Procedural Endpoints and Predictors of Long-term Outcome after Persistent AF Ablation

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AF Ablation


RF Ablation
Cryoballoon Ablation
Multielectrode Ablation
Pulmonary Vein Isolation
Linear Ablation
CFAE Ablation
Rotor Ablation

KUMC Standard Approach for PAF

(B) Standard lesion set

Circumferential antral PV ablation lines around ipsilateral PV pairs
Additional ablation points at the carina
No linear ablations for PAF unless induced or clinical atrial flutter

(C) Standard endpoints

Electrical pulmonary vein isolation
Electrically unexcitable ablation line
Absence of dormant conduction with rapid administration of adenosine
Confirm non-PV foci are no longer induced

AF Ablation:

Other than PVI, it does not have an indisputable mechanistic basis.

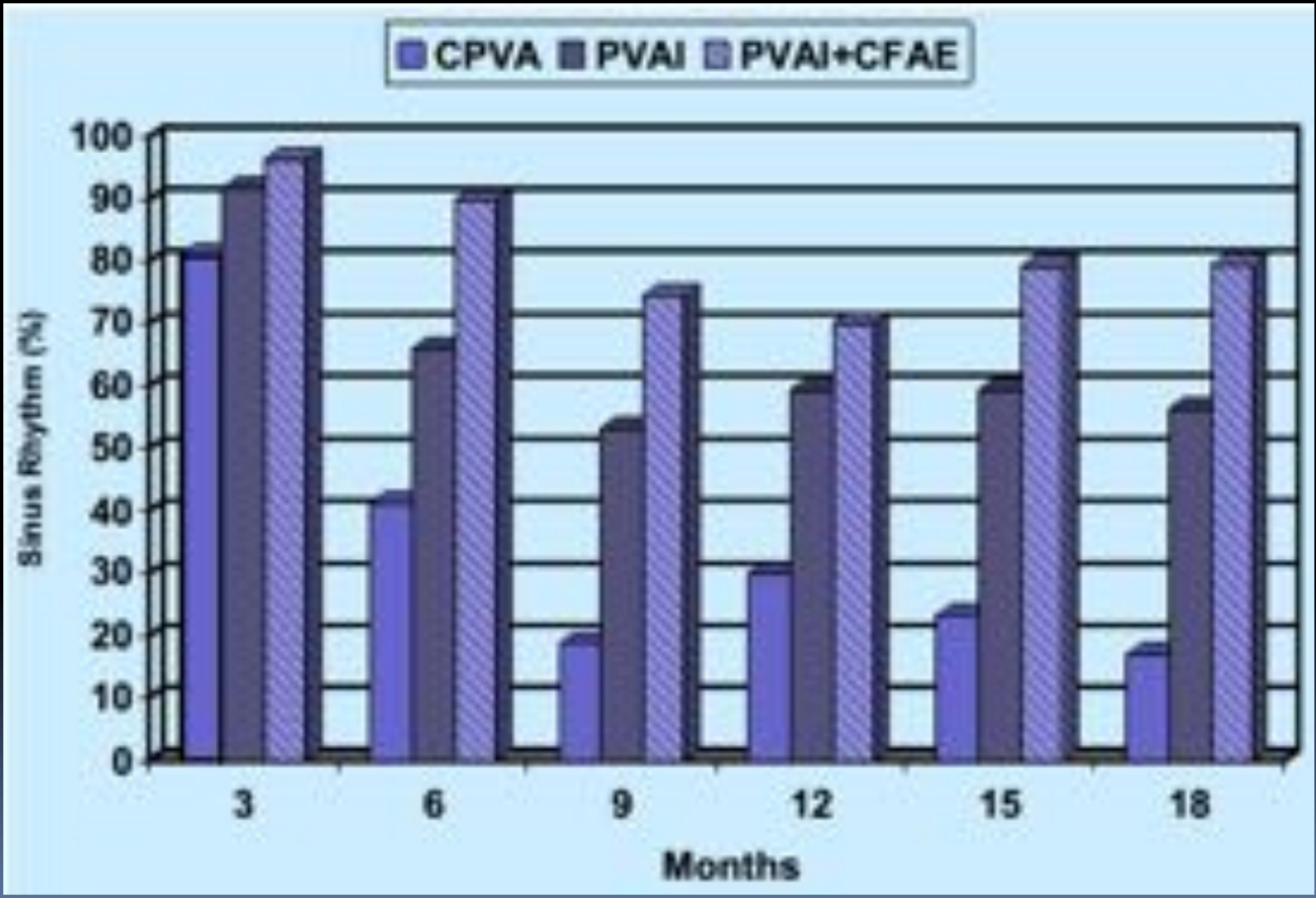
It is empirical, not truly individualized on the basis of mechanism.

Ablation for longstanding permanent atrial fibrillation: Results from a randomized study comparing three different strategies

Claude S. Elayi, MD,* Atul Verma, MD,¶ Luigi Di Biase, MD,†‡ Chi Keong Ching, MD,§§
Dimpi Patel, DO,‡ Conor Barrett, MD,## David Martin, MD,§ Bai Rong, MD,*** Tamer S. Fahmy, MD,¶¶
Yaariv Khaykin, MD,¶ Richard Hongo, MD,‖ Steven Hao, MD,‖ Gemma Pelargonio, MD,#
Antonio Dello Russo, MD,# Michela Casella, MD,# Pietro Santarelli, MD,# Domenico Potenza, MD,††
Raffaele Fanelli, MD,†† Raimondo Massaro, MD,†† Mauricio Arruda, MD,‖‖ Robert A. Schweikert, MD,†††
Andrea Natale, FHRS*‡‡‖‖

Heart Rhythm 2008;5:1658 –1664

Freedom from Recurrent AF/AT after 2 Ablations in the Absence of AADs



Heart Rhythm 2008;5:1658 –1664

Efficacy of Catheter Ablation for Persistent Atrial Fibrillation

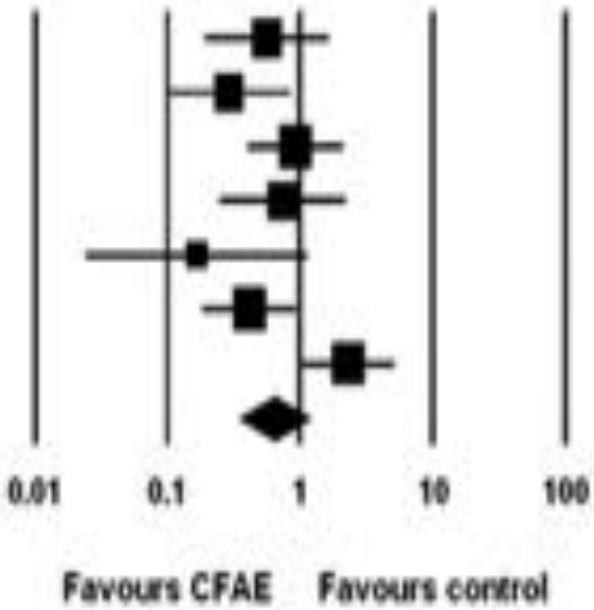
A Systematic Review and Meta-Analysis of Evidence From Randomized and Nonrandomized Controlled Trials

Gareth J. Wynn, MBChB; Moloy Das, MBBS; Laura J. Bonnett, PhD; Sandeep Panikker, MBBS; Tom Wong, MD; Dhiraj Gupta, MD

Circ Arrhythm Electrophysiol. 2014;7:841-852

Meta analysis of the impact of additional CFAE ablation on single procedure efficacy

Study name	Pocedures	Statistics for each study					CFAE	Control
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value		
Verma, 2007	Single	0.559	0.192	1.632	-1.064	0.287	7/40	11/40
Lin, 2009	Single	0.289	0.100	0.837	-2.288	0.022	10/30	19/30
Oral, 2009	Single	0.916	0.403	2.084	-0.210	0.834	17/50	18/50
Oral, 2008	Single	0.737	0.247	2.196	-0.548	0.584	23/33	25/33
Verma, 2010	Single	0.167	0.024	1.145	-1.822	0.068	2/12	6/11
Elayi, 2008	Single	0.415	0.184	0.938	-2.114	0.034	19/49	29/48
Dixit, 2012	Single	2.314	1.038	5.158	2.052	0.040	36/51	28/55
		0.640	0.347	1.182	-1.426	0.154		

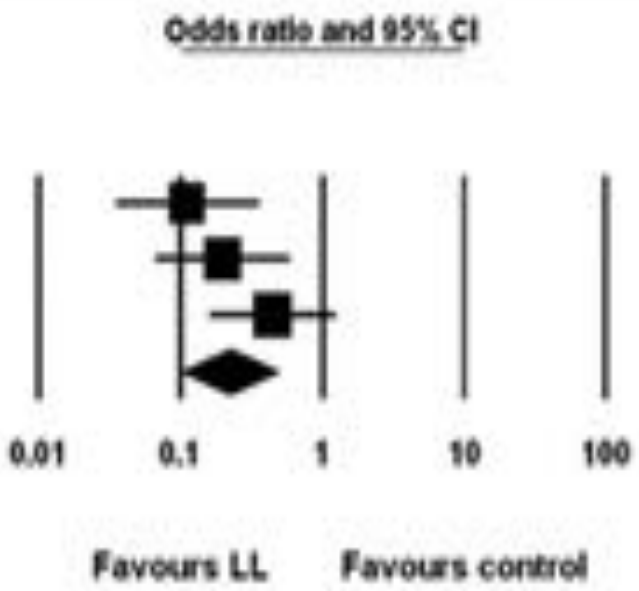


CFAE: Complex fractionated atrial electrogram ablation

Circ Arrhythm Electrophysiol. 2014;7:841-852

Meta analysis of the impact of linear ablation lesions

Study name	Outcome	Statistics for each study					Linear lesions	Control
		Odds ratio	Lower limit	Upper limit	Z-Value	p-Value		
Willems, 2006	Single	0.112	0.035	0.361	-3.673	0.000	10 / 32	24 / 30
Fassini, 2005	Single	0.198	0.066	0.591	-2.902	0.004	8 / 32	19 / 29
Gaita, 2008	Single	0.445	0.160	1.236	-1.553	0.120	29 / 53	19 / 26
		0.223	0.101	0.491	-3.728	0.000		

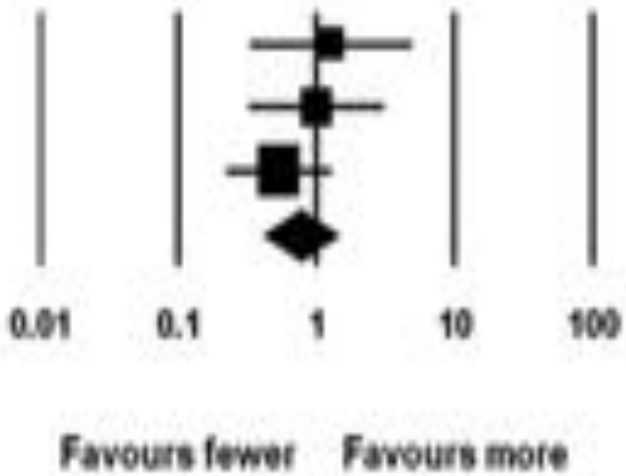


LL: Linear lesions

Circ Arrhythm Electrophysiol. 2014;7:841-852

Meta analysis of the impact of less more extensive linear ablation

Study name	Statistics for each study					Fewer lines	More lines
	Odds ratio	Lower limit	Upper limit	Z-Value	p-Value		
Mikhaylov, 2010	1.270	0.327	4.930	0.345	0.730	8 / 17	7 / 17
Tamborero, 2009	0.993	0.320	3.085	-0.012	0.990	11 / 23	12 / 25
Lim, 2012	0.531	0.219	1.284	-1.405	0.160	23 / 44	28 / 41
	0.768	0.413	1.428	-0.835	0.404		



Circ Arrhythm Electrophysiol. 2014;7:841-852

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Approaches to Catheter Ablation for Persistent Atrial Fibrillation

Atul Verma, M.D., Chen-yang Jiang, M.D., Timothy R. Betts, M.D., M.B., Ch.B., Jian Chen, M.D., Isabel Deisenhofer, M.D., Roberto Mantovan, M.D., Ph.D., Laurent Macle, M.D., Carlos A. Morillo, M.D., Wilhelm Haverkamp, M.D., Ph.D., Rukshen Weerasooriya, M.D., Jean-Paul Albenque, M.D., Stefano Nardi, M.D., Endrj Menardi, M.D., Paul Novak, M.D., and Prashanthan Sanders, M.B., B.S., Ph.D., for the STAR AF II Investigators*

P=0.15 for the overall comparison, by the log-rank test

Perhaps neither complex electrograms nor lines are the correct supplemental targets for a blation.

More selective targets may be needed to better ch aracterize an individual patient's specific arrhythm ic substrate.♪

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Months since First Ablation

No. at Risk						
Pulmonary-vein isolation	61	60	50	41	36	23
Isolation plus electrograms	244	242	161	137	124	72
Isolation plus lines	244	240	152	133	115	57

STAR AF II

Confirms PVI is not sufficiently effective in treating persistent AF (60% of freedom from AF).

AF termination with CFAE ablation was achieved i n only 45%, which may explain the poor prognosis in this group.

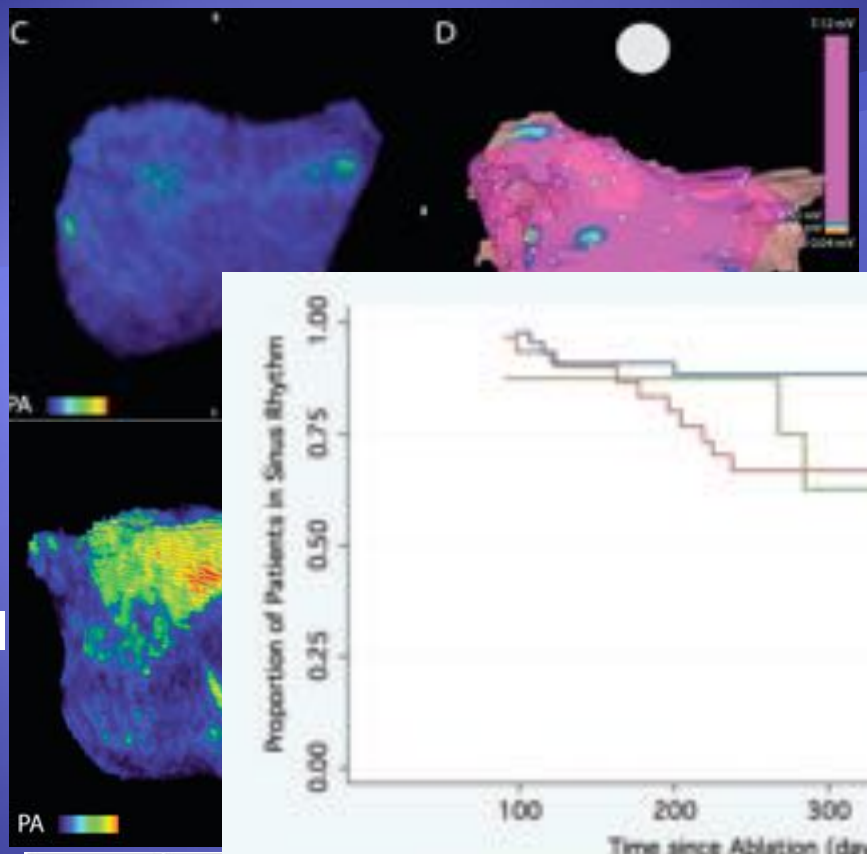
Standard unipolar ablation do not reliably produce the permanent transmural and longitudinally cont inuous lesions.

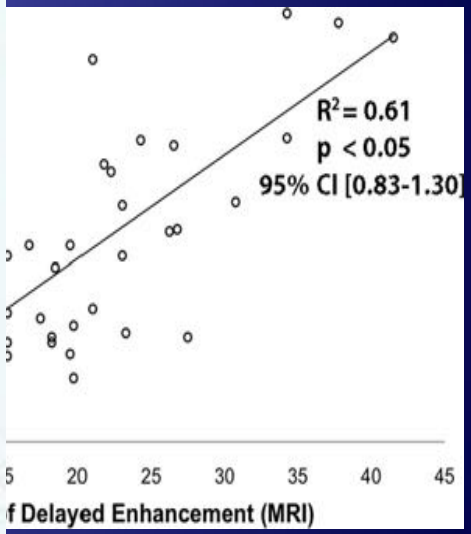
MRI♪ EAM♪

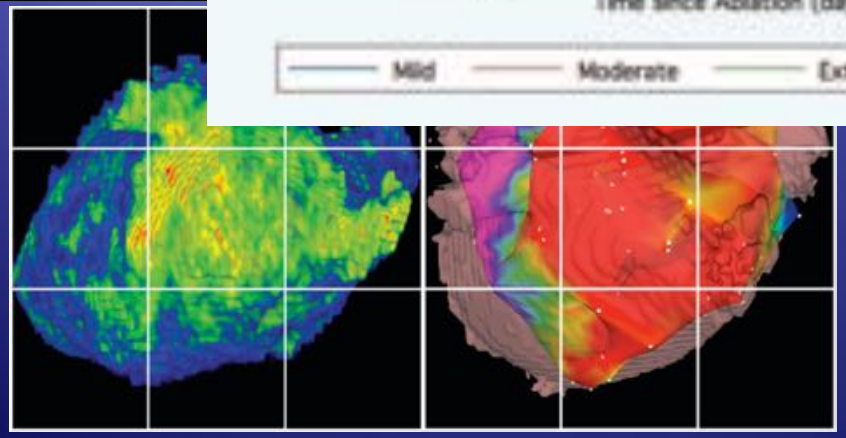
Minimal DE♪

Moderatel DE♪

Extensive DE♪







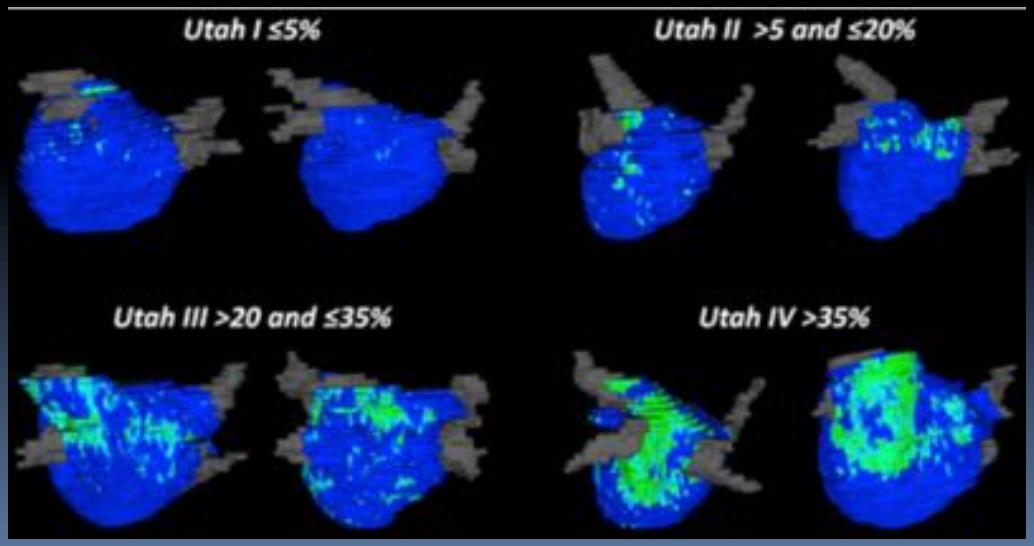
Circulation. 2009;119:1758-1767♪

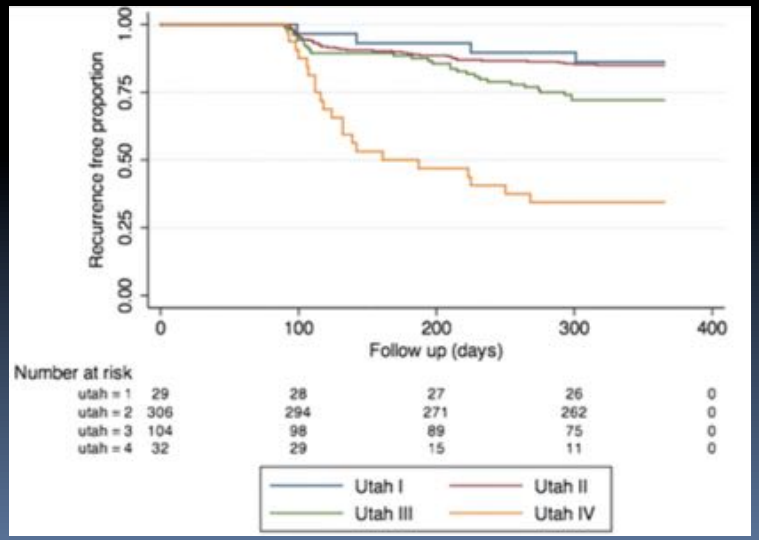
Implication of cardiac MR in AF

- Late gadolium enhancement (LGE) of Cardiac MR (CMR) is accepted a s a powerful tool for detecting atrial fibrosis.

