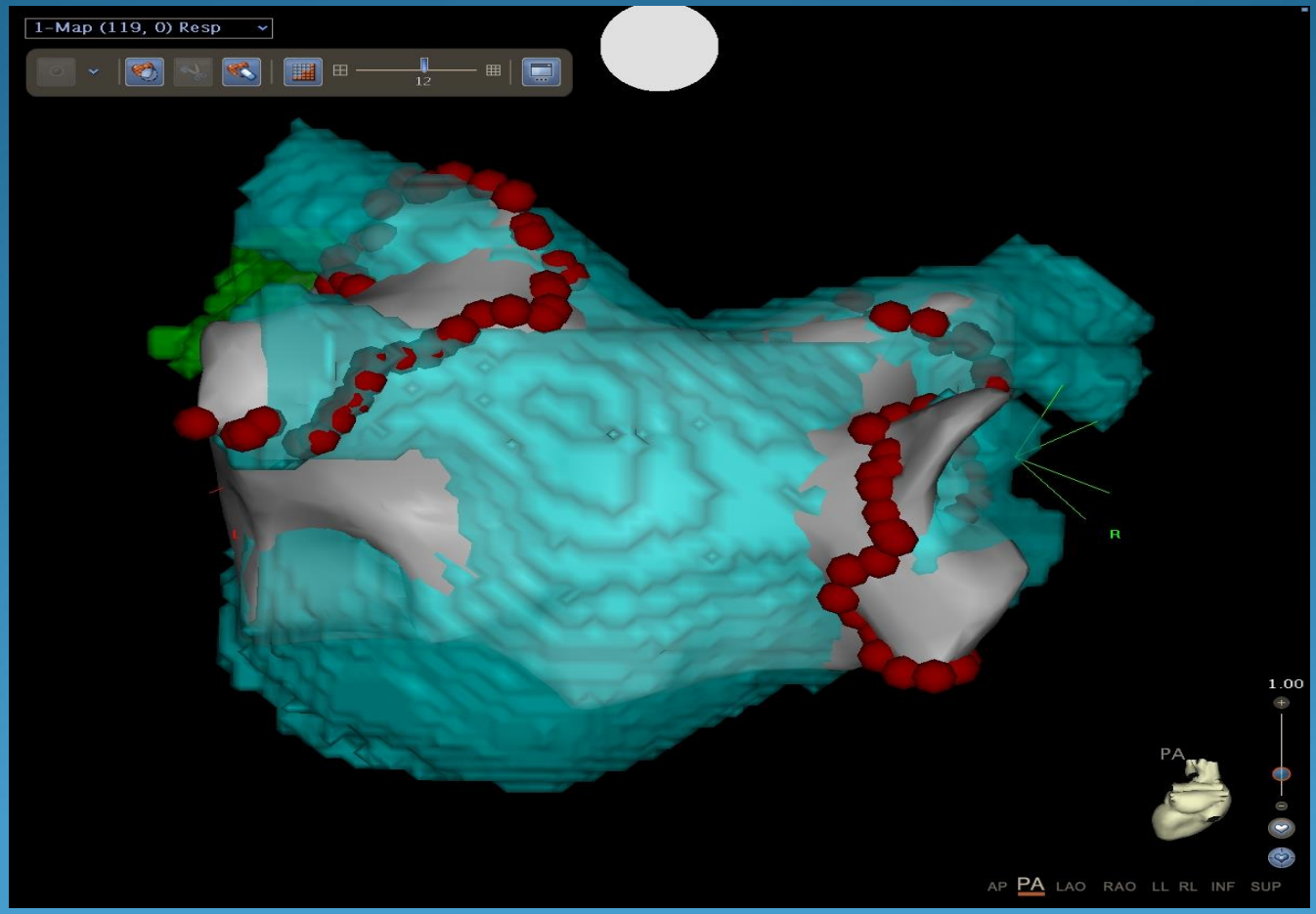






Haissaguerre et al N Engl J Med. 1998;339:659–666.

Pulmonary Vein Isolation for PAF



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Online article and related content current as of May 3, 2010.

Comparison of Antiarrhythmic Drug Therapy and Radiofrequency Catheter Ablation in Patients With Paroxysmal Atrial Fibrillation: A Randomized Controlled Trial

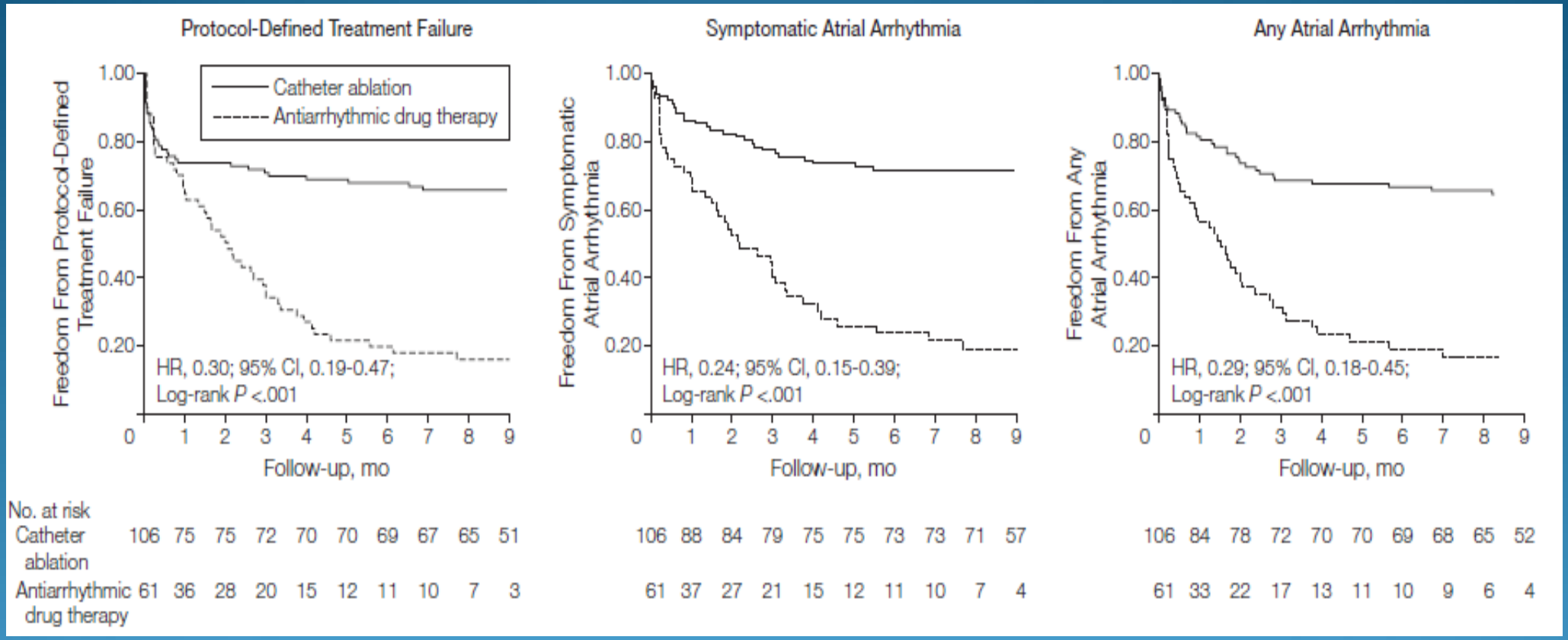
David J. Wilber; Carlo Pappone; Petr Neuzil; et al.

JAMA. 2010;303(4):333-340 (doi:10.1001/jama.2009.2029)
http://jama.ama-assn.org/cgi/content/full/303/4/333

Table 1. Baseline Patient Characteristics[a]

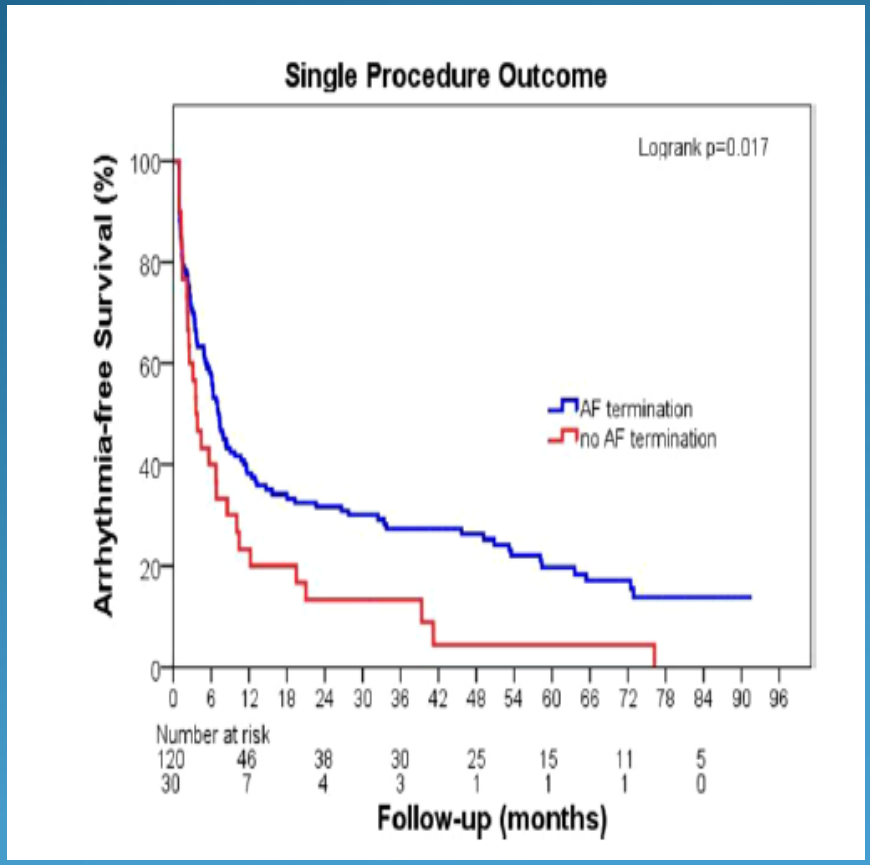
Characteristics	Catheter Ablation	Antiarrhythmic Drug Therapy	*P* Value[b]
Demographics	(n = 106)	(n = 61)	
Age, mean (SD), y	55.5 (53.7-57.3)	56.1 (52.9-59.4)	.72
Sex, male	73 (68.9)	38 (62)	.40
Patient history	(n = 105)	(n = 60)	
AF duration, median (IQR), y	5.4 (4.3-6.5)	6.2 (4.6-7.9)	.43[c]
Hypertension	51 (48.6)	30 (50)	.87
Diabetes	10 (9.5)	7 (12)	.79
Structural heart disease	10 (9.5)	9 (15)	.32
Cerebrovascular accident/TIA	2 (1.9)	3 (5)	.35
Prior thromboembolic events	2 (1.9)	2 (3)	.62
NYHA class	(n = 93)	(n = 58)	
I	81 (87)	50 (86)	>.99
II	12 (13)	8 (14)	
LVEF, mean (SD), %	62.3 (60.4-64.3) (n = 99)	62.7 (60.7-64.7) (n = 56)	.79
Left atrial dimension, mean (SD), mm	40.0 (38.9-41.1) (n = 100)	40.5 (39.0-41.9) (n = 54)	.62
Prior antiarrhythmic drug failures	(n = 105)	(n = 60)	
Sotalol	36 (34.3)	22 (37)	.87
Dofetelide	3 (2.9)	1 (2)	>.99
Propafenone	53 (50.5)	30 (50)	>.99
Flecainide	33 (31.4)	13 (22)	.21
Amiodarone	7 (6.7)	6 (10)	.55
Failed antiarrhythmic drug class	(n = 106)	(n = 61)	
I/III at baseline, mean (95% CI)	1.3 (1.1-1.5)	1.2 (1.0-1.4)	.93[c]
II/IV only	20 (18.9)	7 (11)	.28
Baseline QOL scores, mean (95% CI)			
Mental Component Summary	44.5 (42.2-46.7) (n = 97)	44.0 (40.7-47.3) (n = 53)	.79
Physical Component Summary	46.1 (44.4-47.8) (n = 97)	47.6 (45.3-50.0) (n = 53)	.29
Symptom Frequency Score	20.7 (18.9-22.6) (n = 94)	18.6 (16.2-21.1) (n = 51)	.18
Symptom Severity Score	17.1 (15.5-18.7) (n = 76)	16.0 (13.7-18.4) (n = 44)	.44

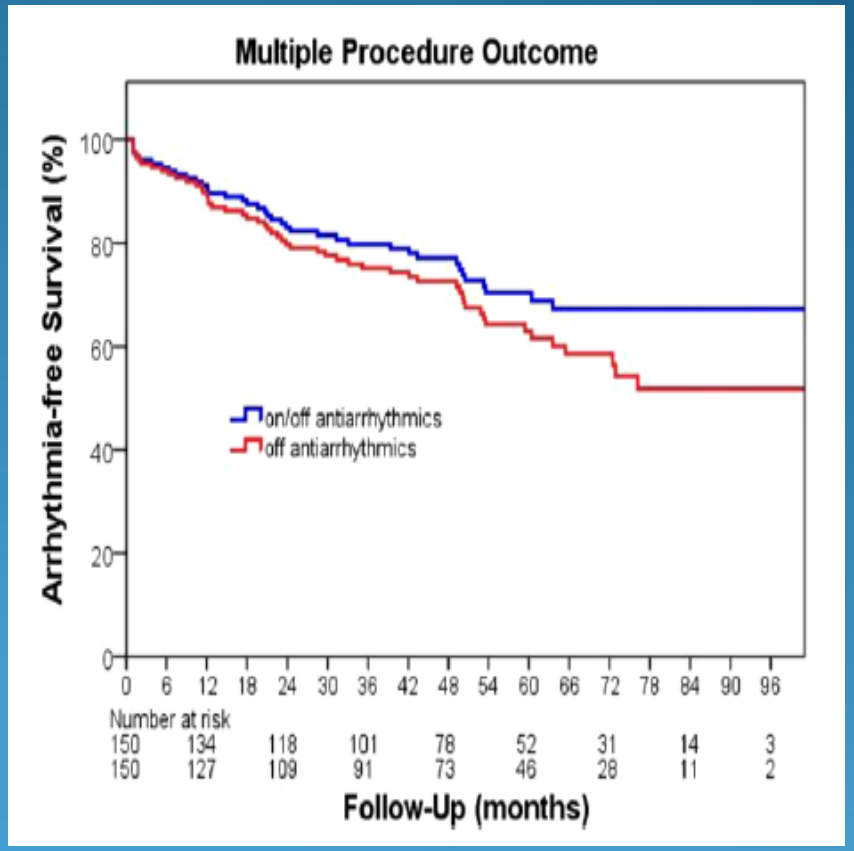
Results


Protocol-Defined Treatment Failure
Freedom From Protocol-Defined Treatment Failure
1.00
0.80
0.60
0.40
0.20
Catheter ablation
Antiarrhythmic drug therapy
HR, 0.30; 95% CI, 0.19-0.47;
Log-rank P <.001
0 1 2 3 4 5 6 7 8 9
Follow-up, mo
Symptomatic Atrial Arrhythmia
Freedom From Symptomatic Atrial Arrhythmia
1.00
0.80
0.60
0.40
0.20
HR, 0.24; 95% CI, 0.15-0.39;
Log-rank P <.001
0 1 2 3 4 5 6 7 8 9
Follow-up, mo
Any Atrial Arrhythmia
Freedom From Any Atrial Arrhythmia
1.00
0.80
0.60
0.40
0.20
HR, 0.29; 95% CI, 0.18-0.45;
Log-rank P <.001
0 1 2 3 4 5 6 7 8 9
Follow-up, mo
No. at risk
Catheter ablation 106 75 75 72 70 70 69 67 65 51
Antiarrhythmic drug therapy 61 36 28 20 15 12 11 10 7 3
106 88 84 79 75 75 73 73 71 57
61 37 27 21 15 12 11 10 7 4
106 84 78 72 70 70 69 68 65 52
61 33 22 17 13 11 10 9 6 4

Five-Year Outcome of Catheter Ablation of Persistent Atrial Fibrillation Using Termination of Atrial Fibrillation as a Procedural Endpoint

Daniel Scherr, MD; Paul Khairy, MD, PhD; Shinsuke Miyazaki, MD; Valerie Aurillac-Lavignolle, BSc; Patrizio Pascale, MD; Stephen B. Wilton, MD; Khaled Ramoul, MD; Yuki Komatsu, MD; Laurent Roten, MD; Amir Jadidi, MD; Nick Linton, MD, PhD; Michala Pedersen, MD; Matthew Daly, MD; Mark O'Neill, MD; Sebastien Knecht, MD, PhD; Rukshen Weerasooriya, MD; Thomas Rostock, MD; Martin Manninger, MD; Hubert Cochet, MD; Ashok J. Shah, MD; Sunthareth Yeim, MD; Arnaud Denis, MD; Nicolas Derval, MD; Meleze Hocini, MD; Frederic Sacher, MD; Michel Haissaguerre, MD; Pierre Jais, MD





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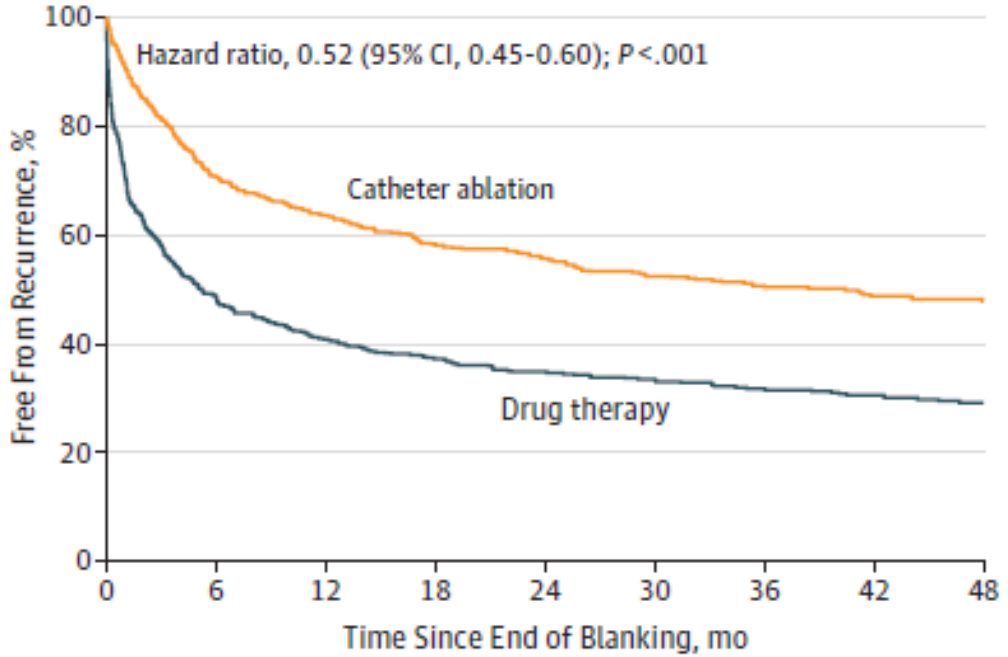
Effect of Catheter Ablation vs Antiarrhythmic Drug Therapy on Mortality, Stroke, Bleeding, and Cardiac Arrest Among Patients With Atrial Fibrillation

The CABANA Randomized Clinical Trial

Figure 6. Recurrent Atrial Fibrillation After Blanking by Intention-to-Treat Analysis



No. at risk									
Drug therapy	629	304	252	212	181	157	131	115	94
Catheter ablation	611	432	381	328	291	241	201	163	134

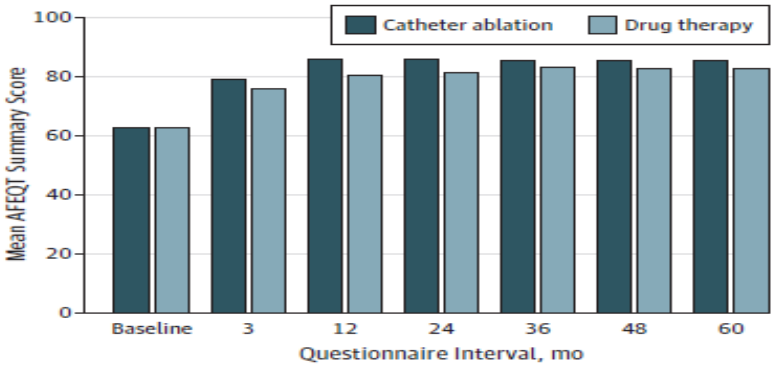
JAMA | Original Investigation

Effect of Catheter Ablation vs Medical Therapy on Quality of Life Among Patients With Atrial Fibrillation