- Utah group (CARMA Center) demonstrated that the amount of LGE had an excellent correlation with clinical outcome.

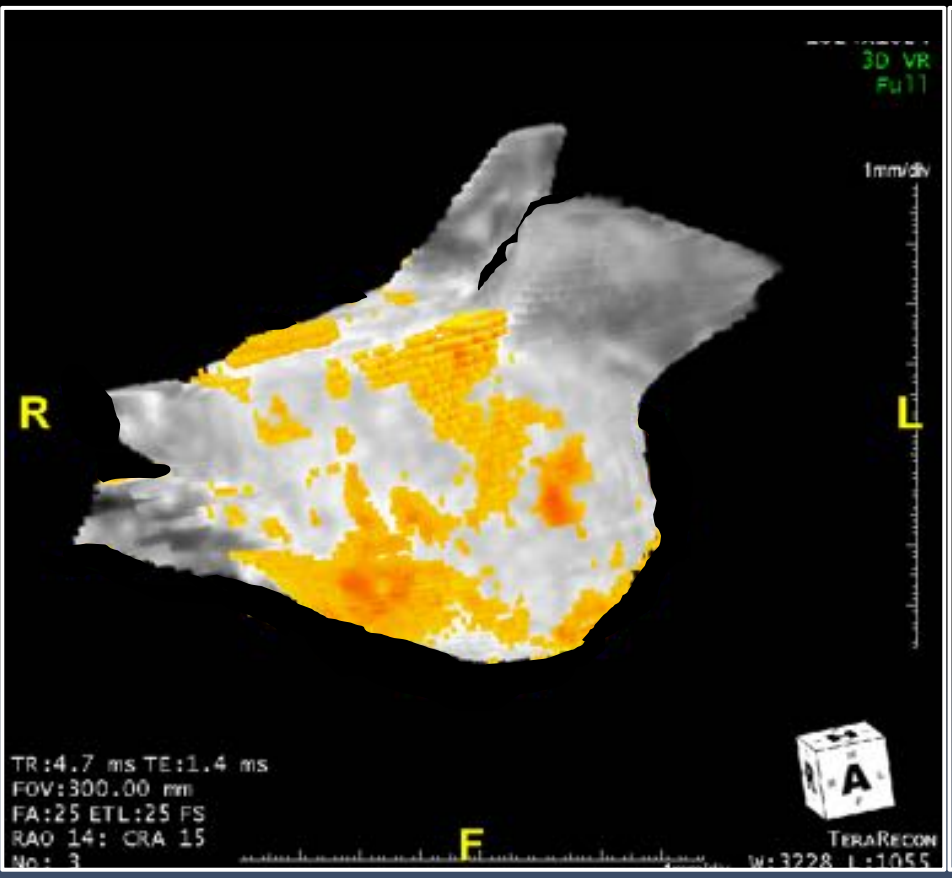
Circulation 2009;119:1758–67

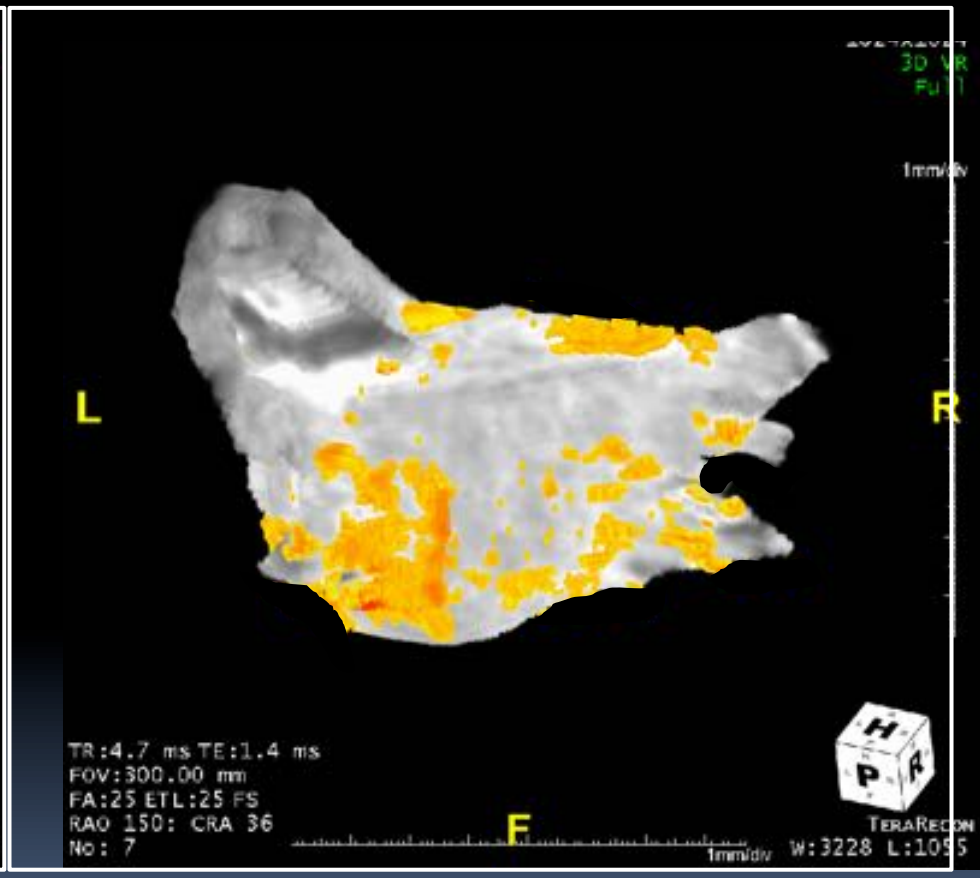




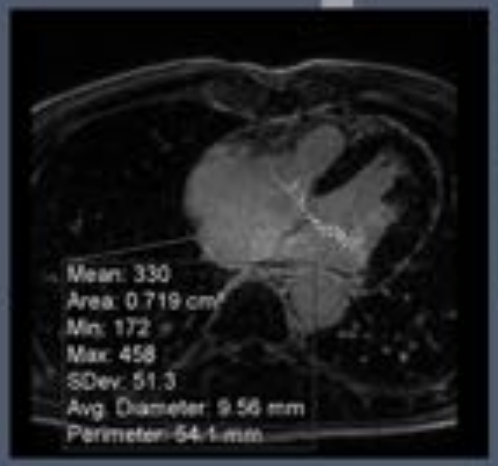
J Cardiovasc Electrophysiol 2011;22:16–22

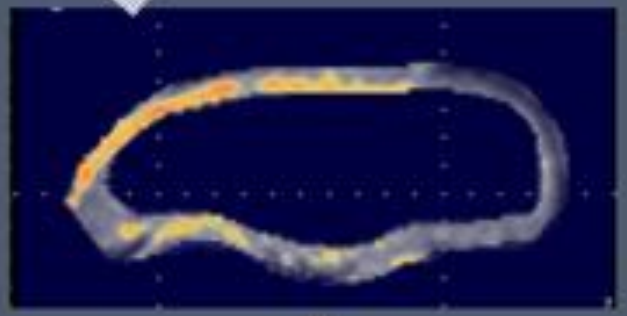
The extent of late gadolinium enhancement of entire LA wall surface was 58%.

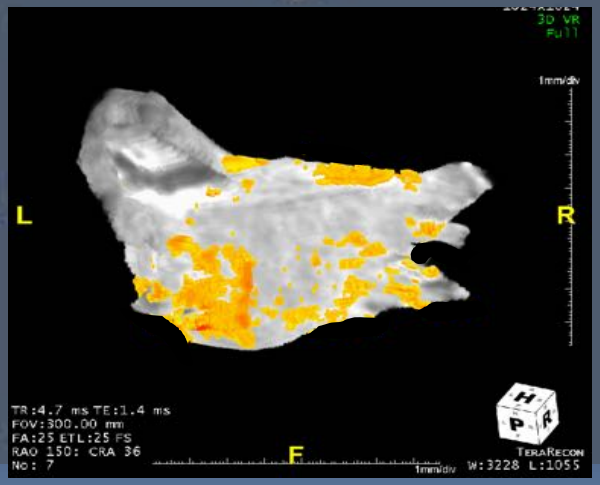




Full Width at Half Methods (FWHM)







Mitral valve leaflets was selected as region of interest

Selection of highest signal intensity of MV leaflets

↓

Half of the maximal signal

Signal threshold

↓

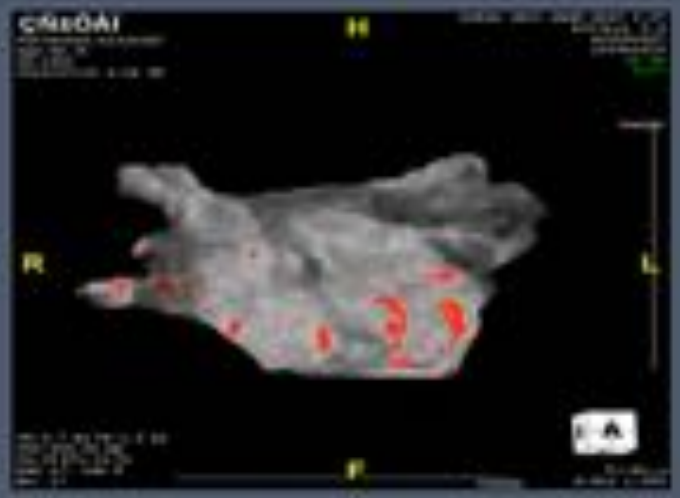
The LA pixel of signal intensity was automatically selected.

↓

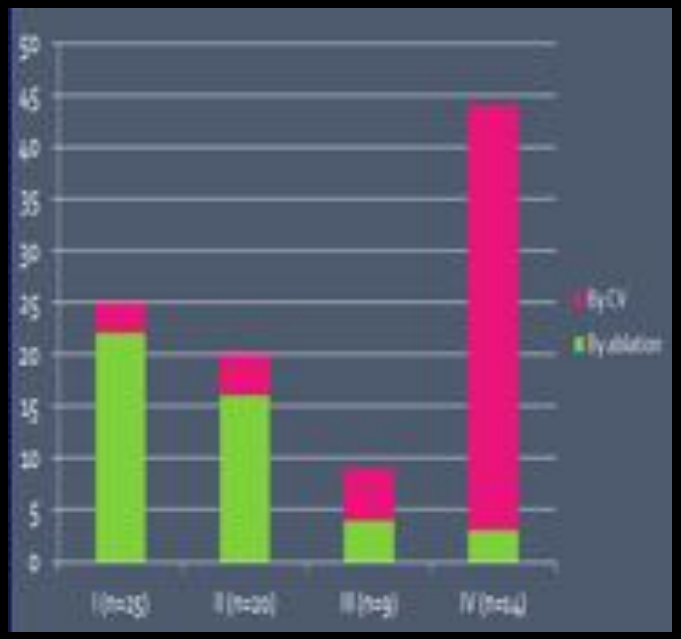
The summation of LA pixel of signal intensity over all slices.

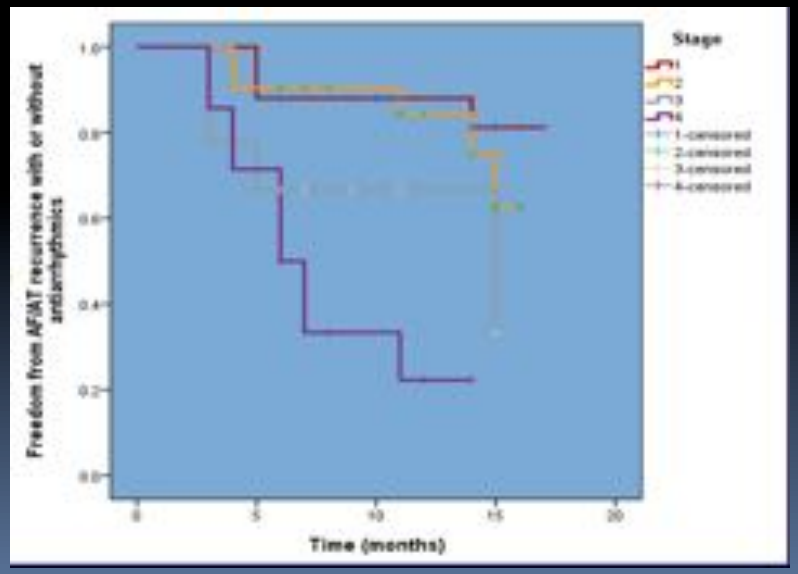
Lee DI, HRS 2015, Unpublished

LA DE MRI



Scar grading	
Grade	LGE
Grade I	< 5%
Grade II	5-15%
Grade III	15-25%
Grade IV	>35%

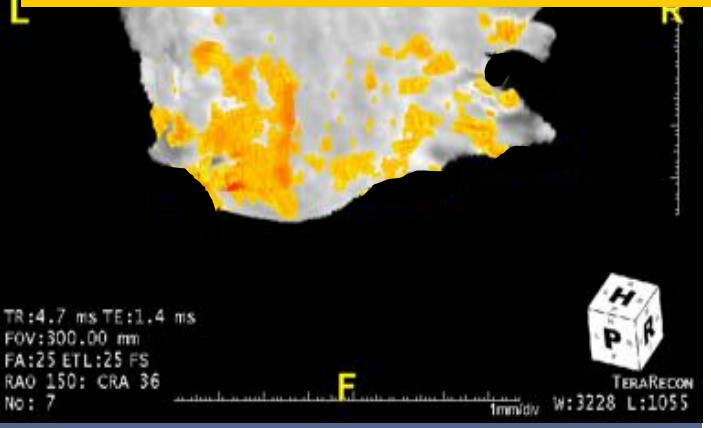


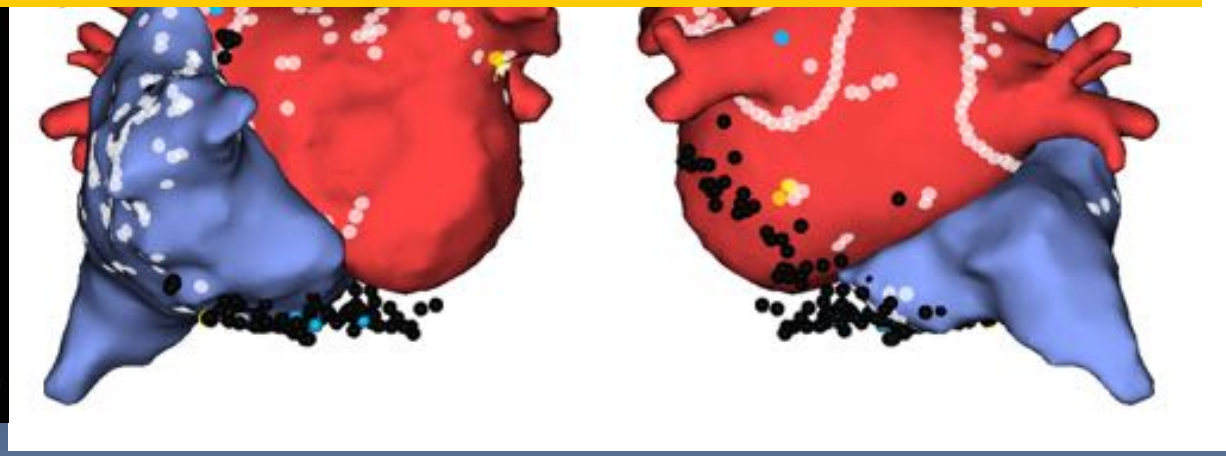


Lee DI, HRS 2015, Unpublished

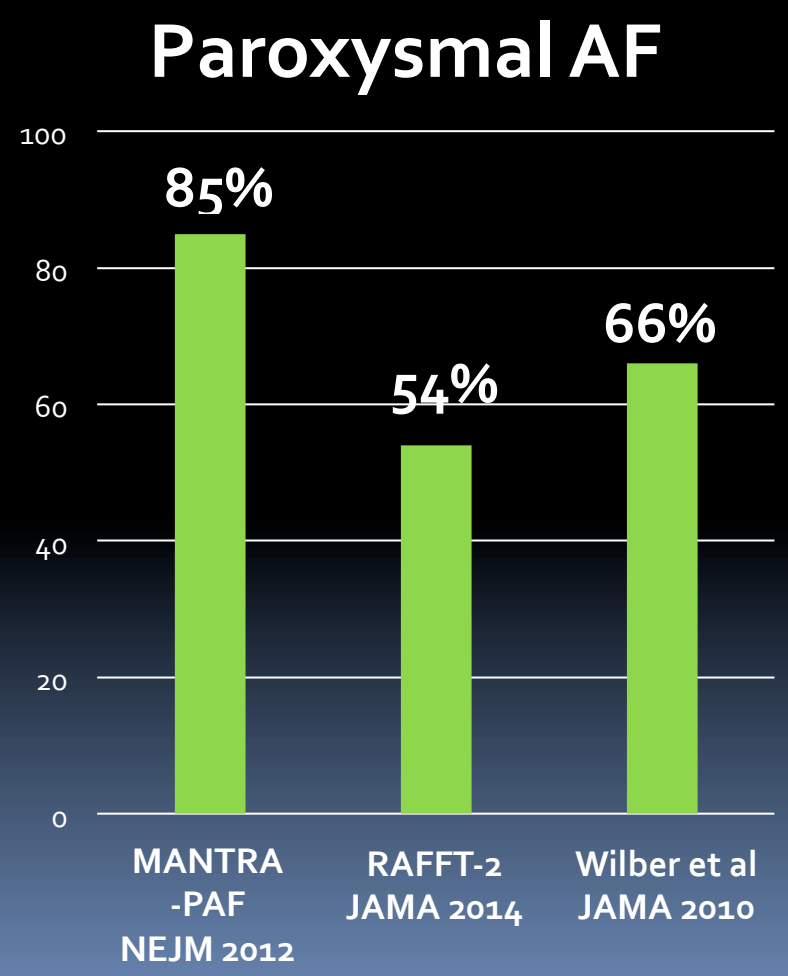
Biatrial ABL failed to terminate AF. AF recurred 6 months after ablation.