The CABANA Randomized Clinical Trial

Figure 2. Atrial Fibrillation Effect on Quality of Life (AFEQT) Summary Scores

A Mean AFEQT summary score



B Between-group AFEQT summary score difference

Interval, mo	No. of Patients Ablation (n = 1108)	No. of Patients Drug Rx (n = 1096)	Adjusted Mean Difference (95% CI)
Baseline	1084	1078	−0.2 (−1.9 to 1.5)
3	971	983	3.0 (1.3 to 4.7)
12	915	903	5.3 (3.7 to 6.9
24	856	798	4.3 (2.7 to 6.0)
36	645	605	2.5 (0.8 to 4.1)
48	476	473	3.0 (1.1 to 4.9)
60	329	320	2.6 (0.3 to 4.8)
All	4192	4082	3.4 (2.1 to 4.8)

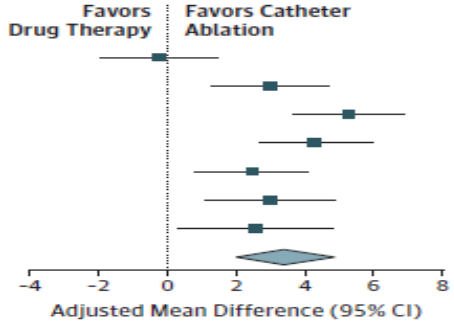
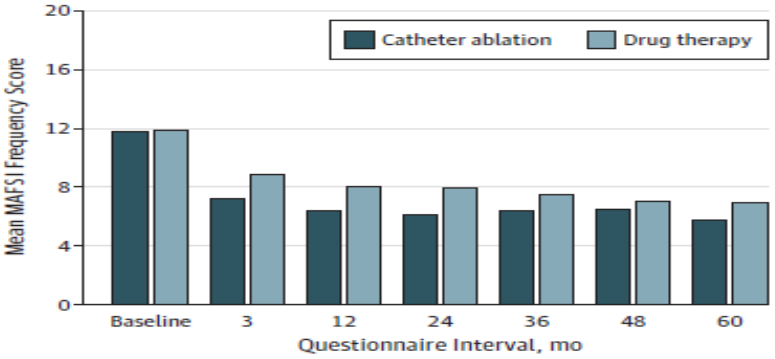


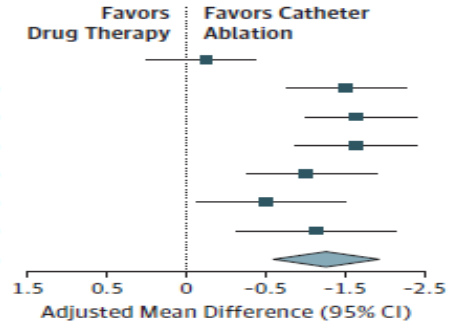
Figure 3. Mayo Atrial Fibrillation–Specific Symptom Inventory (MAFSI) Frequency Scores

A Mean MAFSI frequency score



B Between-group MAFSI frequency score difference

Interval, mo	No. of Patients Ablation (n = 1108)	No. of Patients Drug Rx (n = 1096)	Adjusted Mean Difference (95% CI)
Baseline	1069	1061	−0.2 (−0.7 to 0.4)
3	897	894	−1.6 (−2.2 to −1.0)
12	828	831	−1.7 (−2.3 to −1.2)
24	759	724	−1.7 (−2.3 to −1.1)
36	571	559	−1.2 (−1.9 to −0.6)
48	424	419	−0.8 (−1.6 to −0.1)
60	279	295	−1.3 (−2.1 to −0.5)
All	3758	3722	−1.4 (−1.9 to −0.9)



Potential Reasons for Recurrence

- **Disease is too advanced (persistent VS paroxysmal)**
- **PV reconnection**
- **Non-PV trigger**
- **AF Risk Factors control (HT, Obesity….)**

How can we do better?

- **Better Patient Selection**
- **Better way to create sustained PV isolation**
- Search non-PV trigger
- Optimal risk factors control

Radiofrequency Ablation of Persistent Atrial Fibrillation

Diagnosis-to-Ablation Time, Markers of Pathways of Atrial Remodeling, and Outcomes

Ayman A. Hussein, MD; Walid I. Saliba, MD; Amr Barakat, MD;
Mohammed Bassiouny, MD; Mohammed Chamsi-Pasha, MD; Rasha Al-Bawardy, MD;

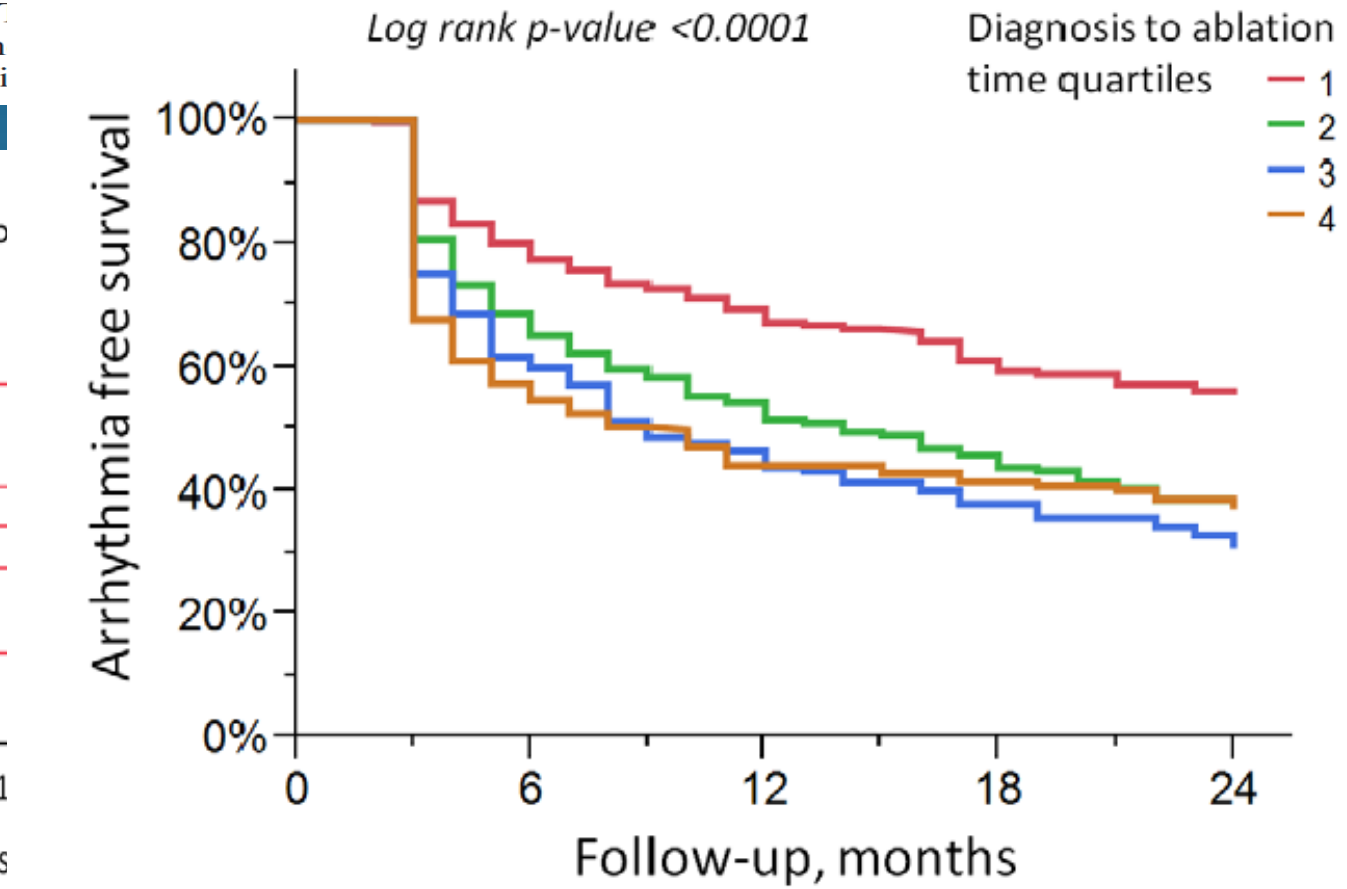
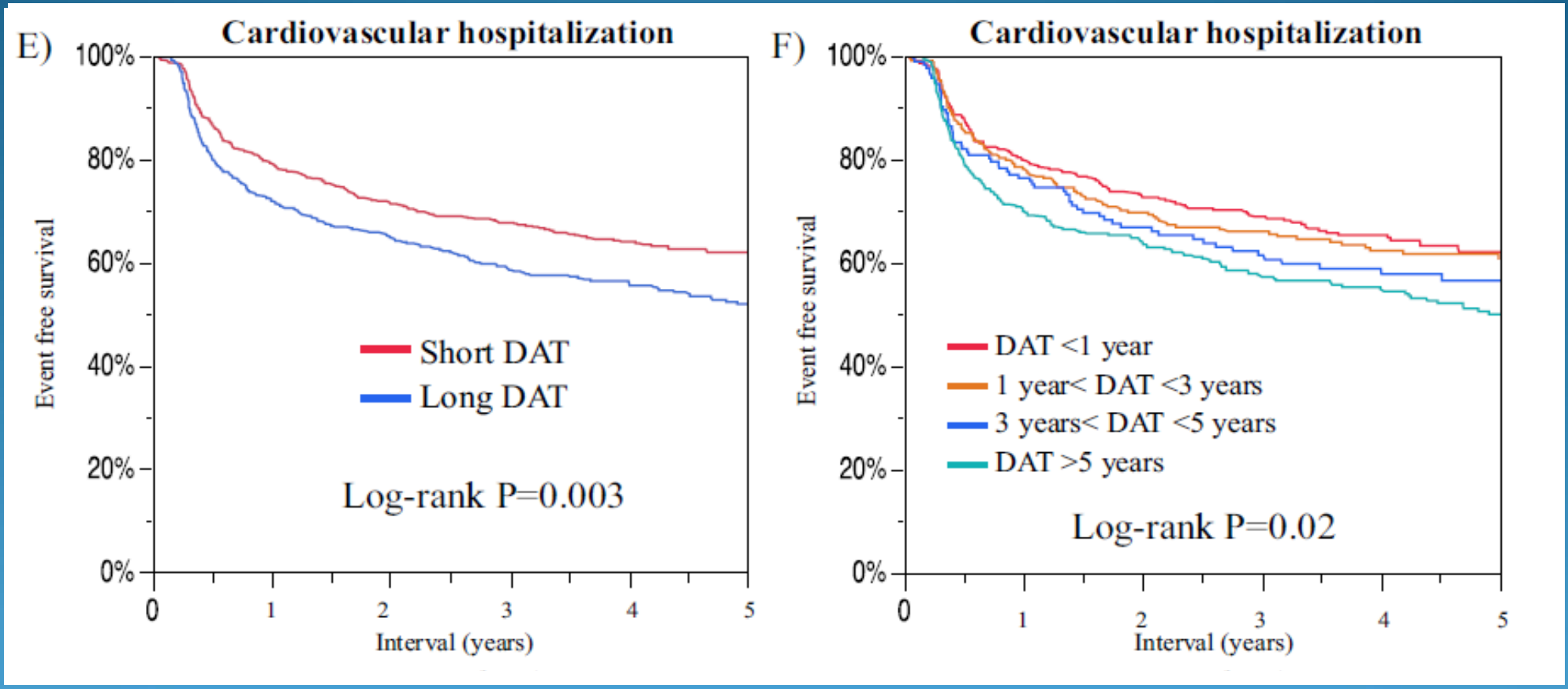


Figure 2. Kaplan–Meier curves presenting success of ablation of persistent atrial fibrillation as a function of the quartiles of the time interval between the very first diagnosis and the ablation procedure.

Early choice for catheter ablation reduced readmission in management of atrial fibrillation: Impact of diagnosis-to-ablation time

Tetsuma Kawaji [a,b], Satoshi Shizuta [b,*], Shintaro Yamagami [b], Takanori Aizawa [b], Akihiro Komasa [b], Takashi Yoshizawa [a], Masashi Kato [a], Takafumi Yokomatsu [a], Shinji Miki [a], Koh Ono [b], Takeshi Kimura [b]

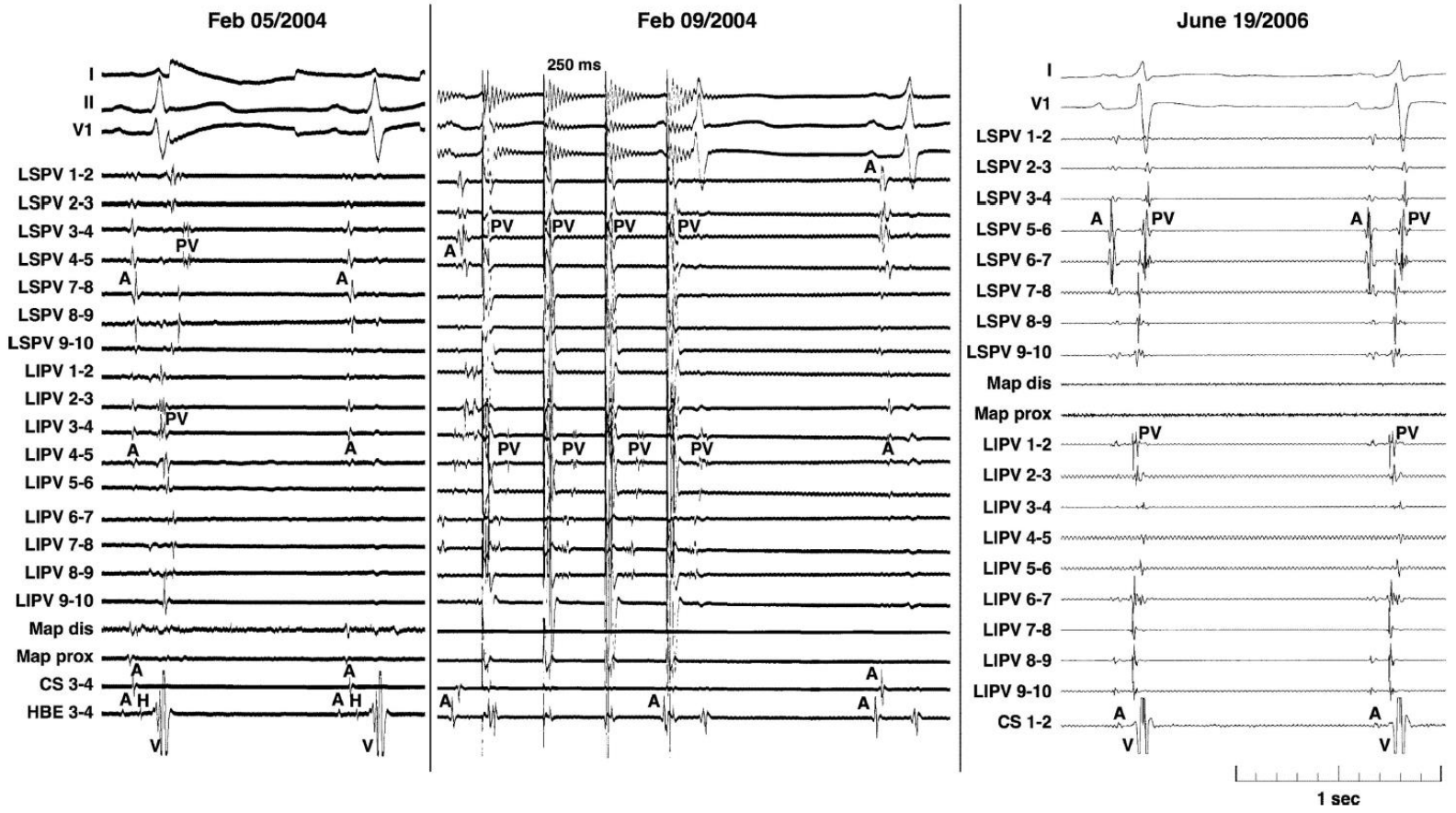
[a] *Department of Cardiology, Mitsubishi Kyoto Hospital, Japan*
[b] *Department of Cardiovascular Medicine, Graduate School of Medicine, Kyoto University, Japan*



Long-Term Results of Catheter Ablation in Paroxysmal Atrial Fibrillation : Lessons From a 5-Year Follow-Up

Feifan Ouyang, Roland Tilz, Julian Chun, Boris Schmidt, Erik Wissner, Thomas Zerm, Kars Neven, Bulent Köktürk, Melanie Konstantinidou, Andreas Metzner, Alexander Fuernkranz and Karl-Heinz Kuck

PV re-connection



How to achieve sustained PV isolation?

- **Catheter Stability**
- **Transmural and continuous lesions**
- **HAS TO WAIT and medication provocation**

General anesthesia reduces the prevalence of pulmonary vein reconnection during repeat ablation when compared with conscious sedation: Results from a randomized study

Luigi Di Biase, MD, PhD,*†‡ Sergio Conti, MD,*§ Prasant Mohanty, MBBS, MPH,* Rong Bai, MD,* Javier Sanchez, MD,* David Walton, MD,‖ Annie John, MD,‖ Pasquale Santangeli, MD,¶ Claude S. Elayi, MD,# Salwa Beheiry, RN,** G. Joseph Gallinghouse, MD,* Sanghamitra Mohanty, MD,* Rodney Horton, MD,* Shane Bailey, MD,* J. David Burkhardt, MD, FHRS,* Andrea Natale, MD, FHRS, FACC, FESC*†

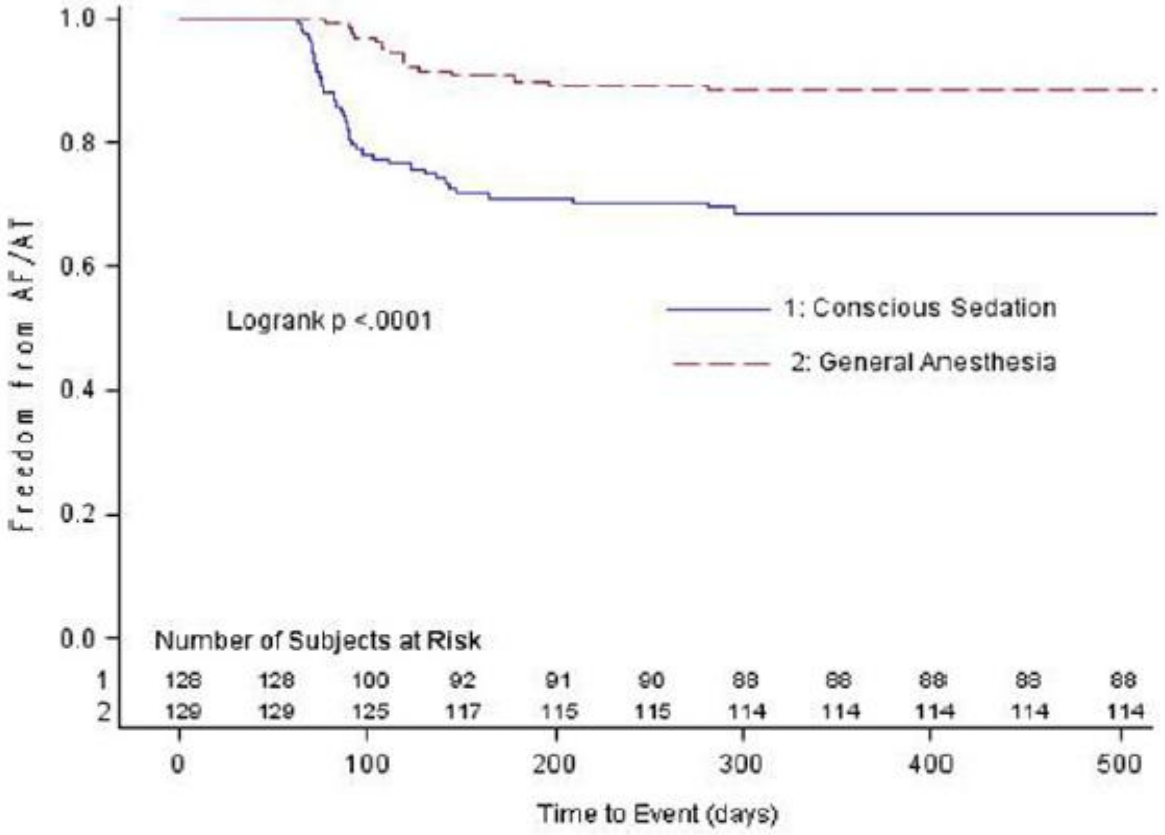
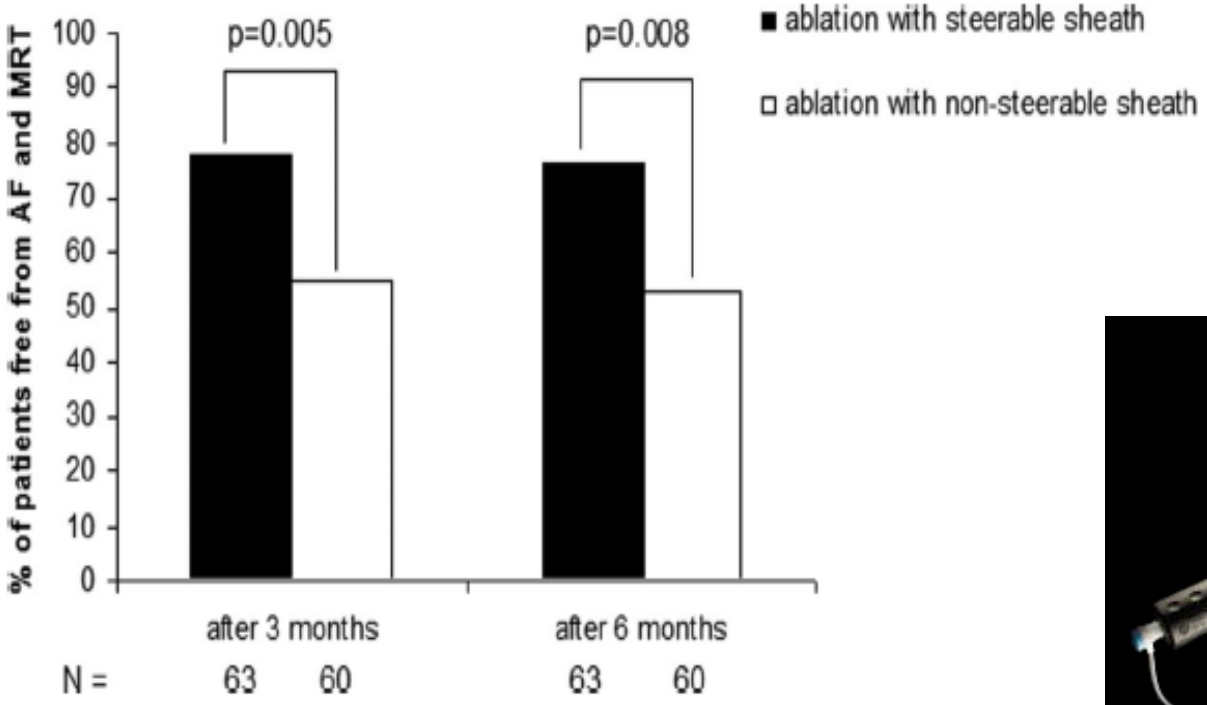