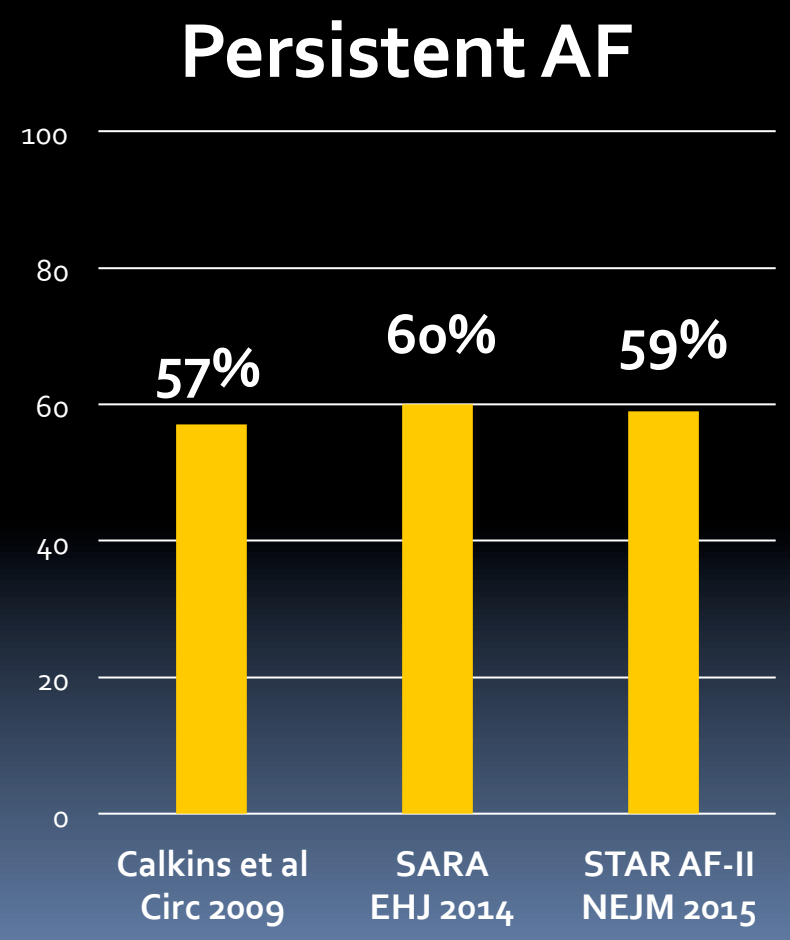
LA DE-MRI is of value to predict ablation succe ss and follow up outcome.





Freedom from AF after Catheter Ablation in Recent Study





Comparison of $CHADS_2$, R_2CHADS_2, and CHA_2DS_2-VASc Scores for the Prediction of Rhythm Outcomes After Catheter Ablation of Atrial Fibrillation

The Leipzig Heart Center AF Ablation Registry

Jelena Kornej, MD; Gerhard Hindricks, MD; Jedrzej Kosiuk, MD; Arash Arya, MD; Philipp Sommer, MD; Daniela Husser, MD; Sascha Rolf, MD; Sergio Richter, MD; Yan Huo, MD; Christopher Piorkowski, MD; Andreas Bollmann, MD, PhD

Circ Arrhythm Electrophysiol. 2014;7:281-287.

CHA2DS2-VASc, R2 CHADS2 score were a ssociated with clinical outcome.

	UV			MV Model 1			MV Model 2			MV Model 3		
Variables	HR	95% CI	*P* Value	HR	95% CI	*P* Value	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Age, y	1.01	1.003–1.021	0.007									
Female sex	1.11	0.93–1.33	0.231									
Persistent AF	1.82	1.53–2.15	<0.001	1.50	1.24–1.80	<0.001	1.49	1.24–1.80	<0.001	1.51	1.25–1.82	<0.001
eGFR <60 mL/min per 1.73 m^2	1.62	1.21–2.16	0.001	1.40	1.03–1.90	0.031				1.34	0.98–1.83	0.064
EF, %	0.99	0.98–0.99	0.018									
LA diameter, mm	1.04	1.03–1.06	<0.001	1.03	1.02–1.05	<0.001	1.03	1.02–1.04	<0.001	1.03	1.02–1.05	<0.001
$CHADS_2$	1.17	1.07–1.27	0.001	1.06	0.97–1.16	0.226						
R_2CHADS_2	1.17	1.09–1.26	<0.001				1.09	1.01–1.18	0.022			
CHA_2DS_2-VASc	1.11	1.05–1.18	<0.001							1.06	0.99–1.13	0.075
ERAF	3.12	2.62–3.71	<0.001	2.82	2.34–3.41	<0.001	2.83	2.35–3.42	<0.001	2.81	2.33–3.39	<0.001

AF indicates atrial fibrillation; CI, confidence interval; EF, ejection fraction; eGFR, estimated glomerular filtration rate; ERAF, early recurrence AF; LA, left atrial; MV, multivariable analysis; HR, hazards ratio; and UV, univariable analysis.

Circ Arrhythm Electrophysiol. 2014;7:281-287.

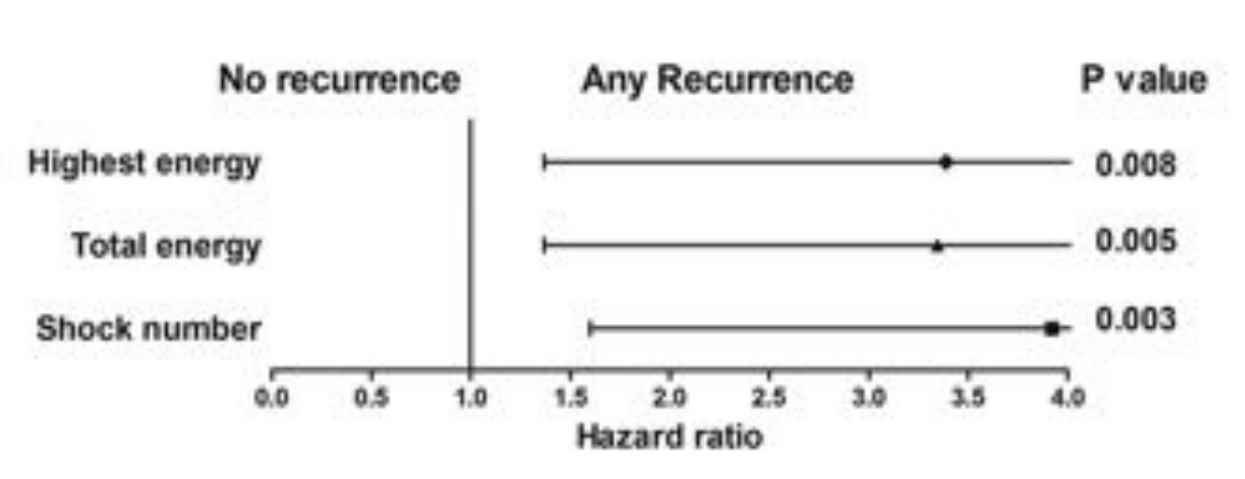
Prediction of Long-Term Outcomes of Catheter Ablation of Persistent Atrial Fibrillation by Parameters of Preablation DC Cardioversion

JUN HYUK KANG, M.D., DAE IN LEE, M.D., SUA KIM, M.D., MI NA KIM, M.D., YAE MIN PARK, M.D., JI EUN BAN, M.D., JONG IL CHOI, M.D., HONG EUY LIM, M.D., SANG WEON PARK, M.D., and YOUNG-HOON KIM, M.D., PH.D.

J Cardiovasc Electrophysiol, Vol. 23, pp. 1165-1170, November 2012

DC energy parameters for successful CV before RFCA were useful predict the long-term outcome.

	Overall (n = 94)	AF Recurrence Group (n = 32)	Freedom from AF Group (n = 62)	P Value
Number of the trials of cardioversion	1.4 ± 0.8	1.4 ± 0.9	1.3 ± 0.6	0.949
Use of amiodarone (%)	25 (24.2%)	10 (31.3%)	15 (26.6%)	0.623
Number of DC shocks	3.3 ± 2.4	3.9 ± 3.2	3.0 ± 1.8	0.073
Total energy delivered (J)	352.1 ± 317.9	439.1 ± 426.9	235.5 ± 307.3	0.056
Highest level of energy delivered (J)	158.9 ± 96.6	173.9 ± 117.1	151.1 ± 84.2	0.281



J Cardiovasc Electrophysiol, Vol. 23, pp. 1165-1170, November 2012

Pre-Ablation Evaluation

Predictors of Long-term Outcome

1. AF duration
2. Clinical type
3. LA size and volume

Pre-Ablation Evaluation

In addition,

- The extent of LGE on MRI,
- Stroke stratification schema (CHA2DS2-VASc, R2-CHADS2 score)
- DC energy parameters

can be used to predict successful ablation.

During Ablation

Relationship of AF Termination with Clinical Outcome

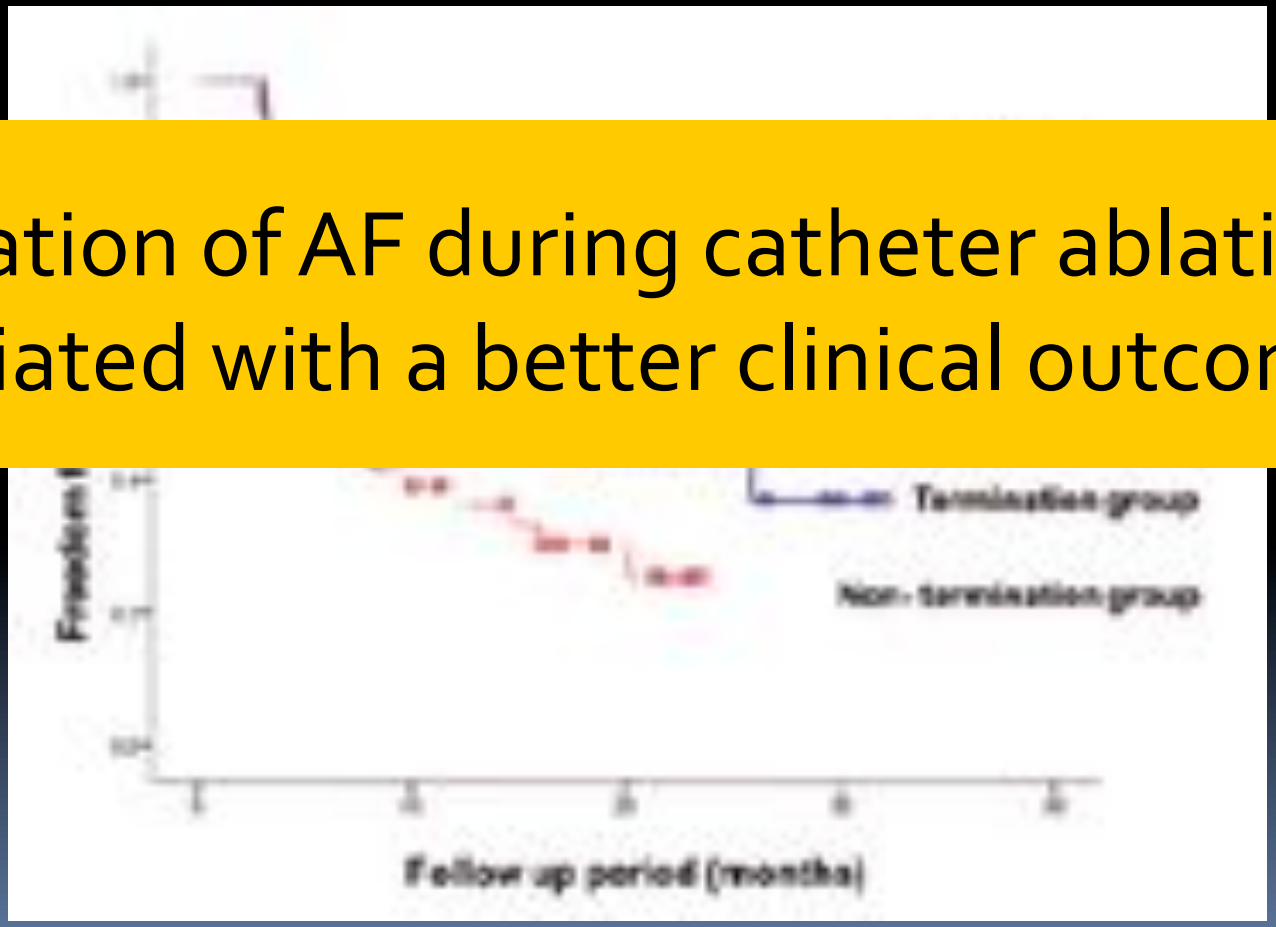
Authors	n	Subjects	CFAE	ABL	AF termination		Recurrence during F/U
Heist	143	PeAF+LSPeAF	Visual or C or NavX	S or M	66%	SR:25%	AF term (+): 48% AF term (-): 58%, p<0.05
Fiala	194	PAF+PeAF+ LSPeAF	Linear (-) CFAE	S	50%	SR:34%	AF term (+): 30% AF term (-): 63%, p<0.05
Yoshida	100	PeAF	Visual	S	39%	SR:3%	AF term (+): 38% AF term (-): 52%, p<0.01
Elayi, 2008	144	LSPeAF CPVA, 47		M	13%	75% AT:	72%
		PVAI, 48			44%		17%
		CFAE+PVAI, 49	Visual		74%	66%	6% P<0.001
Park	140	LSPeAF	NavX-3D	S	68%	SR:24% AT:9 7%	AF term (+): 45% AF term (-): 69%, P<0.01
Estner	35	PeAF	Visual	M	66%	SR:35%	AF term (+): 22% AF term (-): 34%, p=ns
Zhou	200	PeAF+LSPeAF	Visual	S	63%	SR:16% AT: 76%	AF term (+): 46% AF term (-): 57%, p=0.15
Elayi 2010	306	LSPeAF	Visual	S or M	58%	SR:3% AT: 65%	AF term (+): 17% AF term (-): 18%, p=ns

Is Pursuit of Termination of Atrial Fibrillation During Catheter Ablation of Great Value in Patients with Longstanding Persistent Atrial Fibrillation?

YAE M. PARK, M.D., JONG-IL CHOI, M.D., HONG E. LIM, M.D., SANG W. PARK, M.D., and YOUNG-HOON KIM, M.D.

From the Division of Cardiology, Korea University, Seoul, South Korea

J Cardiovasc Electrophysiol, Vol. 23, pp. 1051-1058, October 2012

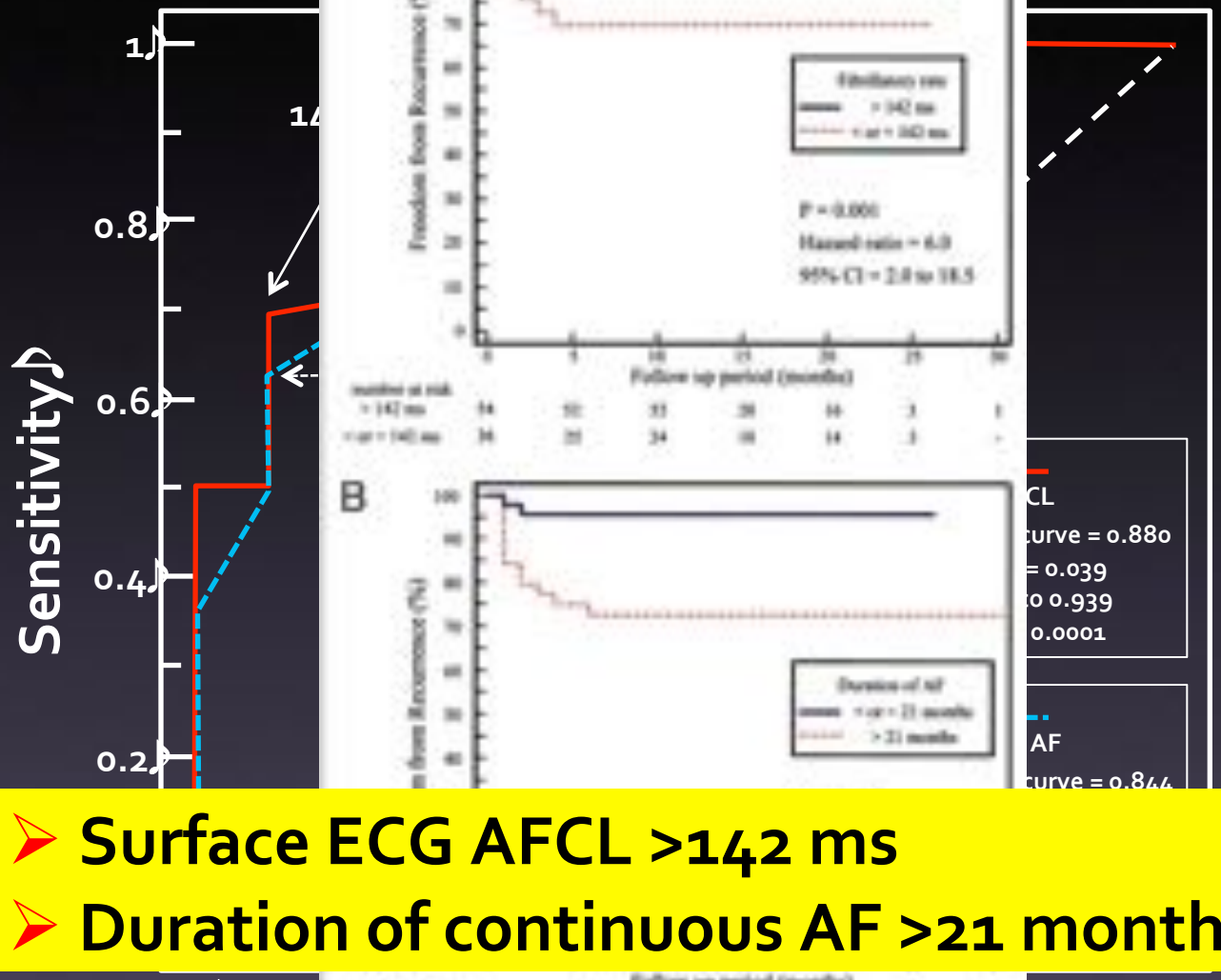


Termination of AF during catheter ablation is a ssociated with a better clinical outcome.