Figure 1 Kaplan-Meier curves showing cumulative probability of AF-free survival according to anesthesia type after a single procedure without AADs. AAD = antiarrhythmic drug; AF = atrial fibrillation; AT = atrial tachycardia.

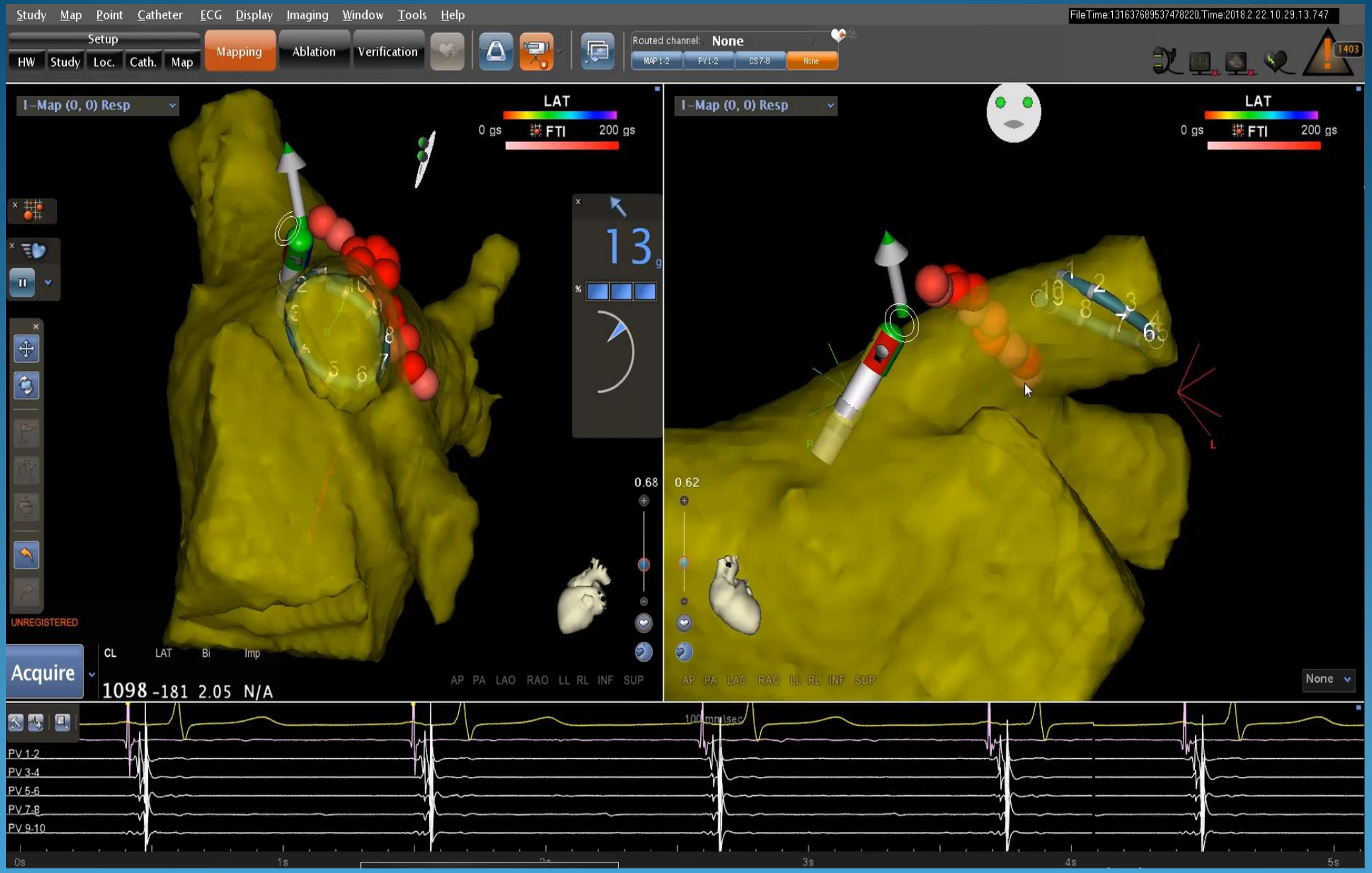
Steerable Versus Nonsteerable Sheath Technology in Atrial Fibrillation Ablation

A Prospective, Randomized Study

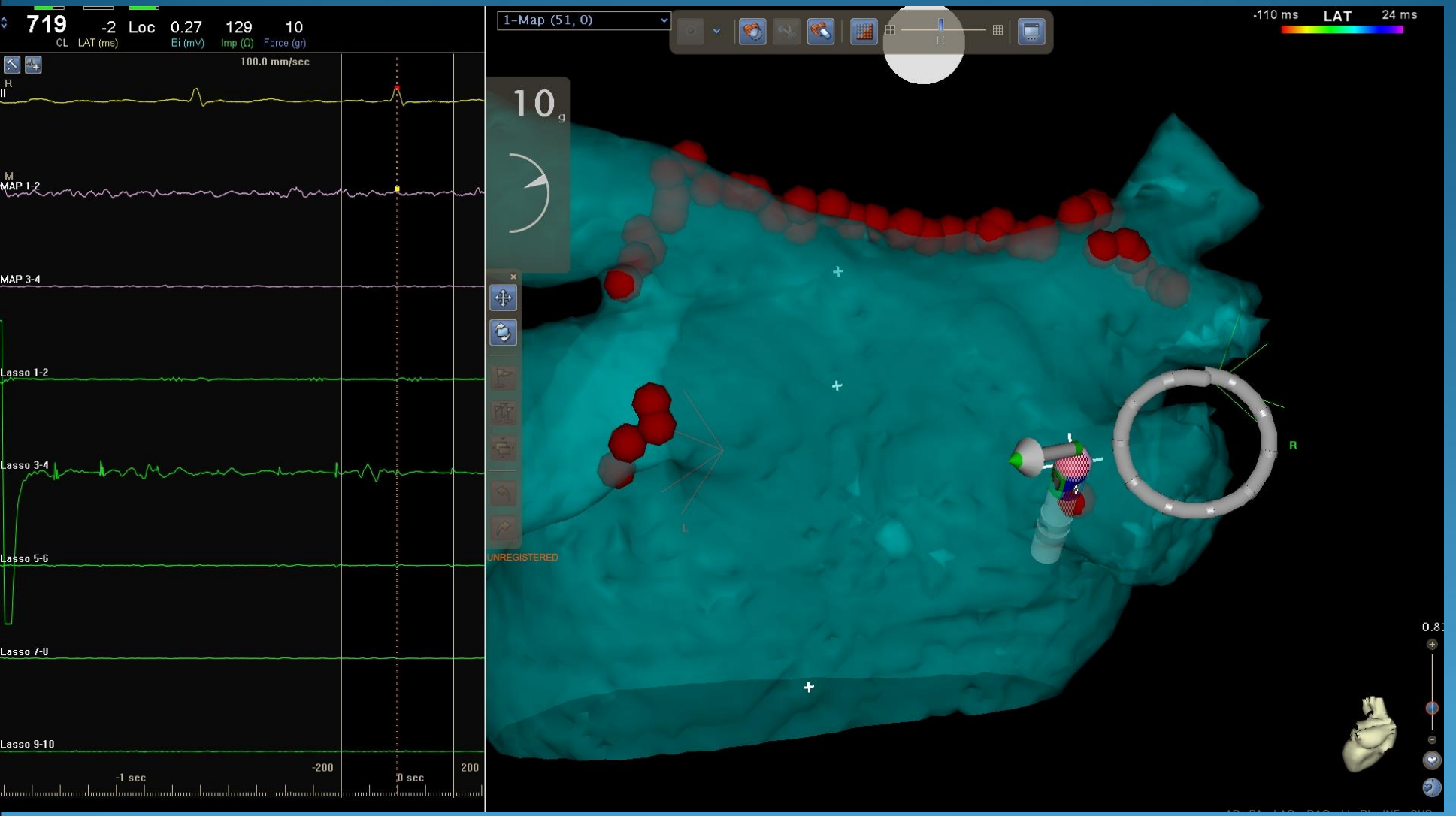
Christopher Piorkowski, MD*; Charlotte Eitel, MD*; Sascha Rolf, MD; Kerstin Bode, MD; Philipp Sommer, MD; Thomas Gaspar, MD; Simon Kircher, MD; Ulrike Wetzel, MD; Abdul Shokor Parwani, MD; Leif-Hendrik Boldt, MD; Meinhard Mende, PhD; Andreas Bollmann, MD, PhD; Daniela Husser, MD; Nikolaos Dagres, MD; Masahiro Esato, MD; Arash Arya, MD; Wilhelm Haverkamp, MD; Gerhard Hindricks, MD



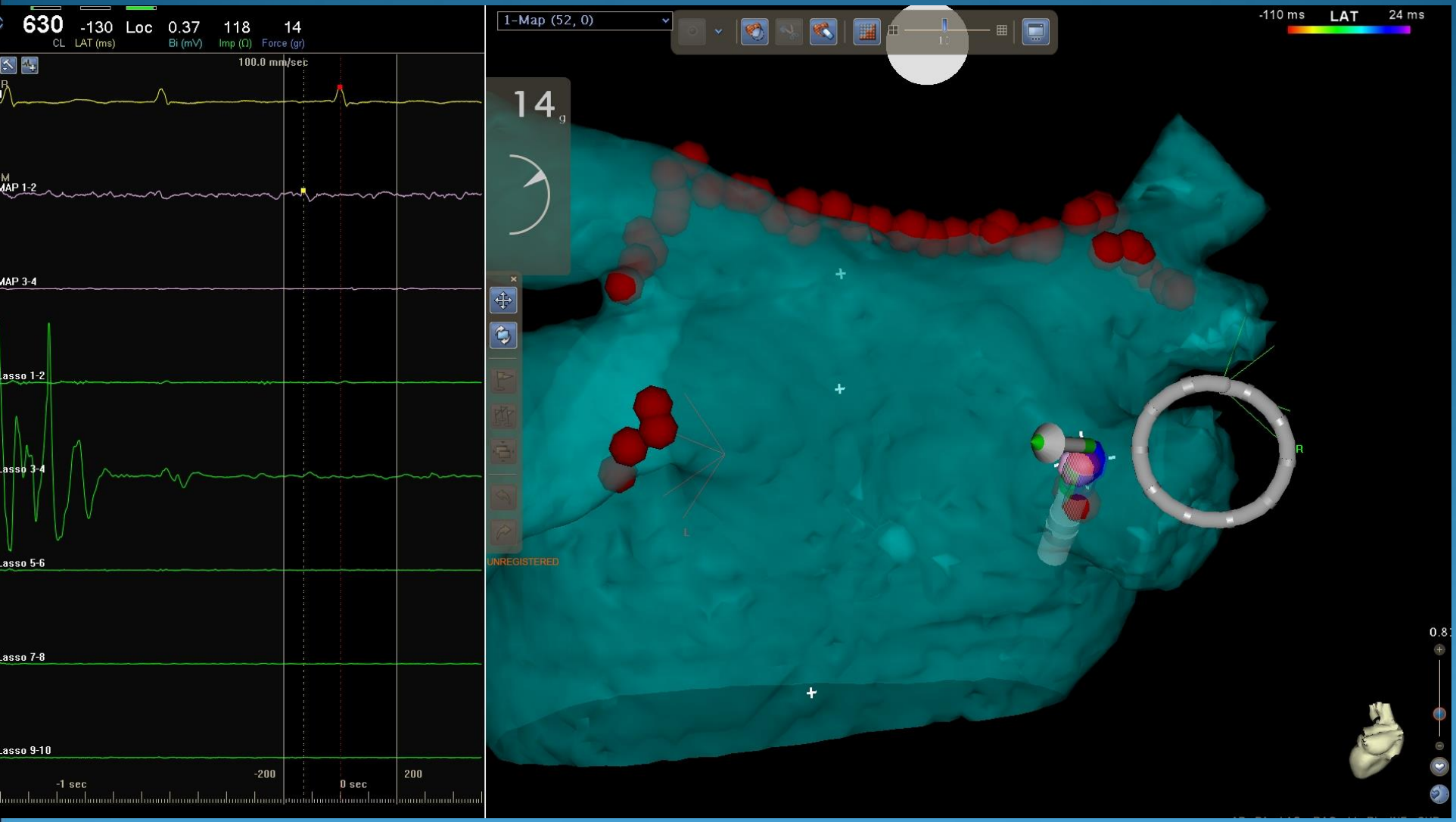
Contact Force



With low contact force, Lasso 3-4
Signal remains unchanged

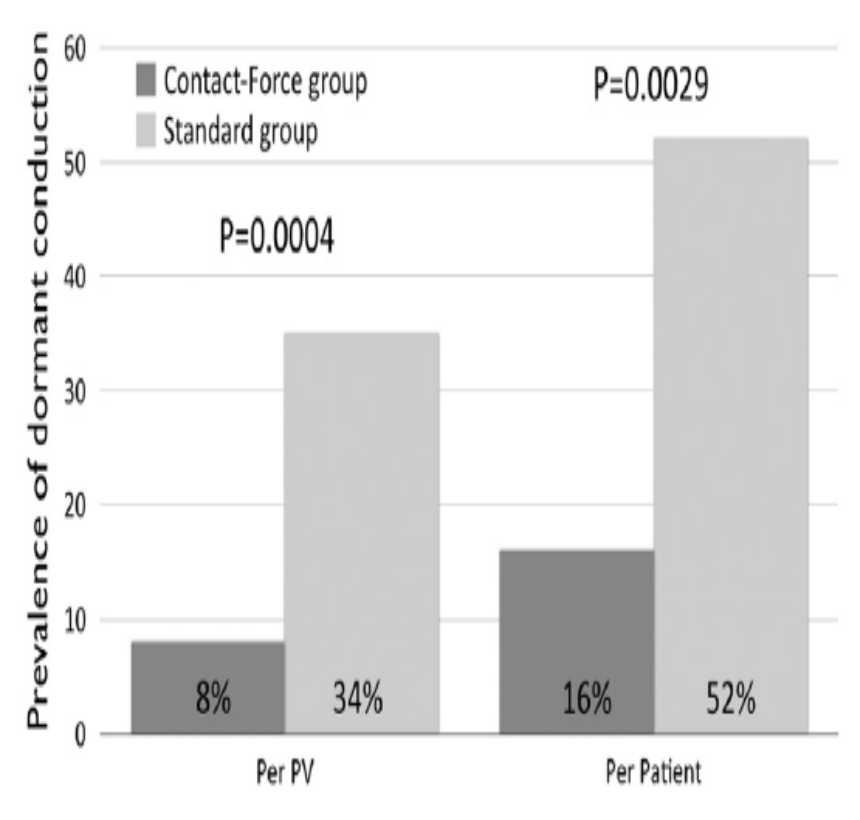


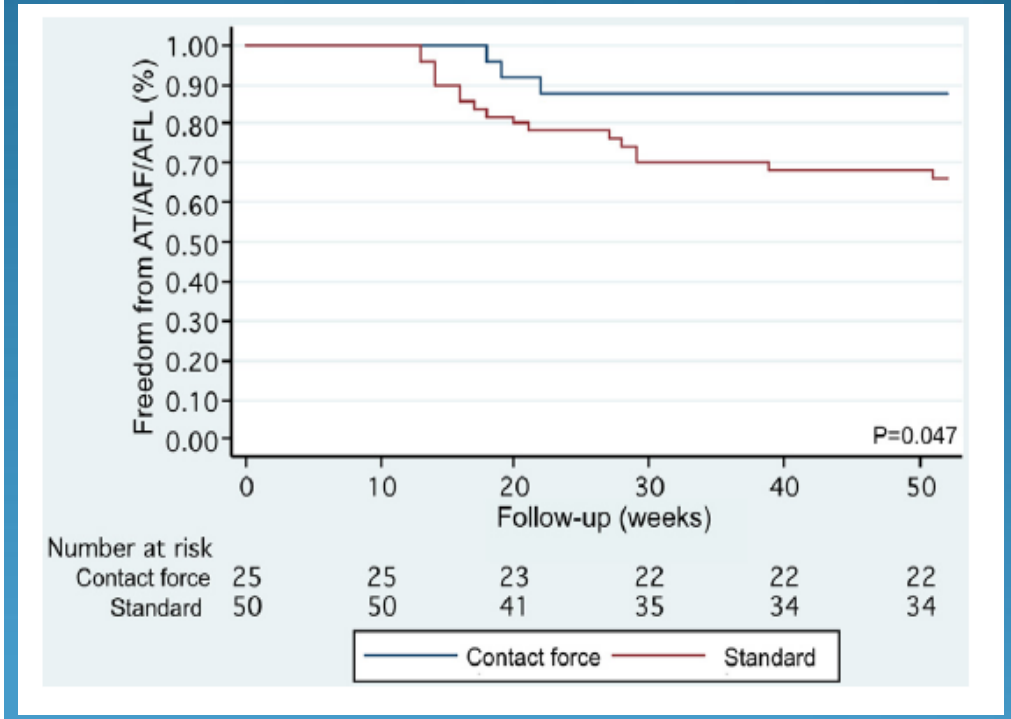
With better contact force in same position



Pulmonary vein isolation using "contact force" ablation: The effect on dormant conduction and long-term freedom from recurrent atrial fibrillation—A prospective study

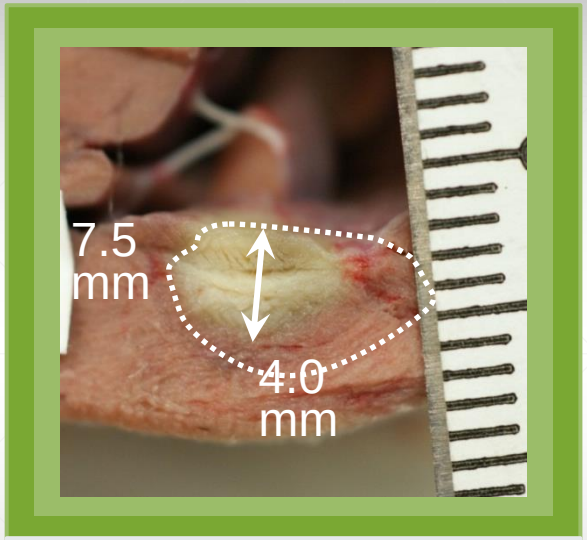
Jason G. Andrade, MD,[*†] George Monir, MD,[‡] Scott J. Pollak, MD,[‡] Paul Khairy, MD, PhD,[*] Marc Dubuc, MD, FHRS,[*] Denis Roy, MD, FHRS,[*] Mario Talajic, MD, FHRS,[*] Marc Deyell, MD, MSc,[†] Léna Rivard, MD,[*] Bernard Thibault, MD, FHRS,[*] Peter G. Guerra, MD,[*] Stanley Nattel, MD,[*] Laurent Macle, MD[*]