Clinical Predictors of Termination and Clinical Outcome of Catheter Ablation for CAF

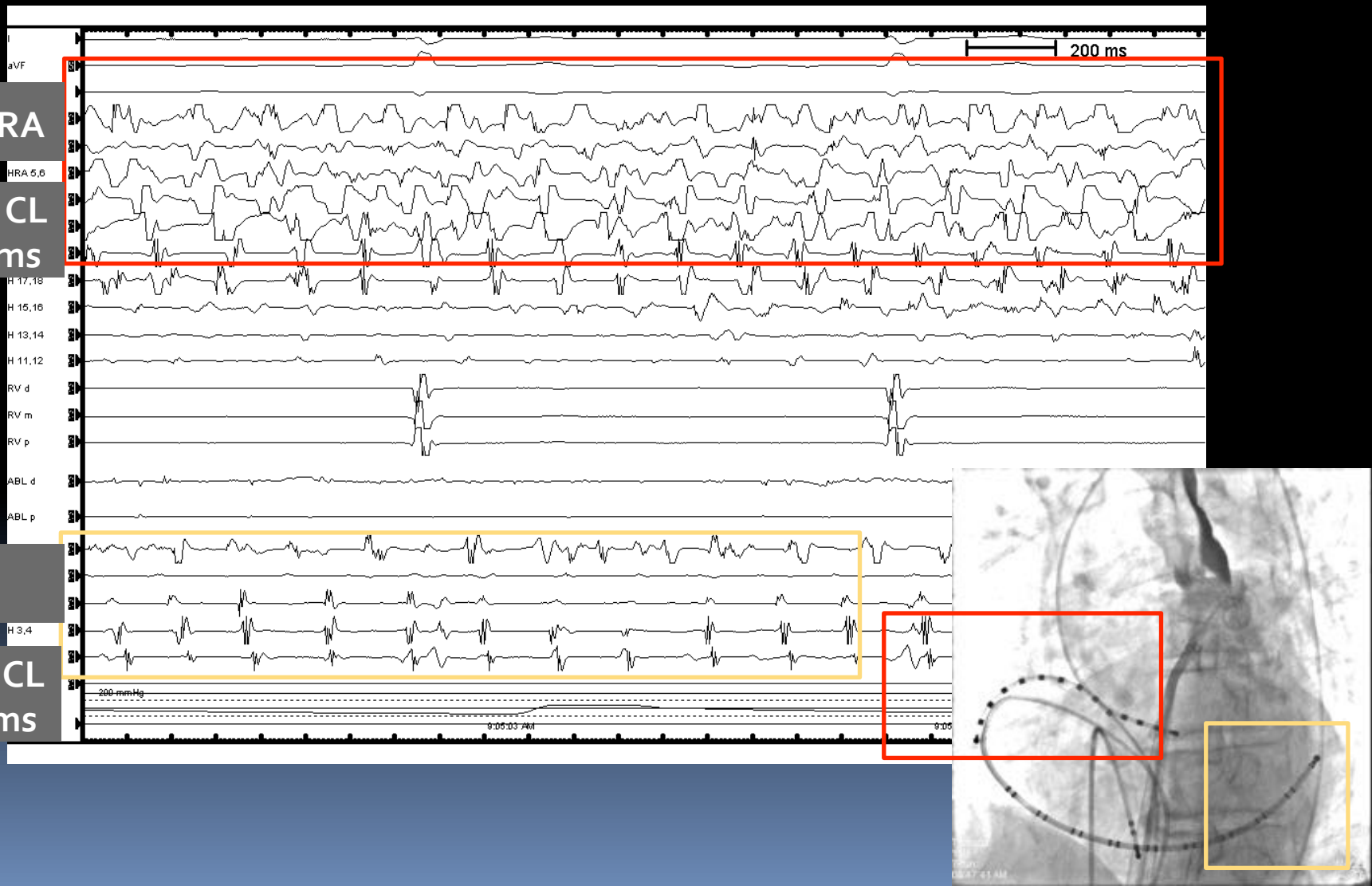
Matsuo S et al. J ACC 2009;54:789-95

Predictor ination



- Surface ECG AFCL >142 ms
- Duration of continuous AF >21 months

M/54, AF for 5 years, LA = 51.0mm



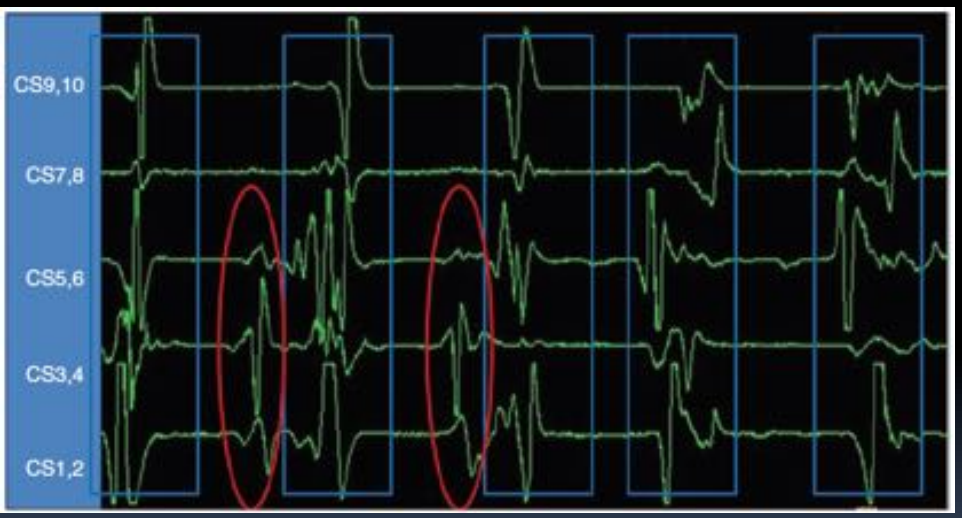
Europace Advance Access published March 2, 2015

Europace
doi:10.1093/europace/euu330

CLINICAL RESEARCH

Atrial fibrillation cycle length as a predictor for the extent of substrate ablation

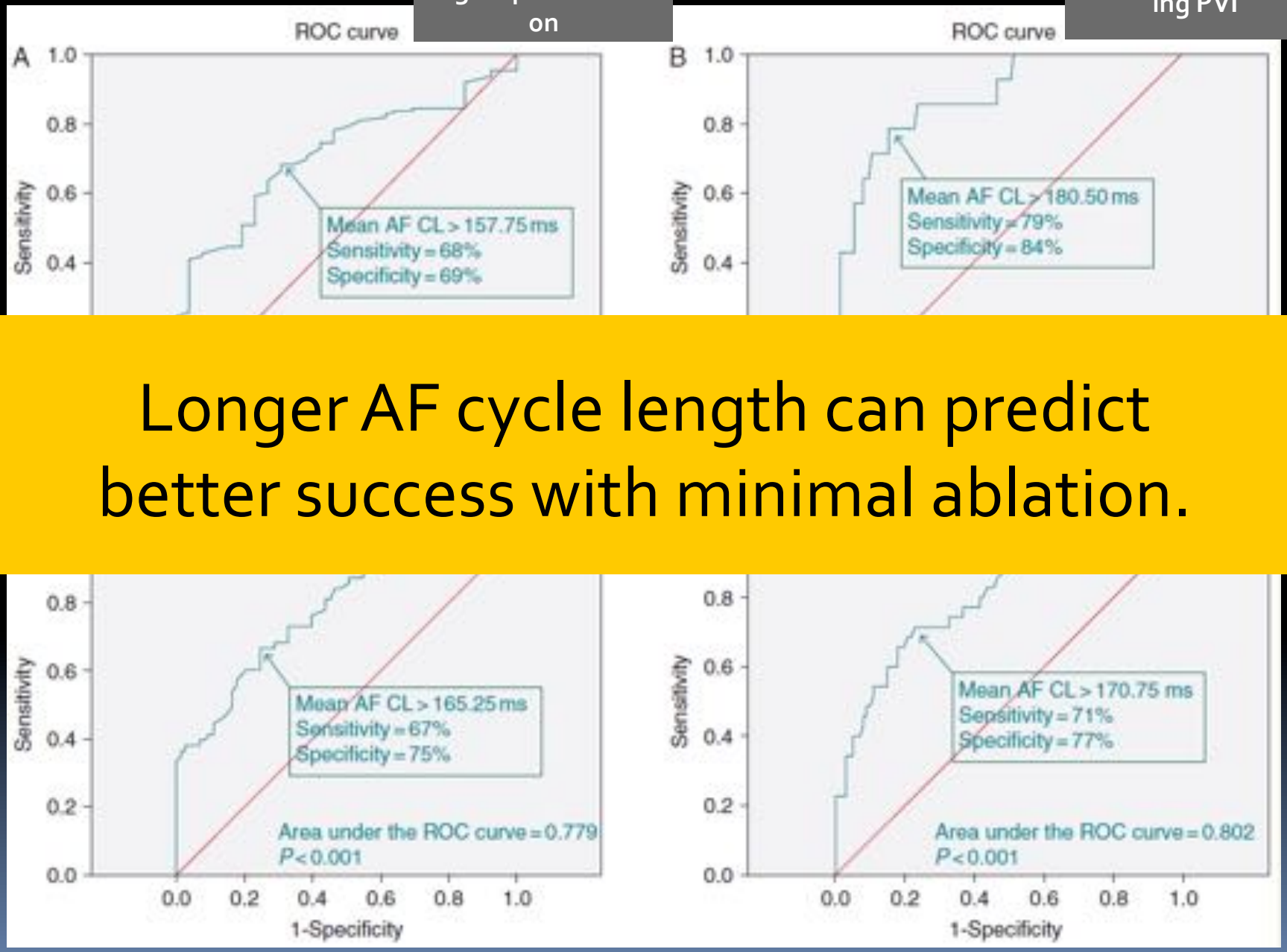
Ho-Chuen Yuen*, Seung-Young Roh, Dae-In Lee, Jinhee Ahn, Dong-Hyeok Kim, Jaemin Shim, Sang-Weon Park, and Young-Hoon Kim



Mean AF CL = averaging 30 consecutive cycles measured at high RA and LA

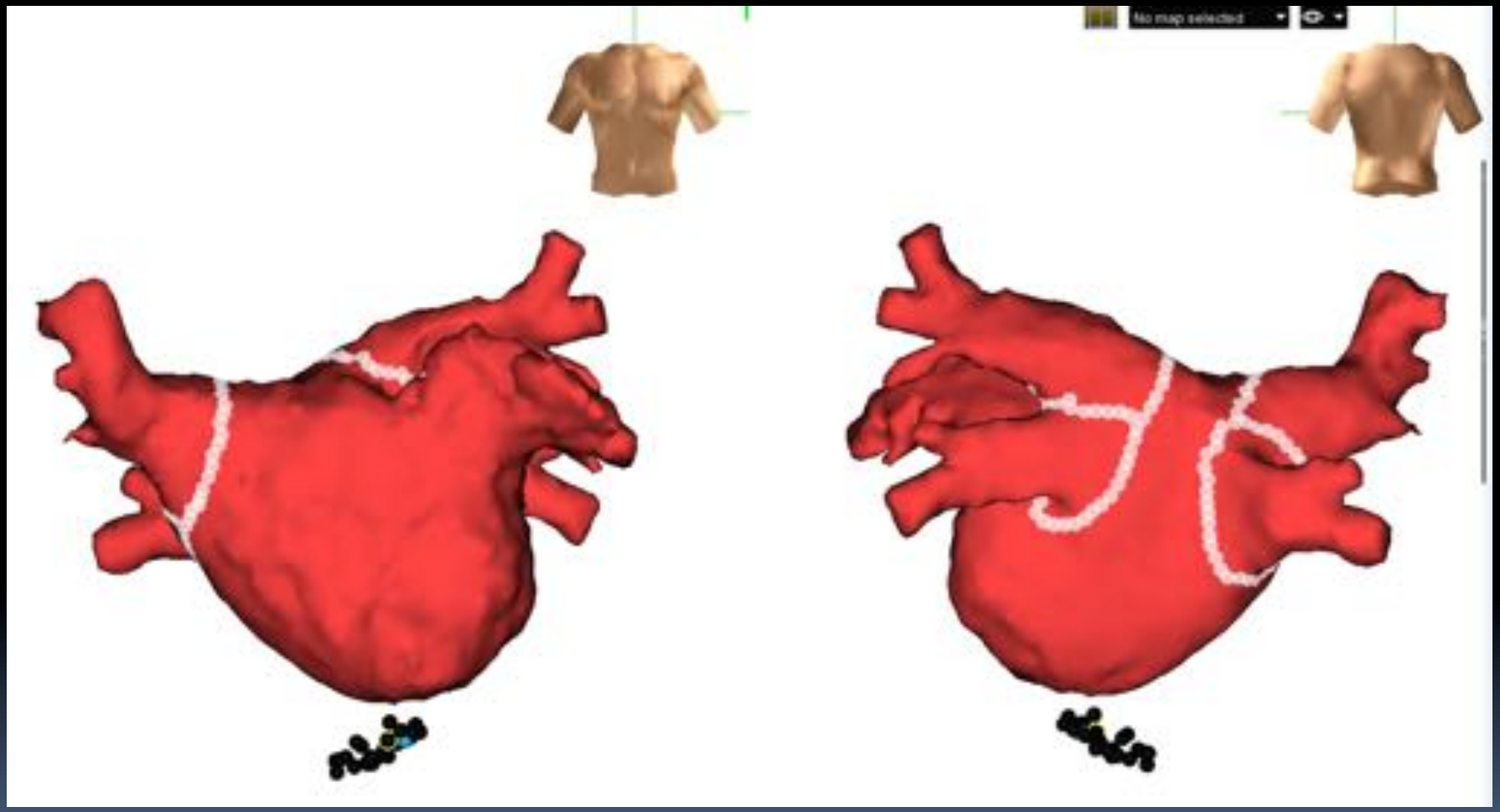
AF termination during stepwise ablation

AF termination during PVI

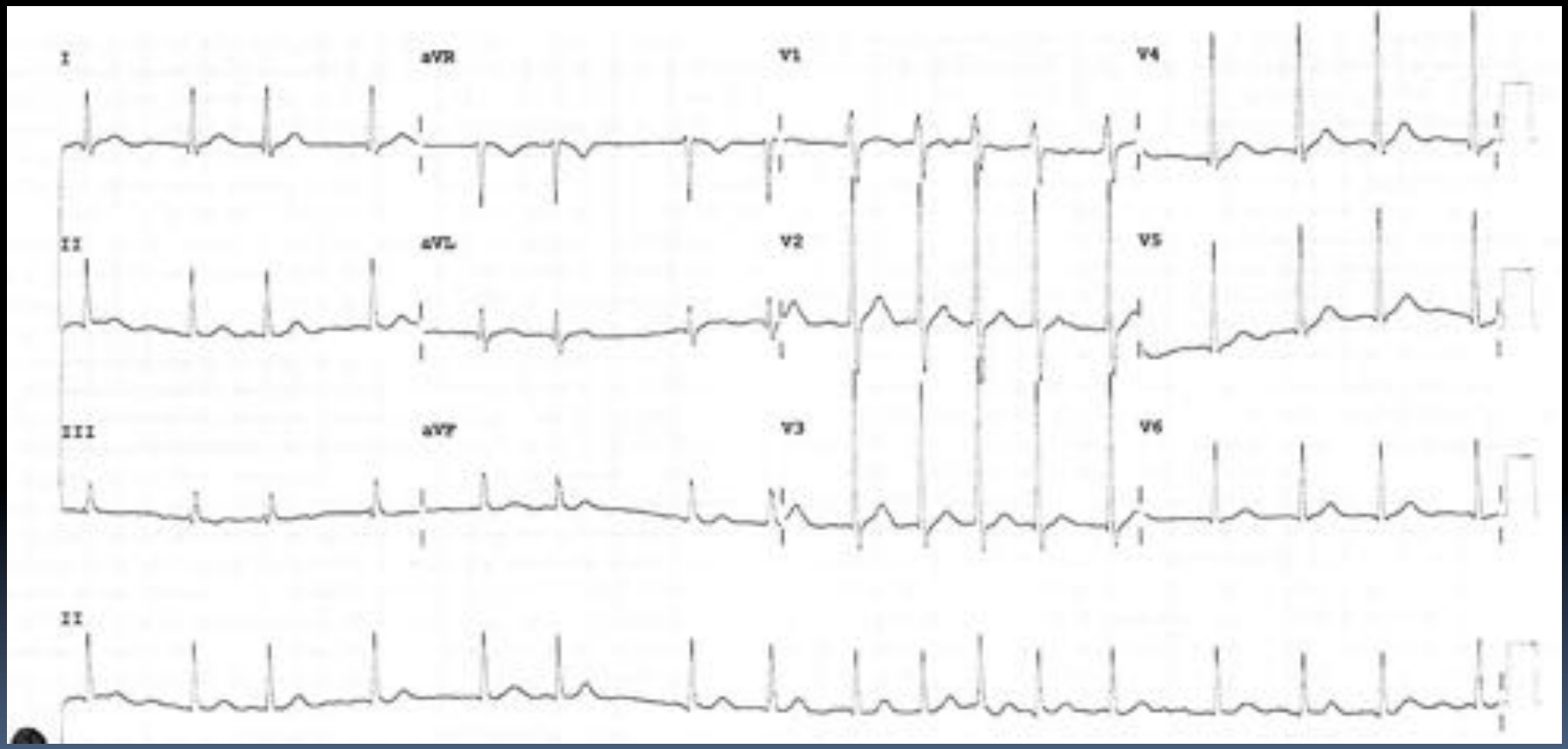


Longer AF cycle length can predict better success with minimal ablation.

M/50 , 1st AF ablation for PAF



One year after ablation

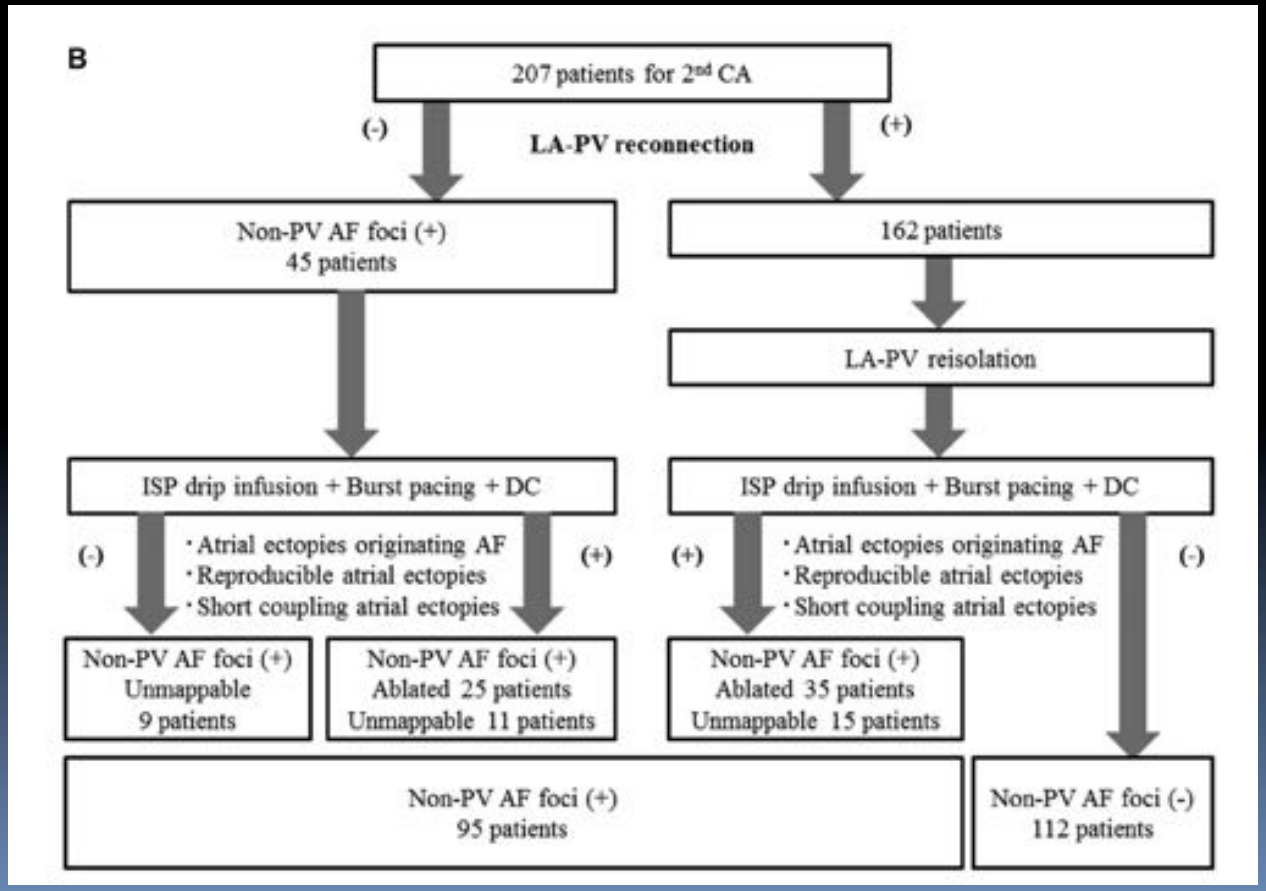


no reconnected all PVs

Impact of Non-Pulmonary Vein Foci on the Outcome of the Second Session of Catheter Ablation for Paroxysmal Atrial Fibrillation

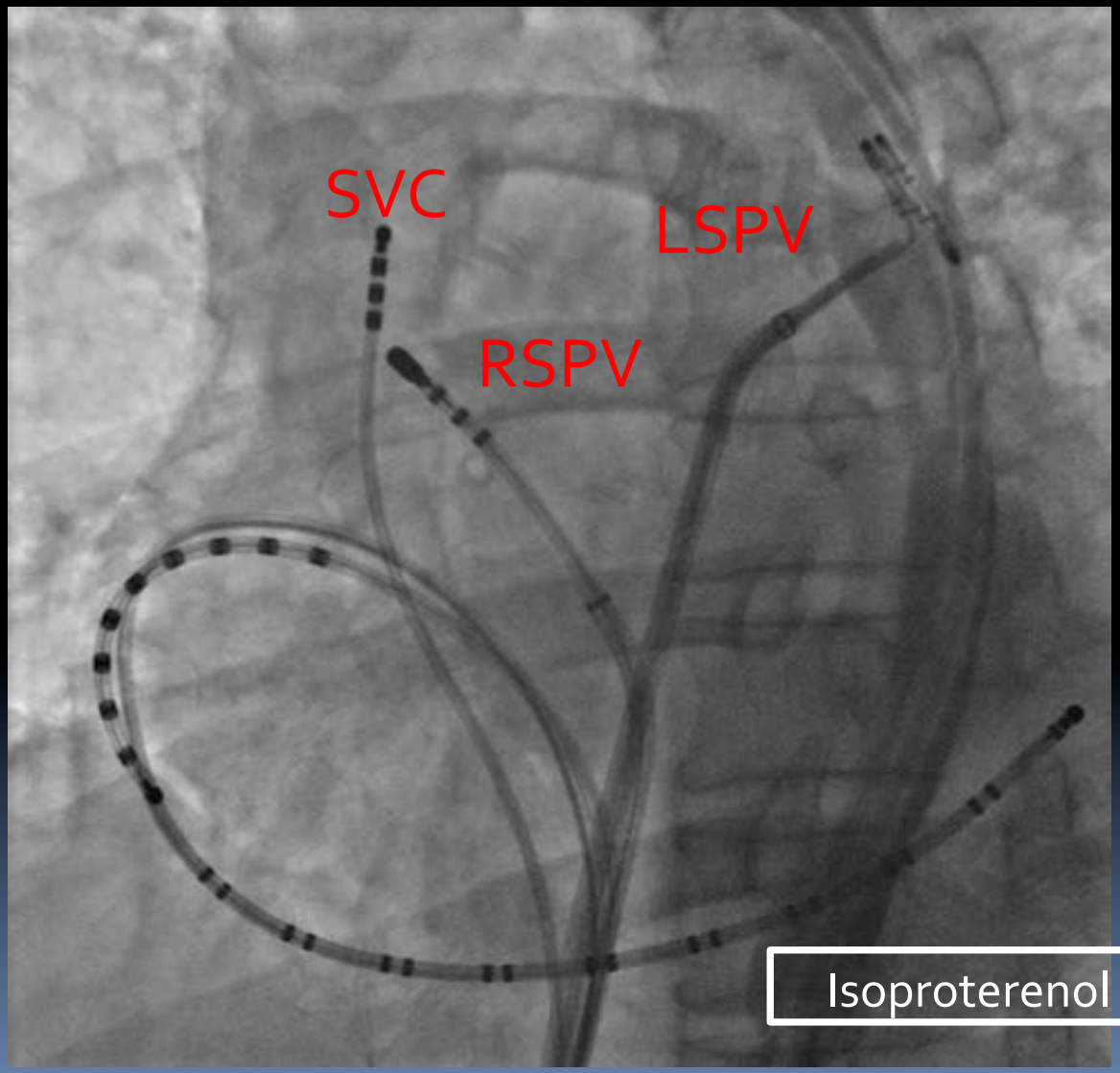
MASATERU TAKIGAWA, M.D.,*,#,† ATSUSHI TAKAHASHI, M.D.,* TAISHI KUWAHARA, M.D.,* KENJI OKUBO, M.D.,* YOSHIHIDE TAKAHASHI, M.D.,* EMIKO NAKASHIMA, M.D.,* YUJI WATARI, M.D.,* KAZUYA YAMAO, M.D.,* JUN NAKAJIMA, M.D.,* KATSUMASA TAKAGI, M.D.,* SHIGEKI KIMURA, M.D.,* HIROYUKI HIKITA, M.D.,* KENZO HIRAO, M.D.,# and MITSUAKI ISOBE, M.D.†

J Cardiovasc Electrophysiol, Vol. 26, pp. 739-746, July 2015

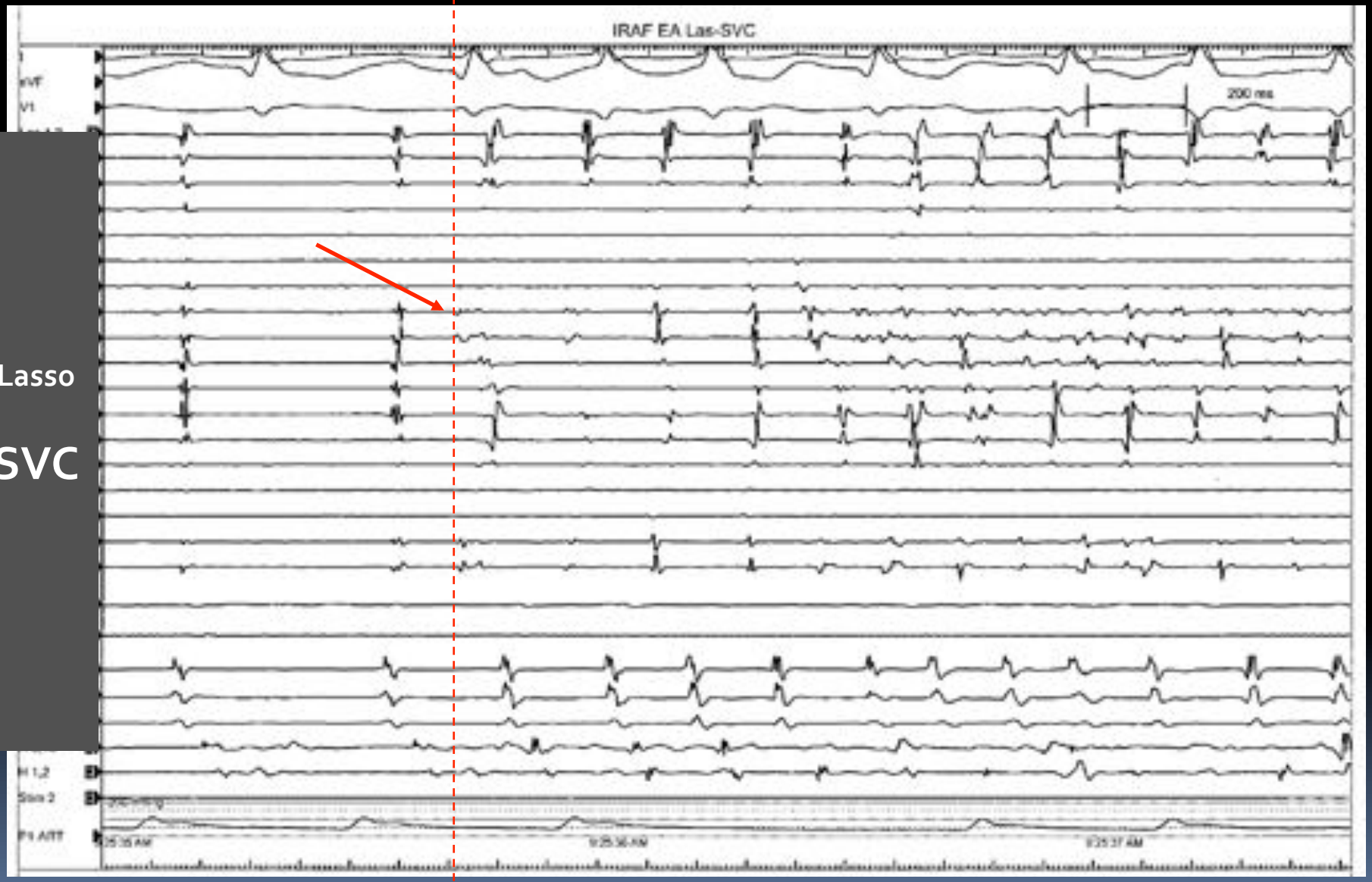


Trigger Evaluation,

IRAF after DC shock under Isoproterenol

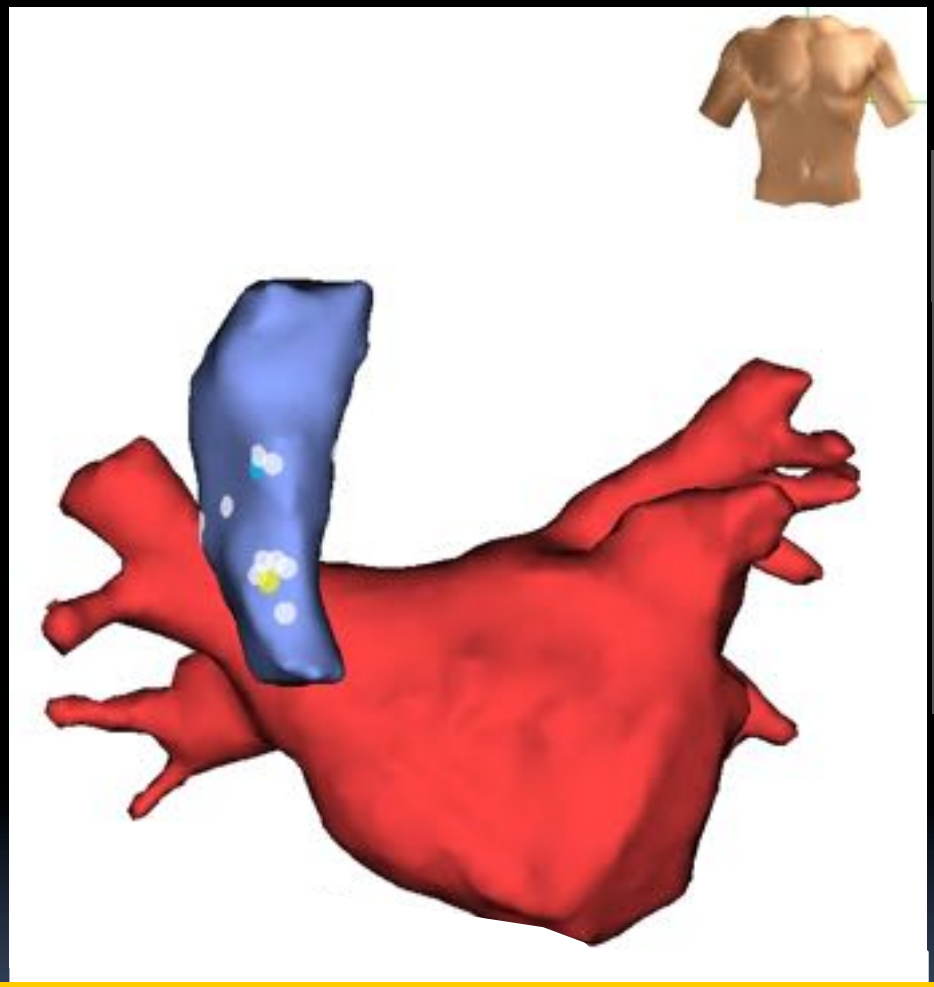


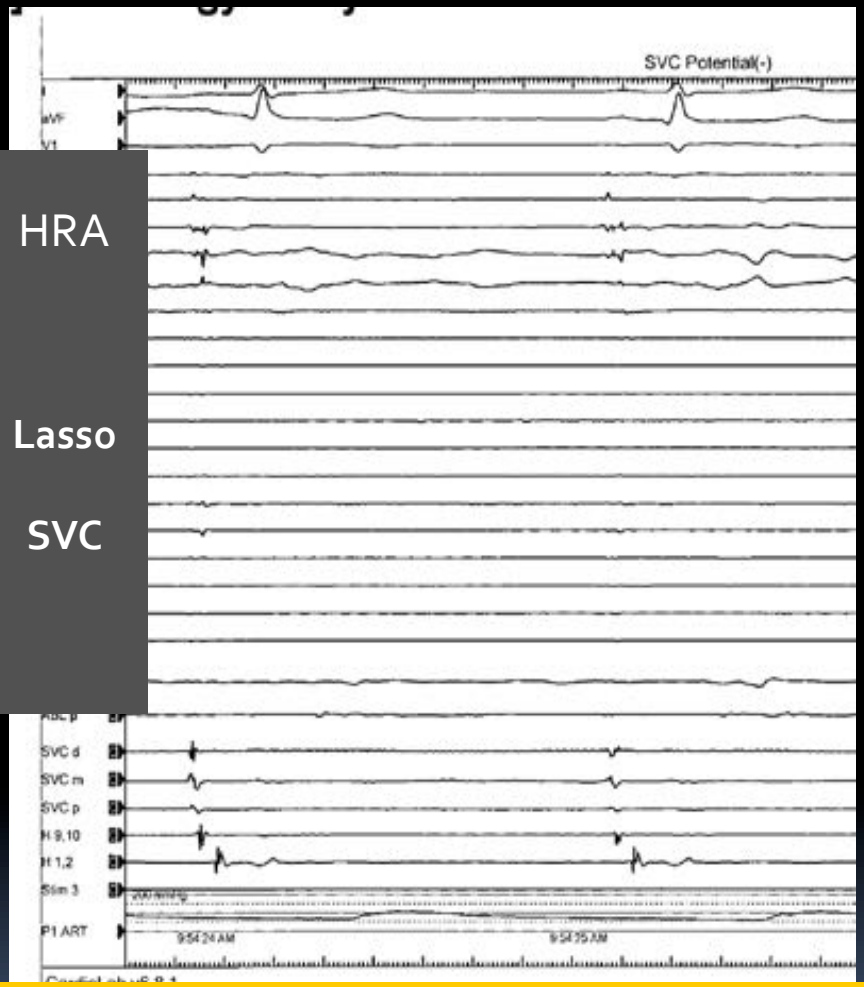
Isoproterenol 10 ~ 20 ugm


IRAF EA Las-SVC
aVF
V1
200 ms
H 1,2
Sins 2
P4 ATT
9:25:35 AM
9:25:36 AM
9:25:37 AM

Lasso

SVC





Effective Trigger test can uncover the origin of AF.

- It remains to be determined whether the "inducibility test after termination" of long-lasting persistent AF improves the outcome.