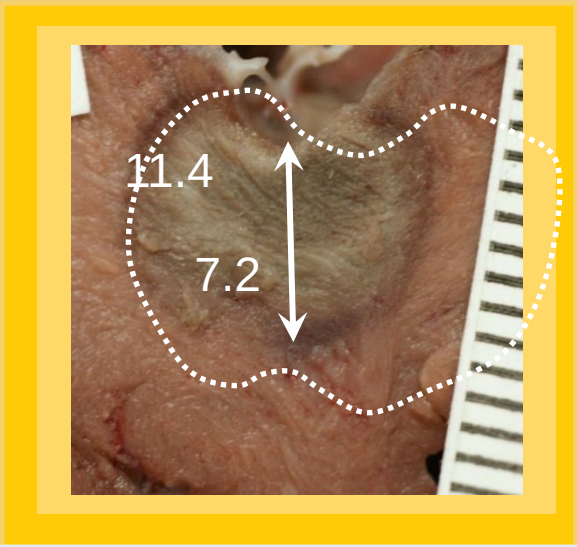


Demo Lesions

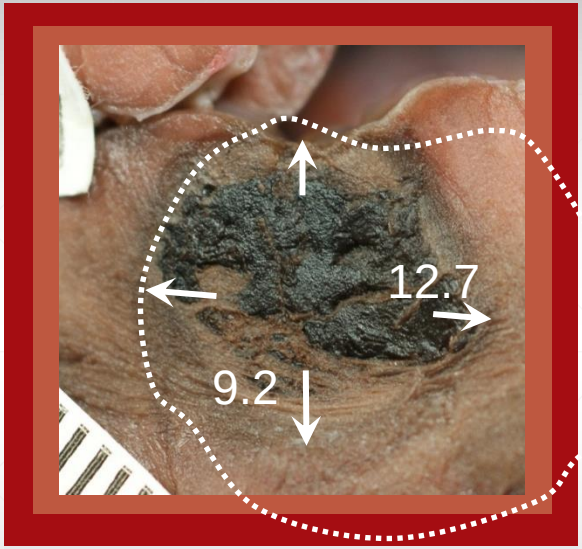
Relationship Between FPTI and RF Lesion Size



FPTI 16,905
(49g, 23W, 15s)



FPTI 62,160
(28g, 37W, 60s)



FPTI 93,240
(42g, 37W, 60s)

HRS 2012
Hiroshi Nakagawa, MD, PhD, Atsushi Ikeda, MD, PhD, Constantine Garth, MS,* Assaf Govari, PhD,* Tushar Sharma, MD, Jan V Pitha, MD, PhD, Ralph Lazzara, MD, Warren M Jackman, MD

Lesion quality – Ablation Index

- What can Ablation Index do?

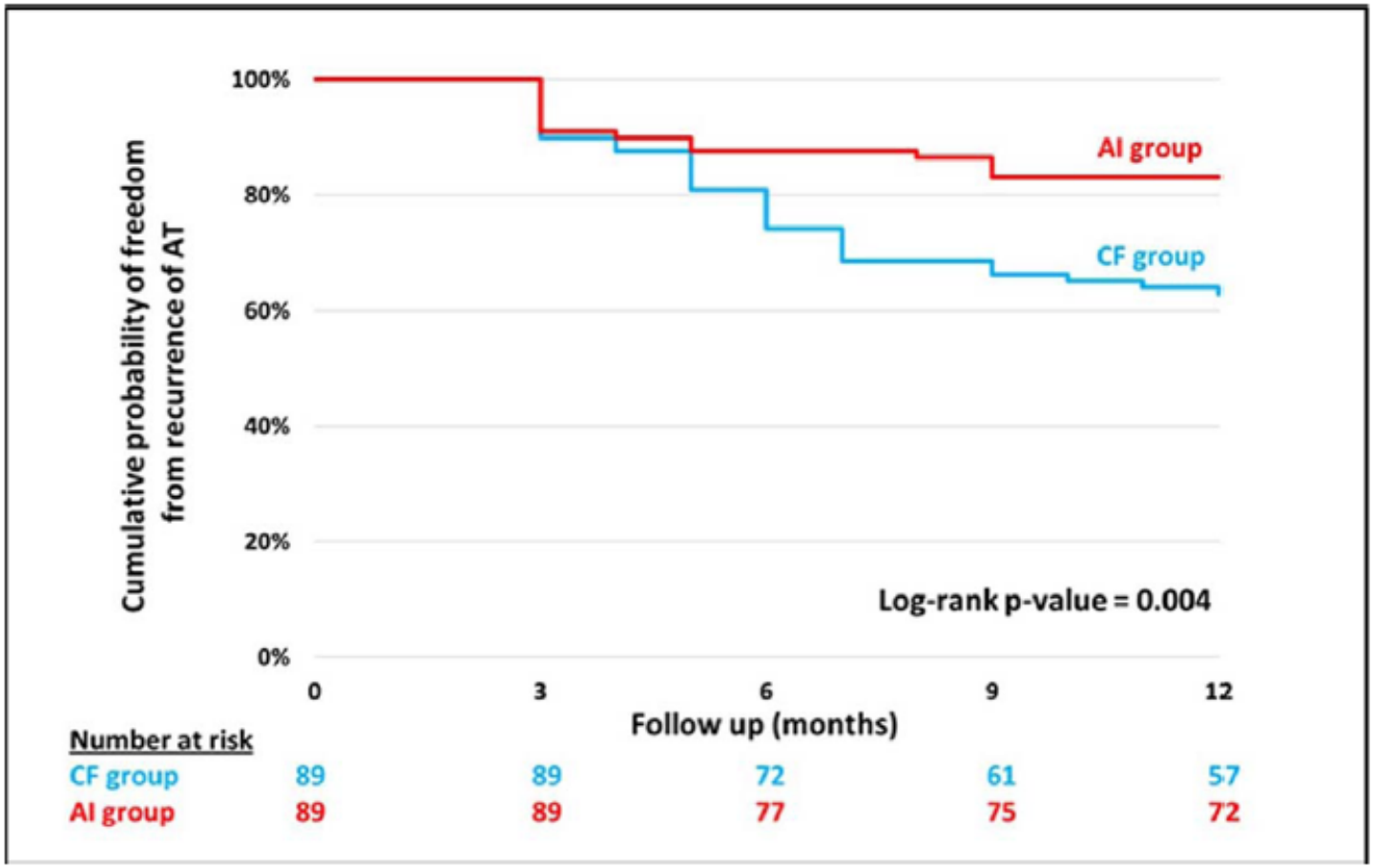
- **Evaluate** lesion quality
- **Guide** to create transmural lesion
- Provide **replicable** procedure outcome
- Minimize potential complication

$$Index = \left(k * \int_0^t CF^a(\tau) P^b(\tau) d\tau \right)^c$$

CF: Contact Force, P: RF Power, *t*: Application Time

Prospective use of Ablation Index targets improves clinical outcomes following ablation for atrial fibrillation

Ahmed Hussein MD[1] | Moloy Das MBBS[2] | Vivek Chaturvedi DM[1] | Issa Khalil Asfour[1] | Niji Daryanani[1] | Maureen Morgan BSc[1] | Christina Ronayne BSc[1] | Matthew Shaw MSc[1] | Richard Snowdon MD[1] | Dhiraj Gupta MD[1]

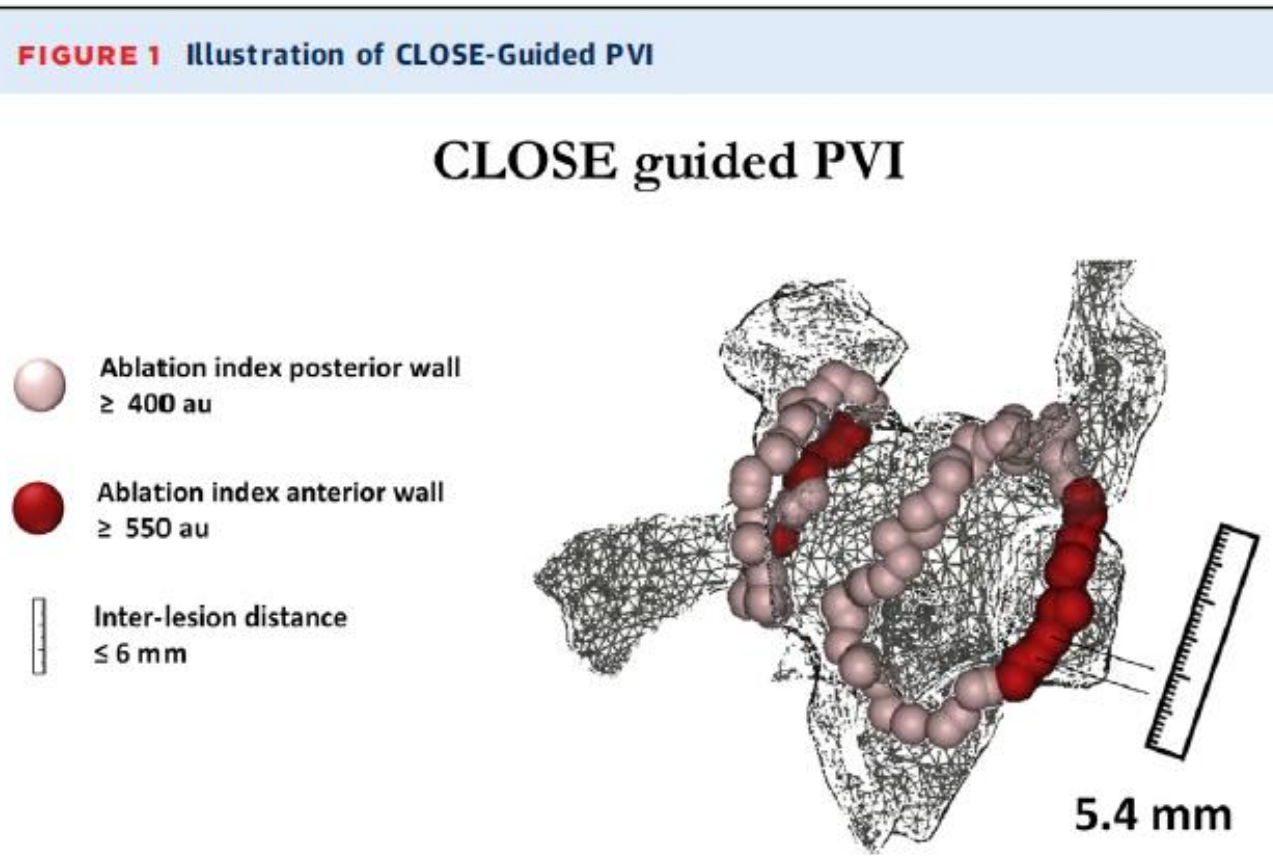


Evaluation of a Strategy Aiming to Enclose the Pulmonary Veins With Contiguous and Optimized Radiofrequency Lesions in Paroxysmal Atrial Fibrillation

A Pilot Study

Philippe Taghji, MD,[a] Milad El Haddad, MSc, PhD,[b] Thomas Phlips, MD,[a] Michael Wolf, MD,[a] Sebastien Knecht, MD, PhD,[a] Yves Vandekerckhove, MD,[a] Rene Tavernier, MD, PhD,[a] Hiroshi Nakagawa, MD, PhD,[c,d] Mattias Duytschaever, MD, PhD[a,b]

FIGURE 1 Illustration of CLOSE-Guided PVI



See text for explanation. AU = arbitrary unit; CLOSE = enclosing the PV with contiguous and optimized RF lesions; ILD = interlesion distance; PVI = pulmonary vein isolation.

Evaluation of a Strategy Aiming to Enclose the Pulmonary Veins With Contiguous and Optimized Radiofrequency Lesions in Paroxysmal Atrial Fibrillation

A Pilot Study

Philippe Taghji, MD,[a] Milad El Haddad, MSc, PhD,[b] Thomas Phlips, MD,[a] Michael Wolf, MD,[a] Sebastien Knecht, MD, PhD,[a] Yves Vandekerckhove, MD,[a] Rene Tavernier, MD, PhD,[a] Hiroshi Nakagawa, MD, PhD,[c,d] Mattias Duytschaever, MD, PhD[a,b]

FIGURE 2 RF Characteristics and Incidence of Acute Durable PVI

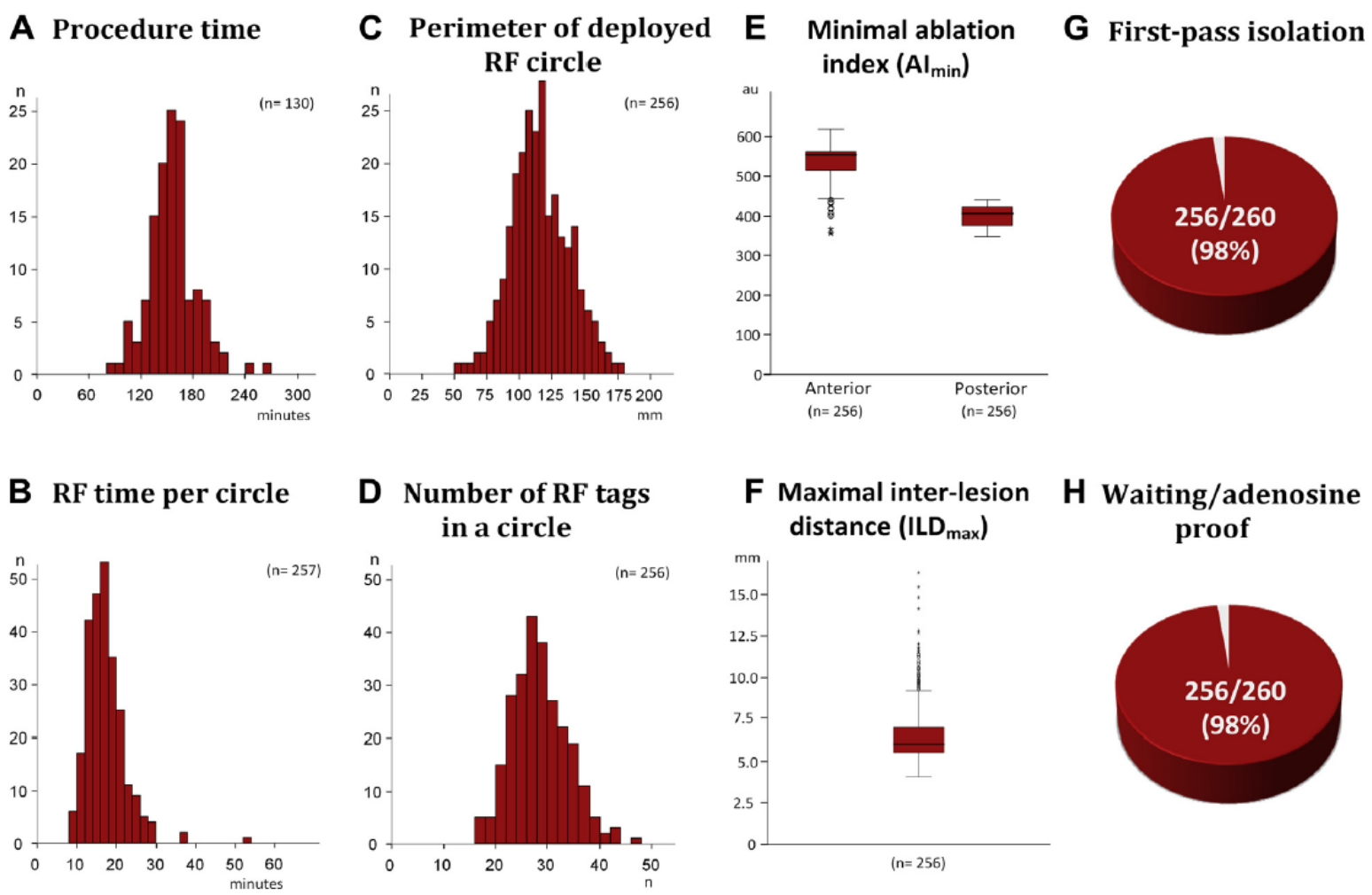
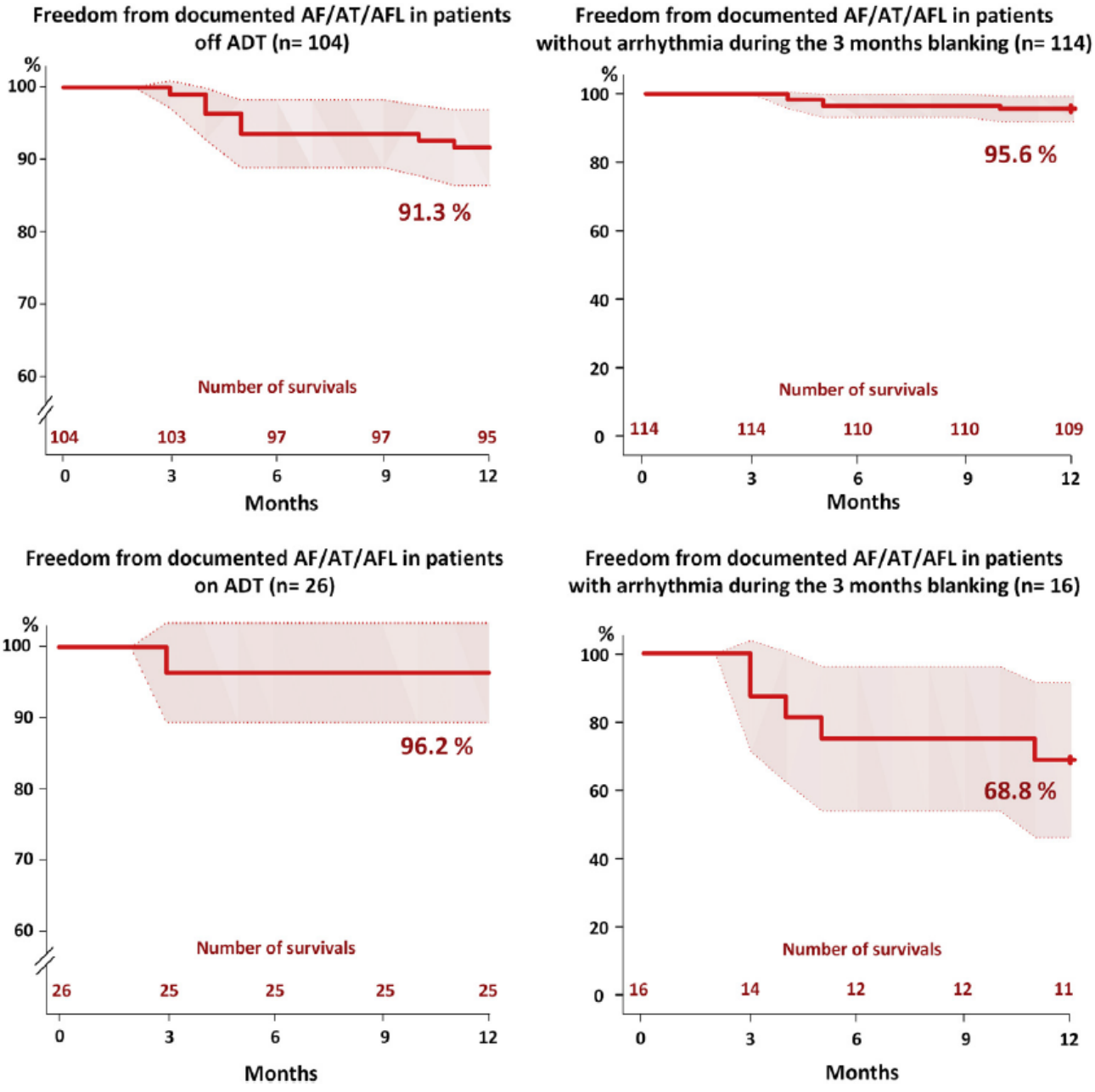


FIGURE 5 Survival Plots for Patient Subgroups



Kaplan-Meier curves depicting time to first recurrence of AF, AFL, or AT in patients undergoing CLOSE-guided ablation for subgroup of patients not taking antiarrhythmic drug therapy (ADT) **(upper left)** or taking ADT **(lower left)**, and without arrhythmia during the 3 months blanking **(upper right)** or with arrhythmia during blanking **(lower right)**. Abbreviations as in Figures 1 and 4.

My approach……

- **Early recommendation for AF ablation**
- **GA is preferred unless contraindicated**
- **Uninterrupted anticoagulation**
- **CT or MRI LA/PV anatomy**
- **Steerable sheath + Irrigated RF +/- Ablation Index for circumferential PV isolation**
- **Wait for 30min after last ablation in each vein +/- ATP or isoprenaline chanllenge**

Results….

- **Last 100 cases (80% paroxysmal)**
- **Skin to skin time: 120 +/- 35 min**
- **CVA: 0%; Pericardial effusion: 1%; AE fistula: 0%**
- **Vascular complication: 2%**
- **Hospital stay <24hrs: 98%**
- **1 Year no recurrence rate after single procedure: 82%**

Thank You