Clinical Significance of Induced AT After Termination of Longstanding Persistent AF Using a Stepwise Approach

Nagamoto and Kim, JCE 2012

Ablation for Long-lasting Persistent AF♪

Stepwise approach

1. PVI+ 2. CFAE map guided biatrial ablation

↓

AT♪

↑

Entrainment mapping
Electroanatomical mapping
Catheter ablation

↓

Sinus Rhythm♪

↓

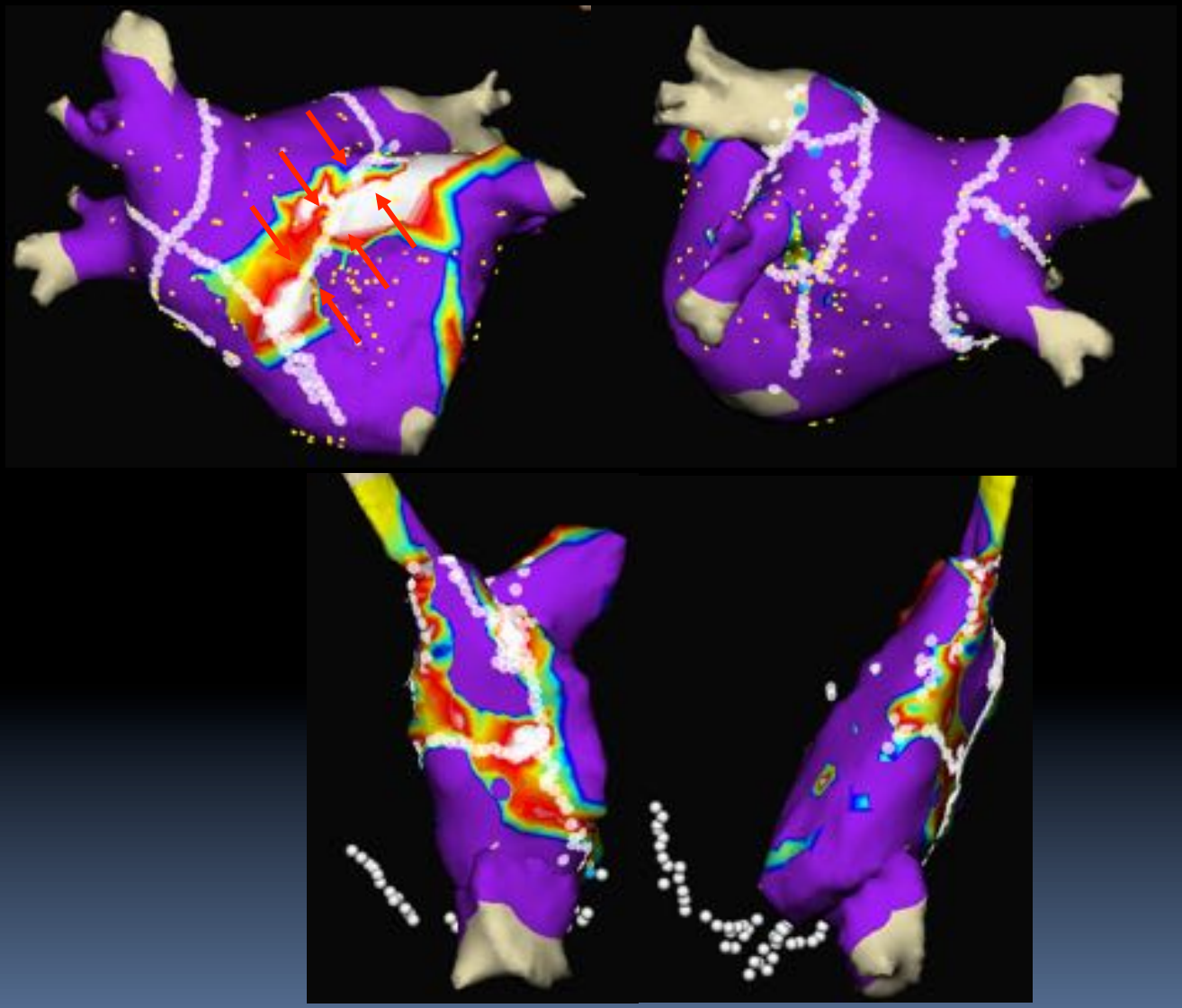
Induction (Burst pacing with/without ISP

↓ Non-inducible♪ ↓ Inducible♪

↓

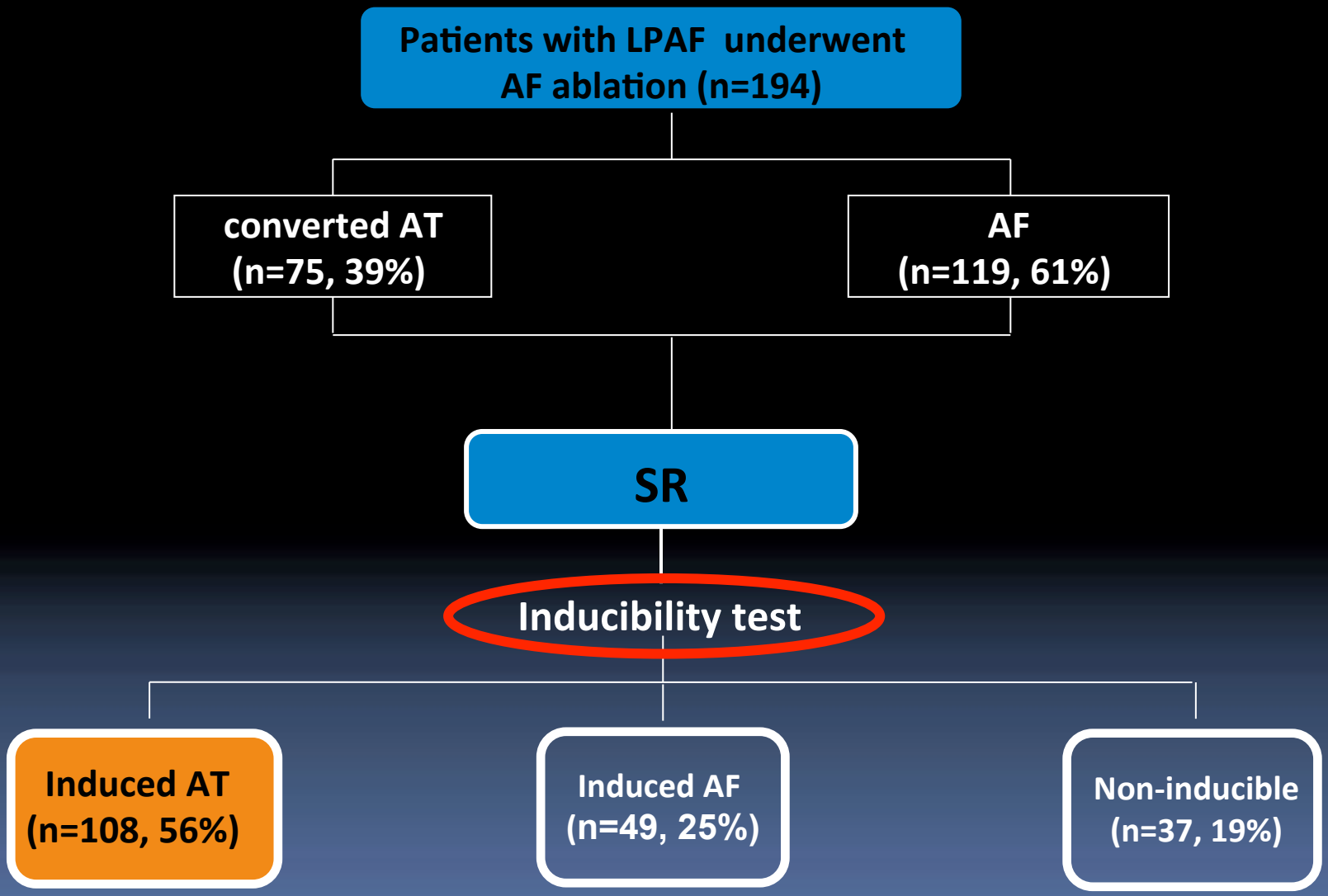
Endpoint of the procedure♪

Post-PVI, CFAE Guided AF Ablation



Nagamoto and Kim, JCE 2012

Clinical Significance of Induced AT After Termination of Longstanding Persistent AF Using a Stepwise Approach

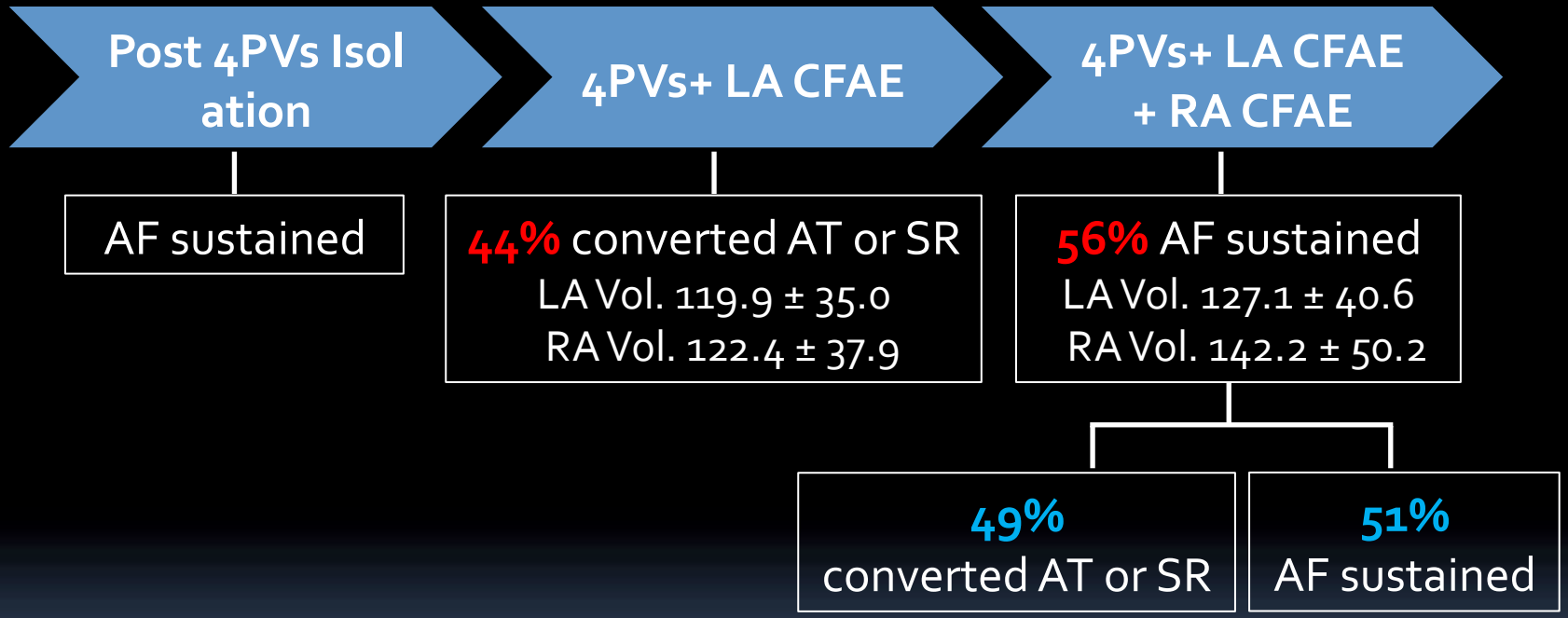


Nagamoto and Kim, JCE 2012

Inducibility test after termination of long-lasting persistent AF♪

- RFCA targeted induced ATs with longer CL (>270 ms) after termination of PeAF decreased recurrence rate of AF/AT. ♪

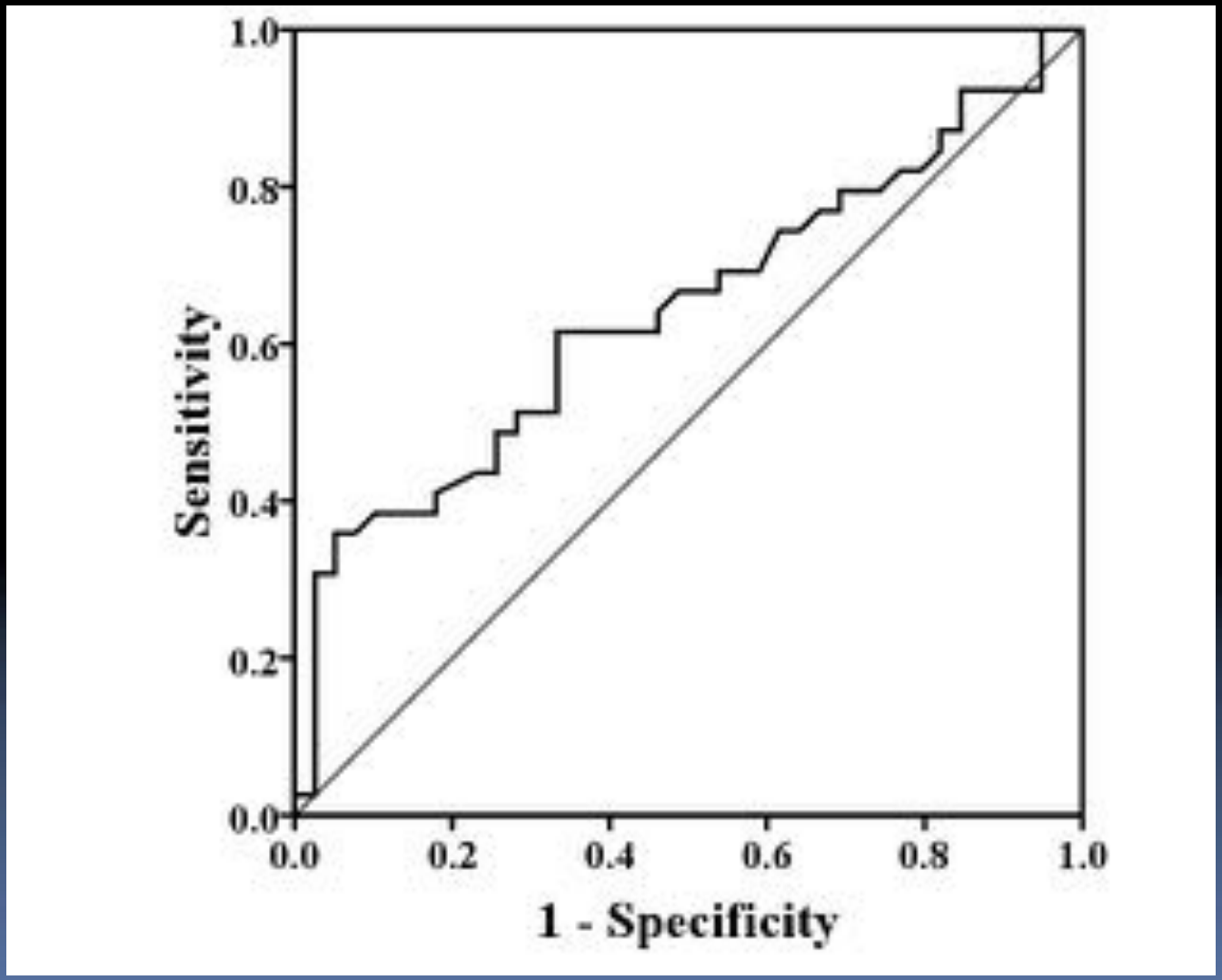
Persistent AF Ablation

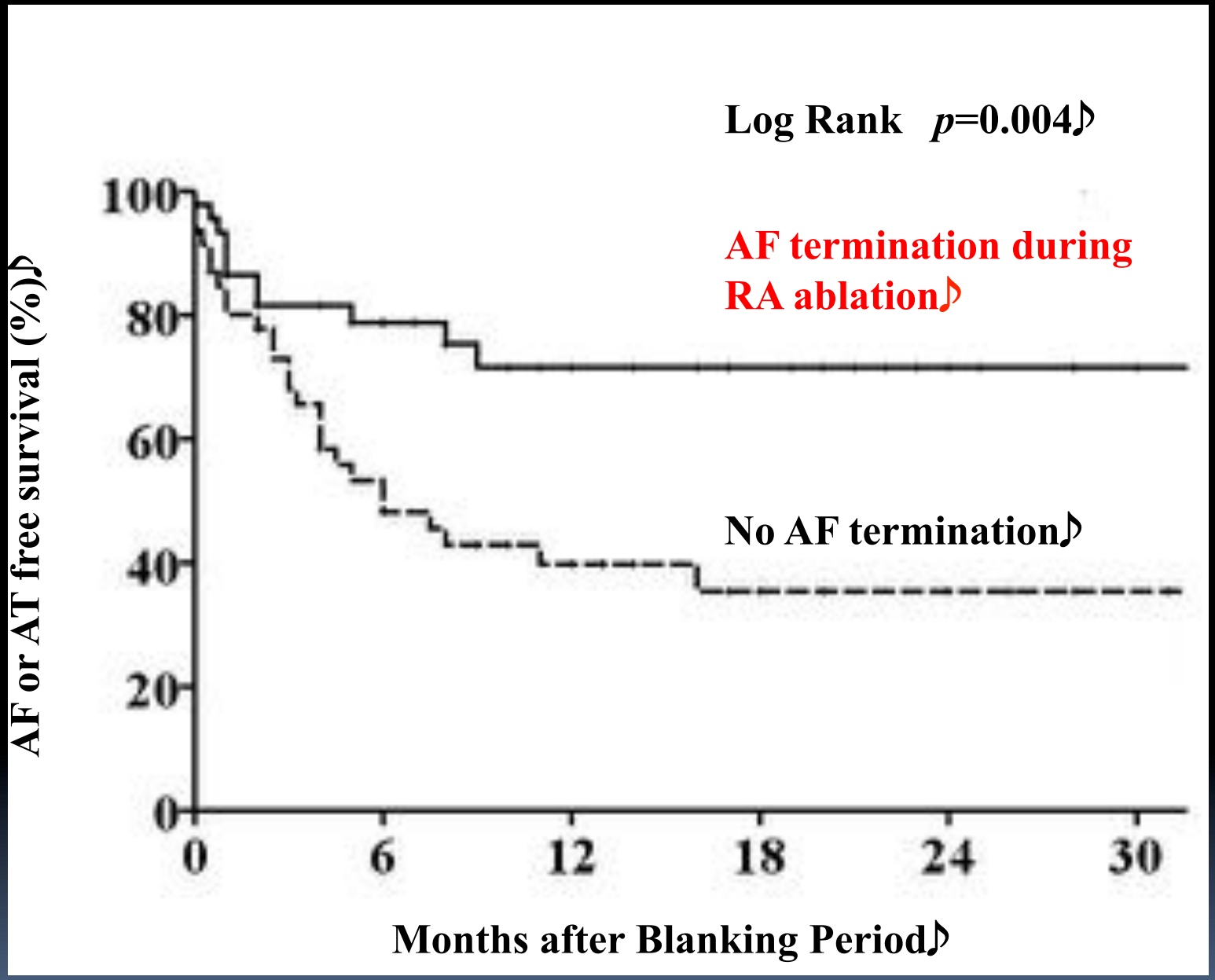


≒72% converted AT or SR

*Chen and Kim. J Cardiovasc Electrophysiol, 2013;*24(9):949-57

RA volume 145 mm^3 predicting AF termination during RA CFAE ablation. Sensitivity of 51% and Specificity of 73%.





No. at Risk						
AF termination	46	27	17	12	7	2
No AF termination	47	21	13	7	5	2

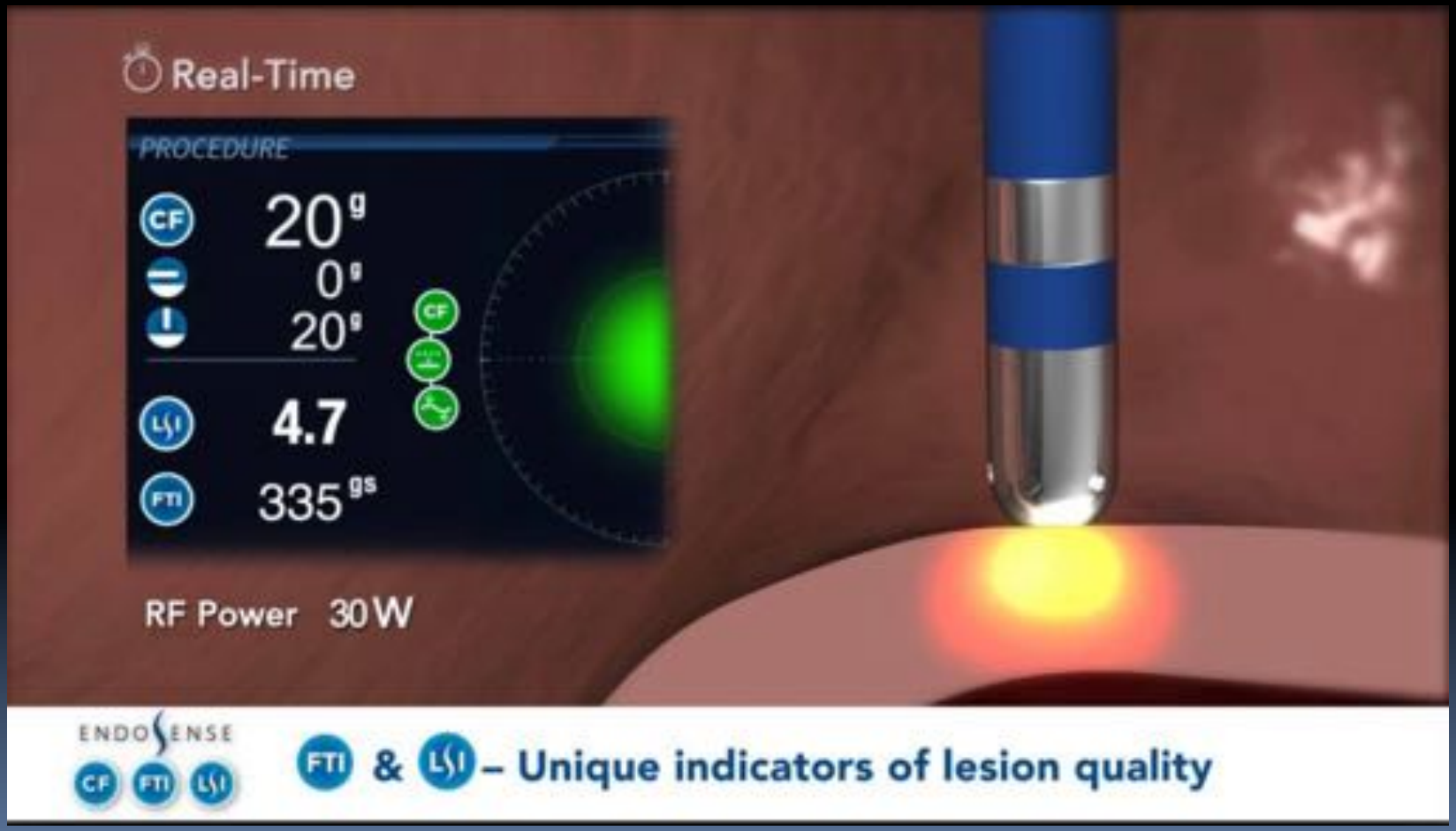
Automated CFAE Guided RA Ablation ♪

- RA CFAE clustered at specific anatomical structures such as the RAA and crista terminalis, and that additional RA CFAE ablation terminated AF in ≈50% of patients with LPeAF in whom LA ablation alone was unsuccessful.

Kim YH. Circ J 2012; 76: 1299 – 1306


Young-Hoon Kim MD PhD
KU
MC
Arrhythmia Center KUMC
Korea University Medical Center
Seoul Korea

Contact force catheter



The relationship between contact force and clinical outcome during radiofrequency catheter ablation of atrial fibrillation in the TOCCATA study

Vivek Y. Reddy, MD,* Dipen Shah, MD, FHRS,† Josef Kautzner, MD,‡ Boris Schmidt, MD,‡‡
Nadir Saoudi, MD, PhD, FHRS,§ Claudia Herrera, MD,‖ Pierre Jaïs, MD, PhD,¶
Gerhard Hindricks, MD, PhD,# Petr Peichl, MD,‡ Aude Yulzari, MS,** Hendrik Lambert, PhD,**
Petr Neuzil, MD, PhD,†† Andrea Natale, MD, PhD, FHRS,‡‡ Karl-Heinz Kuck, MD, PhD, FHRS§§

- Thirty-two patients with PAF underwent PVI using cat heter with a CF sensor (TactiCath Set).
- They were followed for 12 months.

EFFICAS I, II : CF guided ablation improved efficacy.

CONTEMPORARY REVIEW

Use of contact force sensing technology during radiofrequency ablation reduces recurrence of atrial fibrillation: A systematic review and meta-analysis

Muhammad R. Afzal, MD, Jawaria Chatta, MD, Anweshan Samanta, MBBS, Salman Waheed, MD, Morteza Mahmoudi, MD, Rachel Vukas, BS, Sampath Gunda, MD, Madhu Reddy, MD, FHRS, Buddhadeb Dawn, MD, Dhanunjaya Lakkireddy, MD, FHRS

From the Division of Cardiovascular Diseases, Cardiovascular Research Institute, University of Kansas Medical Center, Kansas City, Kansas.

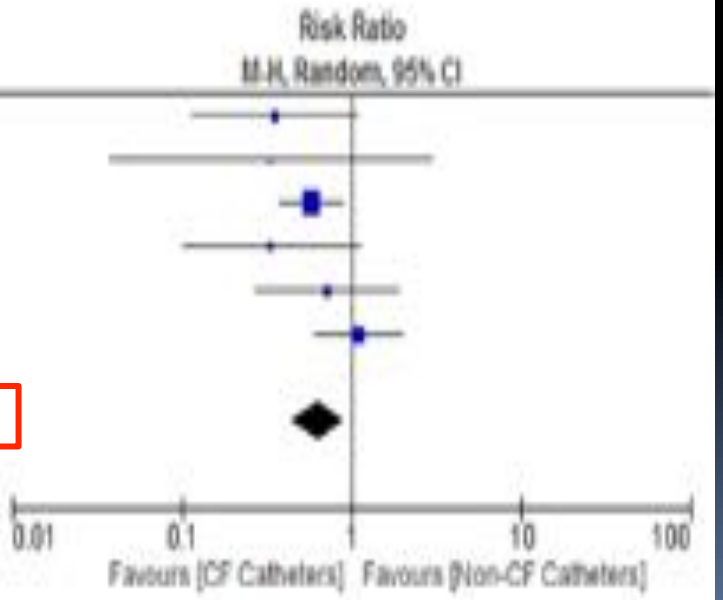
Heart Rhythm2015;12:1990–1996

9 studies (2 RCT, 7 observational), 1148 patients

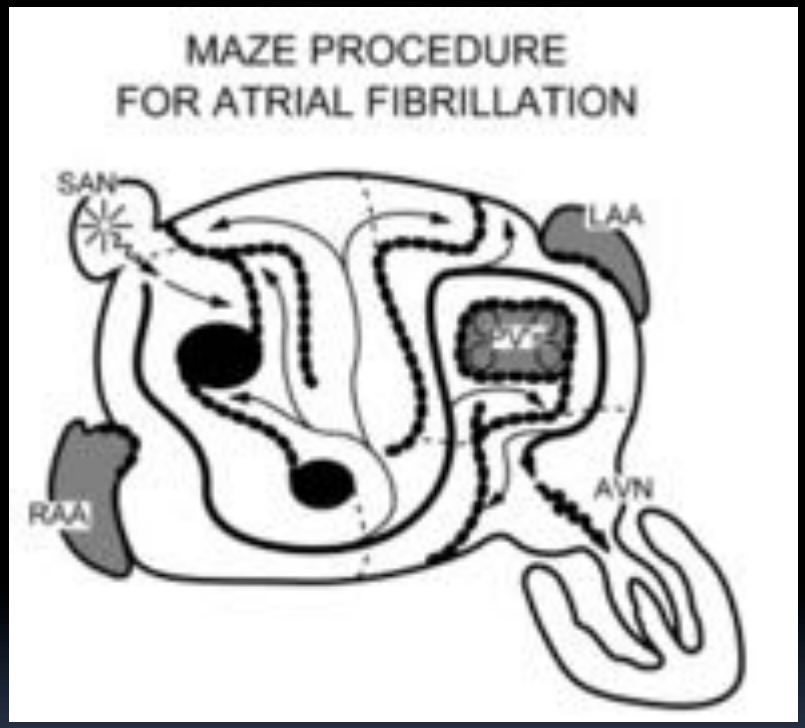
Study or Subgroup	CF Catheters Events	CF Catheters Total	Non-CF Catheters Events	Non-CF Catheters Total	Weight	Risk Ratio M-H, Random, 95% CI
Andrade et al 2014	3	26	17	60	9.4%	0.35 [0.11, 1.09]
Kimura et al 2014	1	19	3	19	2.7%	0.33 [0.04, 2.93]
Mansour et al 2014 (Abstract)	20	83	60	143	40.8%	0.57 [0.37, 0.86]
Marijon et al 2014	3	30	9	30	8.4%	0.33 [0.10, 1.11]
Sciarra et al 2014	5	21	7	21	12.2%	0.71 [0.27, 1.86]
Wakili et al 2014	13	32	13	35	26.4%	1.09 [0.60, 1.99]
Total (95% CI)		210		298	100.0%	0.63 [0.44, 0.91]
Total events	45		109			

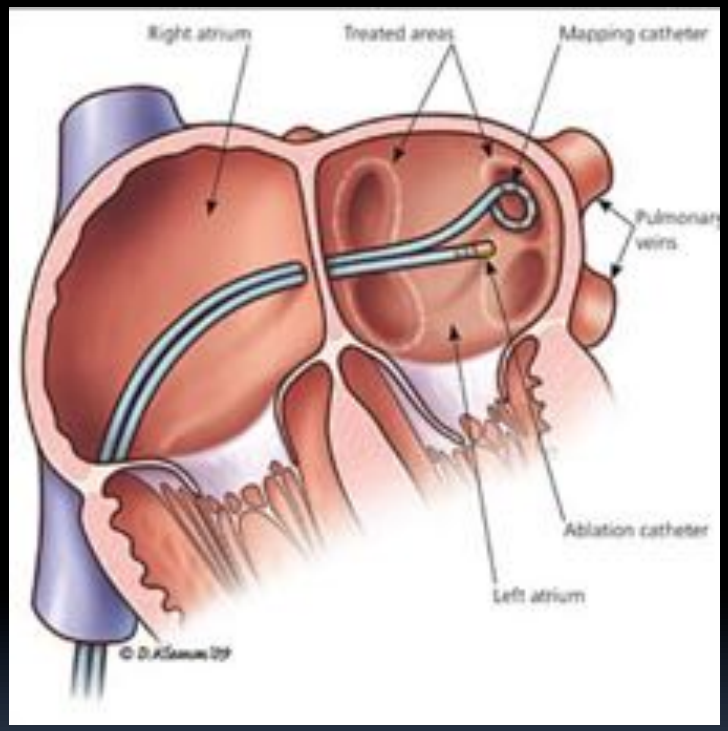
Heterogeneity: Tau² = 0.04; Chi² = 6.06, df = 5 (P = 0.30); I² = 18%

Test for overall effect: Z = 2.49 (P = 0.01)



From technical standpoint, to achieve transmurality remains great challenges.

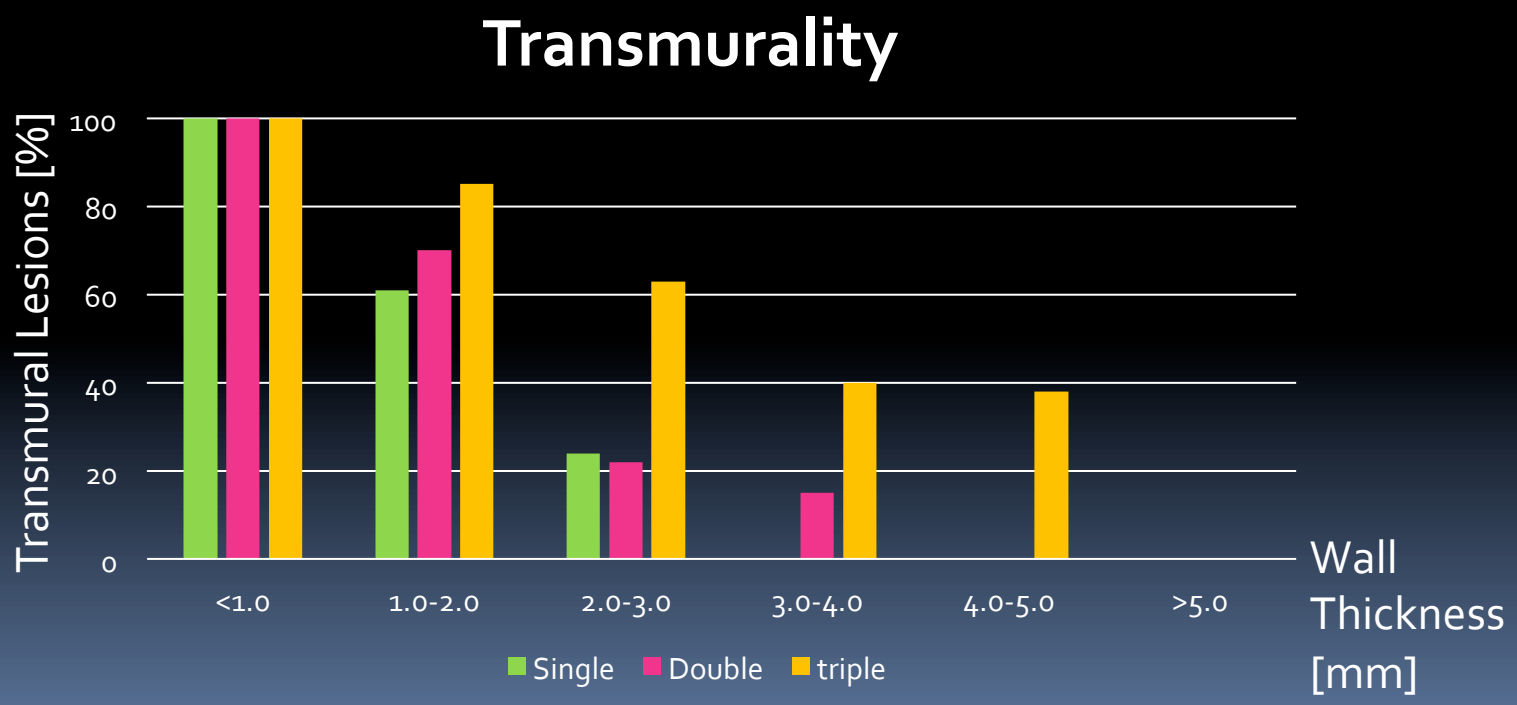




Achievement of Transmurality

ORIGINAL ARTICLE

Histological assessment of transmurality after repeated radiofrequency ablation of the left atrial wall



Gen Thorac Cardiovasc Surg (2014) 62:428–433

The Success rate of Catheter Ablation is Lo wer than that of Surgical Treatment

1. Difficulty of transmural ablation

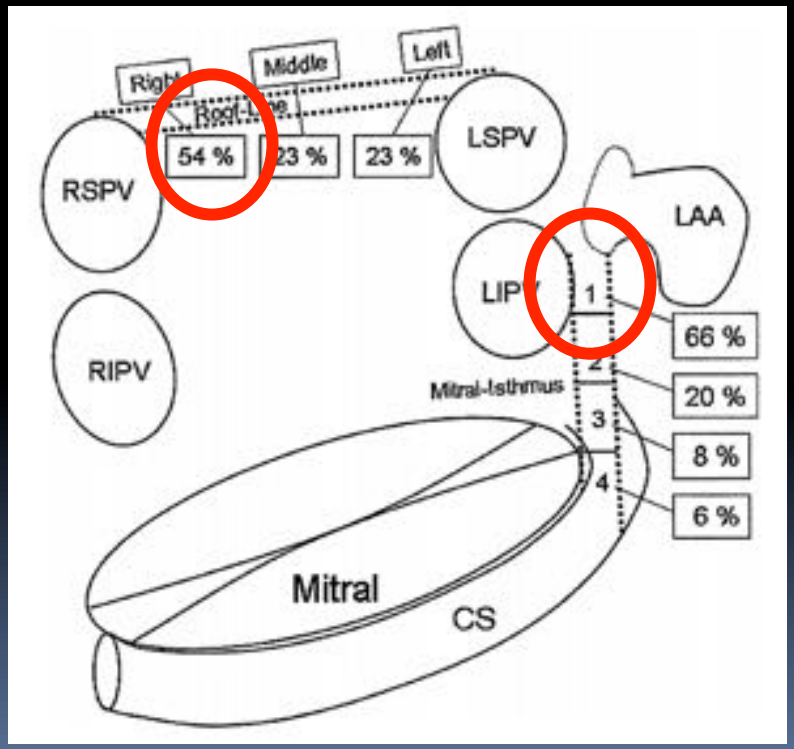
2. Disparity between epicardial and endo cardial potential

3. Gap and conduction recovery of linear a blation

The Limitation of Linear Ablation

- Achievement of complete conduction block rem ains challenging and conduction recovery is com mon.

- Conduction recovery in previous LA linear ablation



JCE . 2006. vol. 17, pp. 1106-1111

Hybrid Percutaneous Epicardial Catheter Ablation with Endocardial Ablation of AF

Hybrid endo- and epicardial catheter ablation via subxiphoid puncture is relevant and feasible in patients with high risk for left side pulmonary vein stenosis and those with suspicious intra-cardiac mural thrombus.

H-N Pak & Y-H Kim et al. JCE 2007;18:917-23
J-I Choi, H-N Pak & Y-H Kim et al. Circ J. 2009;73(2):384-7

Hybrid Thoracoscopic Surgical and Transvenous Catheter Ablation of Atrial Fibrillation

Laurent Pison, MD,* Mark La Meir, MD,† Jurren van Opstal, MD, PhD,* Yuri Blaauw, MD, PhD,* Jos Maessen, MD, PhD,† Harry J. Crijns, MD, PhD*

Maastricht, the Netherlands

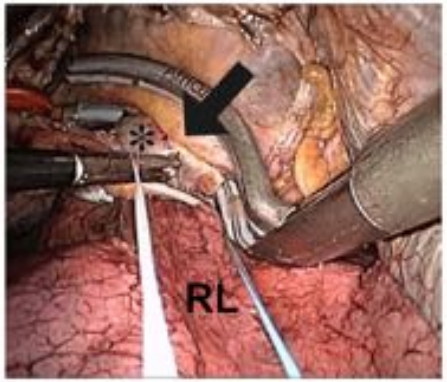


Figure 1 Right Pulmonary Vein Isolation

A large antral lesion (**arrow**) is created using a bipolar radiofrequency clamp, resulting in complete isolation of the right pulmonary veins (PVs). The antrum of the right PVs (*) is clearly visible. RL = right lung.

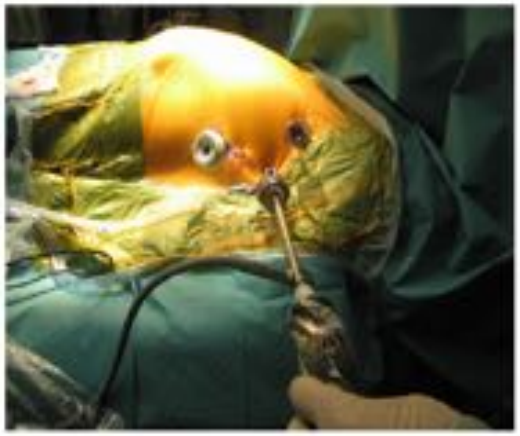
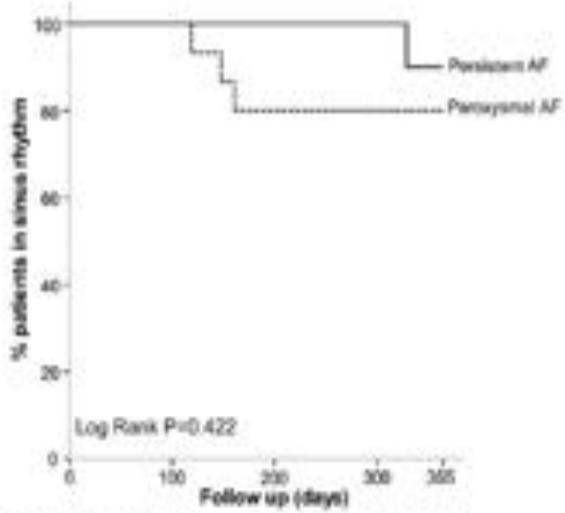


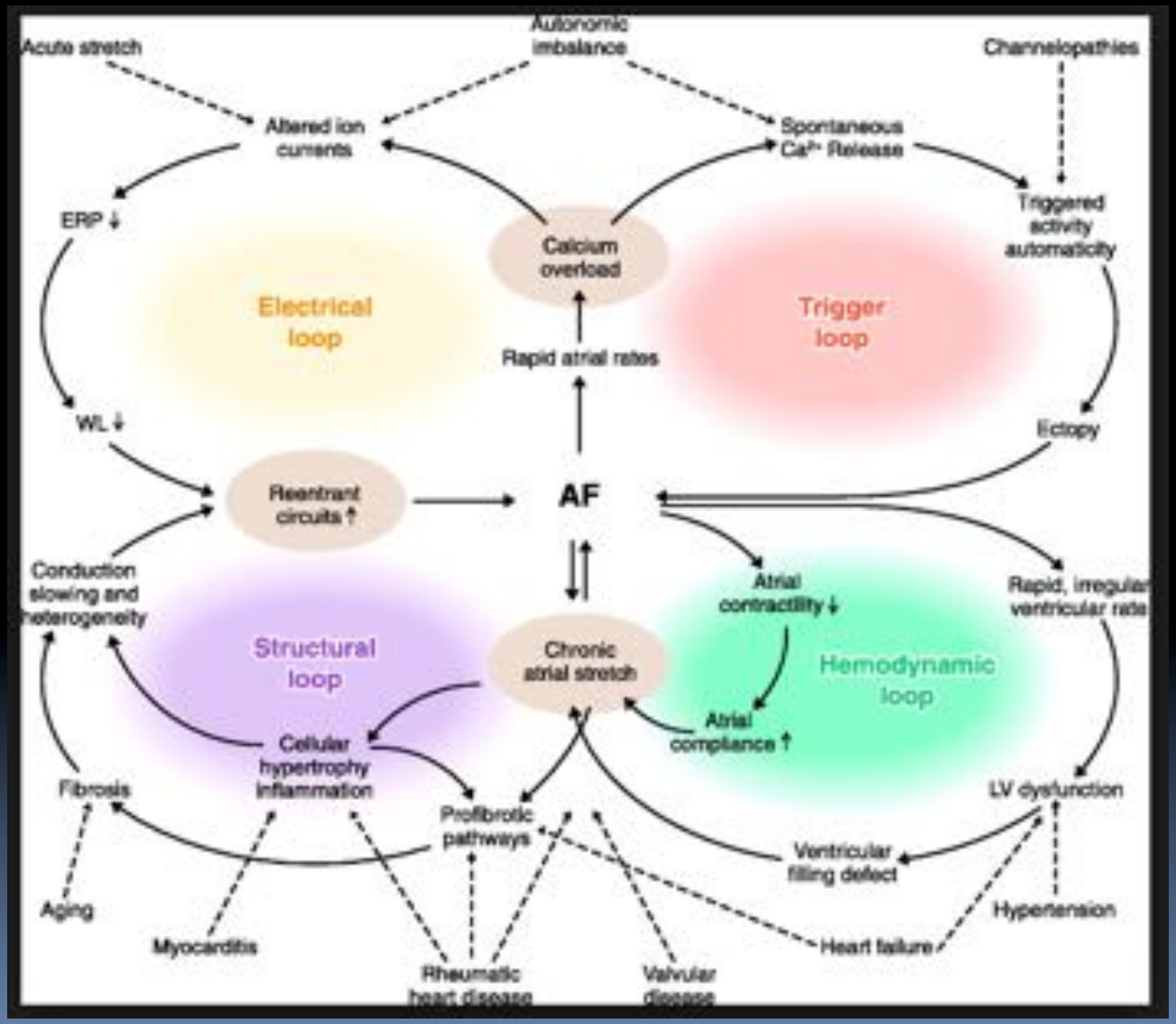
Figure 2 Placement of Ports on the Left Side of the Patient

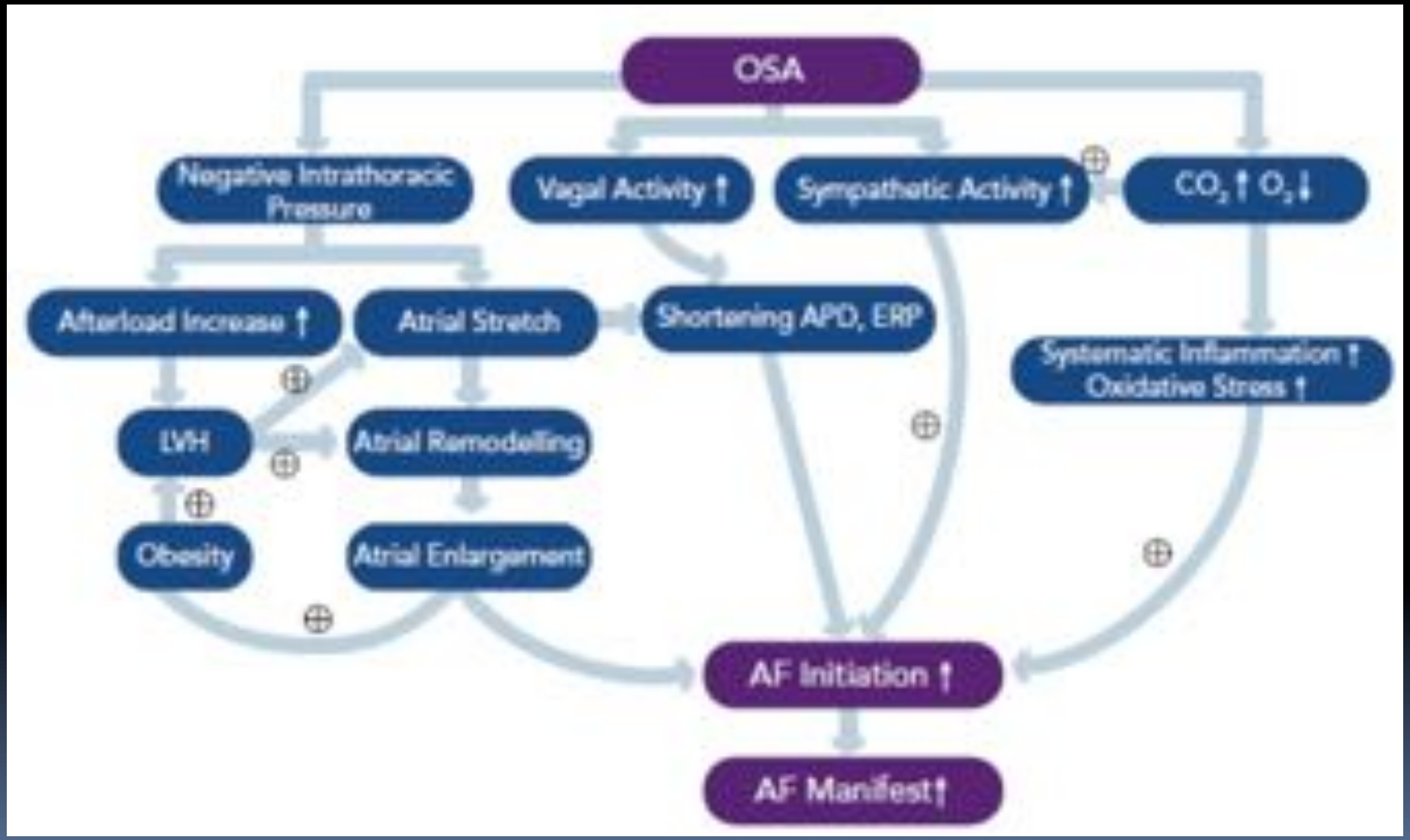


During Ablation

- AF cycle length before ablation influences the result of procedure.
- Trigger test can uncover the origin of AF outside PVs.
- Clinical outcome is better in patients with AF terminati on during ablation.
- New technology (CF) and ablation strategy (epi-endoca rdial ablation and hybrid ablation) can improve the clini cal outcome.

In a considerable instances, AF is mere result of ri sk factor




OSA
Negative Intrathoracic Pressure
Vagal Activity ↑
Sympathetic Activity ↑
CO_2 ↑ O_2 ↓
Afterload Increase ↑
Atrial Stretch
Shortening APD, ERP
Systematic Inflammation ↑
Oxidative Stress ↑
LVH
Atrial Remodelling
Obesity
Atrial Enlargement
AF Initiation ↑
AF Manifest ↑

Europace (2014) 16, 1309–1314
doi:10.1093/europace/euu066

CLINICAL RESEARCH
Ablation for atrial fibrillation

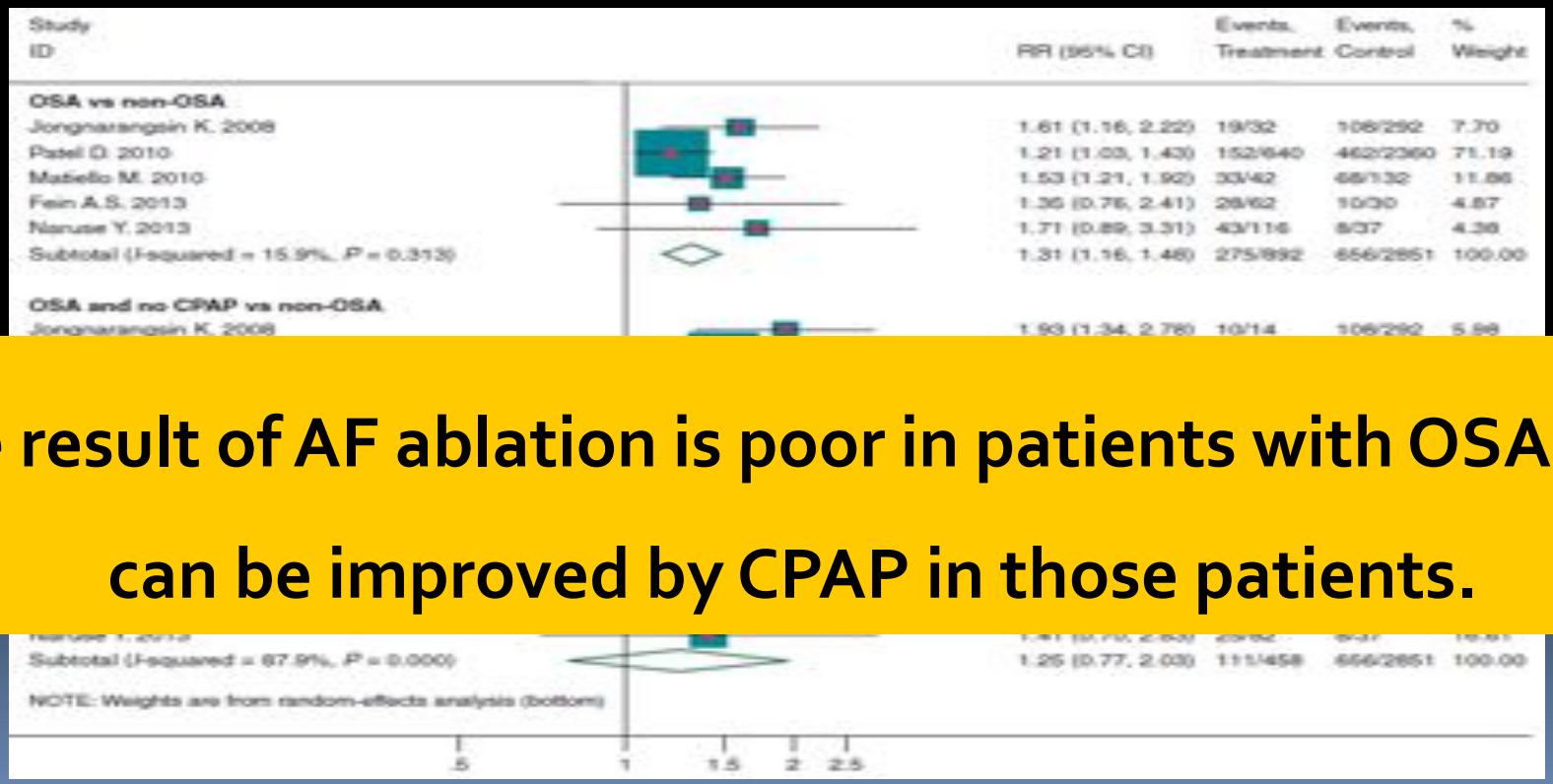
Efficacy of catheter ablation of atrial fibrillation in patients with obstructive sleep apnoea with and without continuous positive airway pressure treatment: a meta-analysis of observational studies

Li Li[1*], Zeng-wu Wang[2], Jie Li[1], Xing Ge[1], Li-zhu Guo[1], Ying Wang[1], Wei-hua Guo[1], Chen-xi Jiang[3], and Chang-sheng Ma[1,3*]

[1]Cardiovascular Center, Beijing Tong Ren Hospital, Capital Medical University, Beijing, China; [2]State Key Laboratory of Cardiovascular Disease, Fu Wai Hospital, National Center for Cardiovascular Disease, CAMC and PUMC, Beijing, China; and [3]Cardiology Department, Atrial Fibrillation Center, Beijing An Zhen Hospital, Capital Medical University, Beijing, China

Received 16 November 2013; accepted after revision 18 February 2014; online publish-ahead-of-print 2 April 2014

3743 patients AF



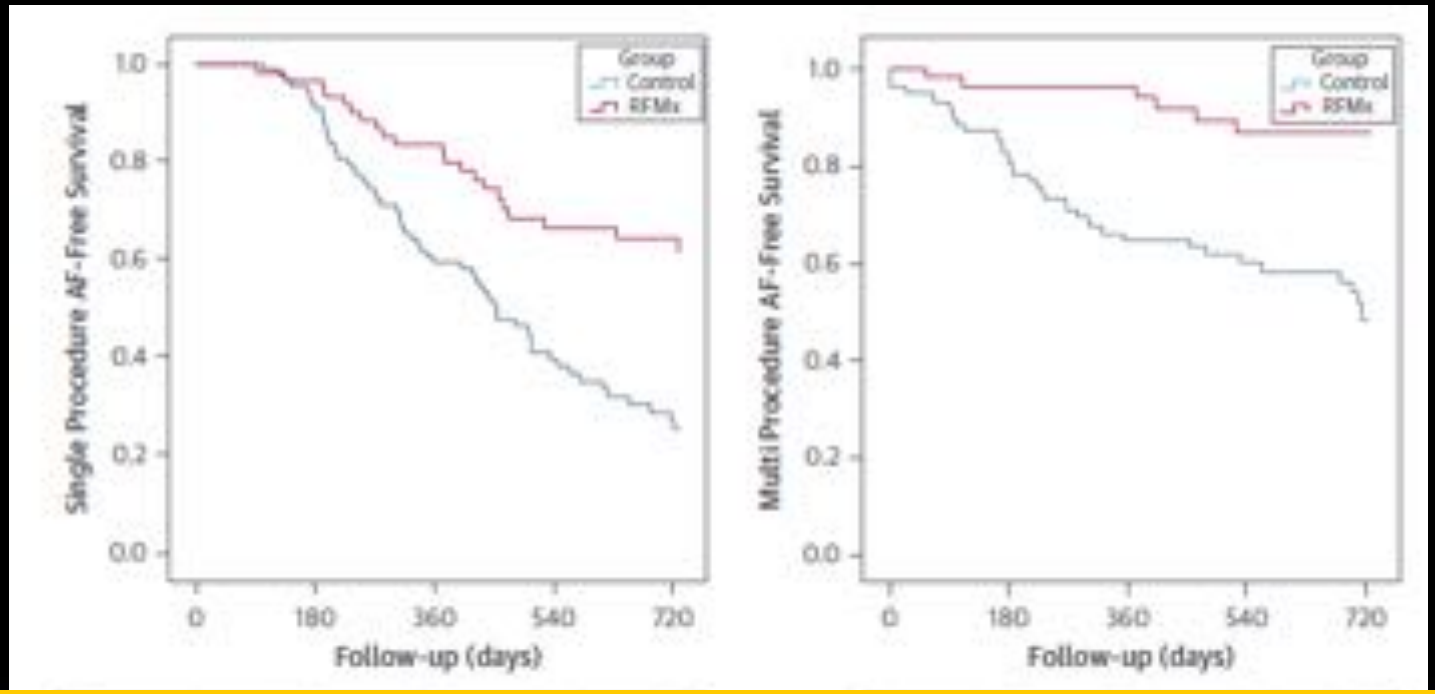
The result of AF ablation is poor in patients with OSA and can be improved by CPAP in those patients.

Aggressive Risk Factor Reduction Study for Atrial Fibrillation and Implications for the Outcome of Ablation

The ARREST-AF Cohort Study

Rajeev K. Pathak, MBBS,* Melissa E. Middeldorp,* Dennis H. Lau, MBBS, PhD,* Abhinav B. Mehta, MAcrSr,† Rajiv Mahajan, MD,* Darragh Twomey, MBBS,* Muayad Alasady, MBBS,*† Lorraine Hanley, BSc,* Nicholas A. Antic, MBBS, PhD,‡ R. Doug McEvoy, MBBS, MD,‡ Jonathan M. Kalman, MBBS, PhD,‡ Walter P. Abhayaratna, MBBS, PhD,‡ Prashanthan Sanders, MBBS, PhD*

- BP < 130/80 mmHg in office and 24-h ambulatory BP measurements
- High protein and low glycemic index food → weight decrease up to 10%
- Lieft style modification of statin → LDL < 100 mg/dl



Risk factor reduction facilitate the rhythm control st rategies.

Post Ablation

- Risk factor reduction including (HTN, DM, OSA, obesity….) is important after AF abla tion.

Pre-Ablation Evaluation

In addition,

- The extent of LGE on MRI,
- Stroke stratification schema (CHA2DS2-VASc, R2-CHADS2 score)
- DC energy parameters

can be used to predict successful ablation.

During Ablation

- AF cycle length before ablation influences the result of procedure.
- Trigger site evaluation can uncover the origin of AF out side PVs.
- Clinical outcome is better in patients with AF terminati on during ablation.
- New technology (contact force catheter) and ablation s trategy (epi-endocardial ablation and hybrid ablation) c an improve the clinical outcome.

Post Ablation

- Risk factor reduction including (HTN, DM, OSA, obesity….) is important after AF abla tion.

Pre-Ablation Evaluation
During Ablation
Post Ablation

- The clinical outcome can be predicted successfully based on several pre-, during and post-ablation parameters.

- Tailored ablation approach based on these predictors can effectively improve the result of AF ablation.

Korea University Medical Center