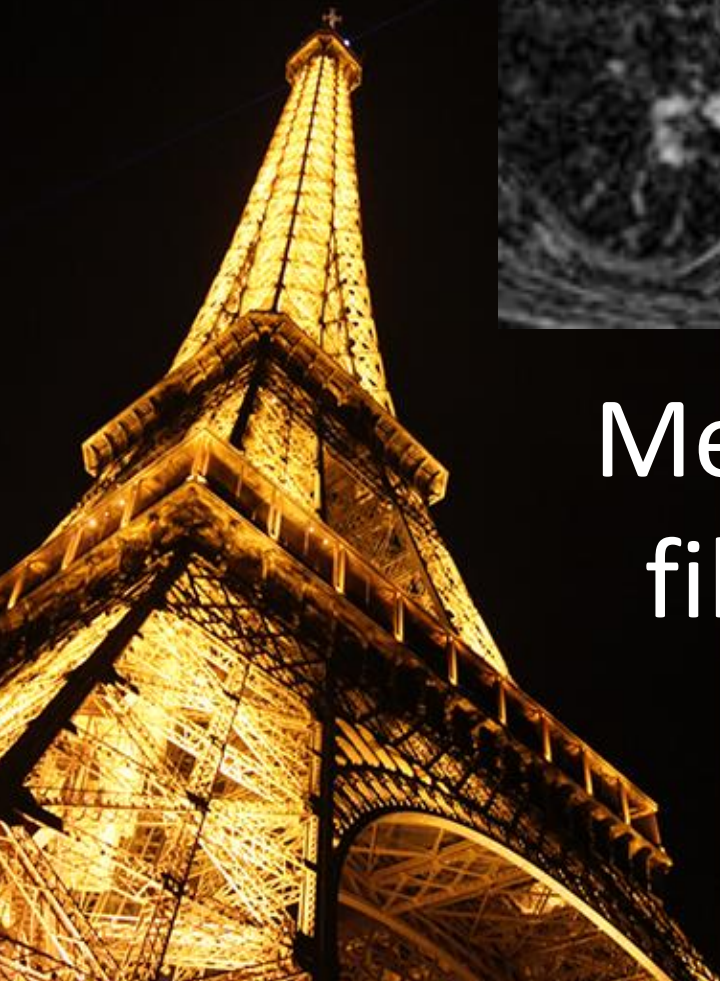
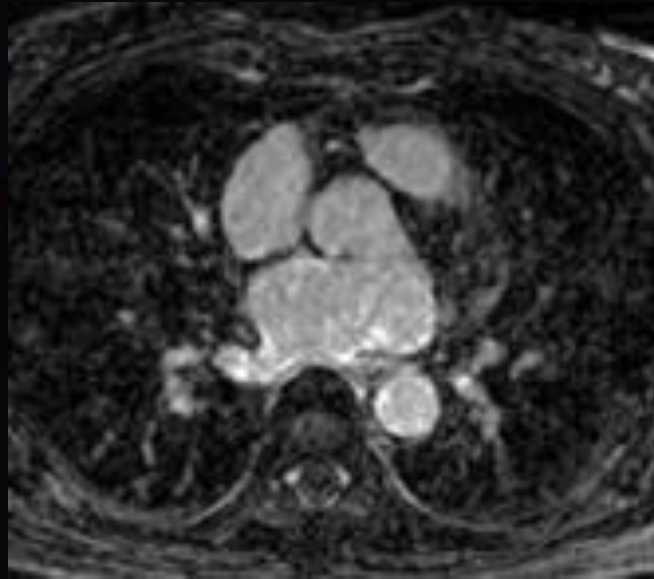


March 2-3

9th Congress Edition

Novotel PARIS Tour Eiffel



Mechanistic lessons from fibrosis analysis by MRI

Drs M.Aït Saïd, J.Horvilleur, J.Lacotte, A.Maltret
V.Manenti, F.Salerno (EP) & Pr J.Garot (MRI)
Institut Cardiovasculaire Paris Sud – Massy

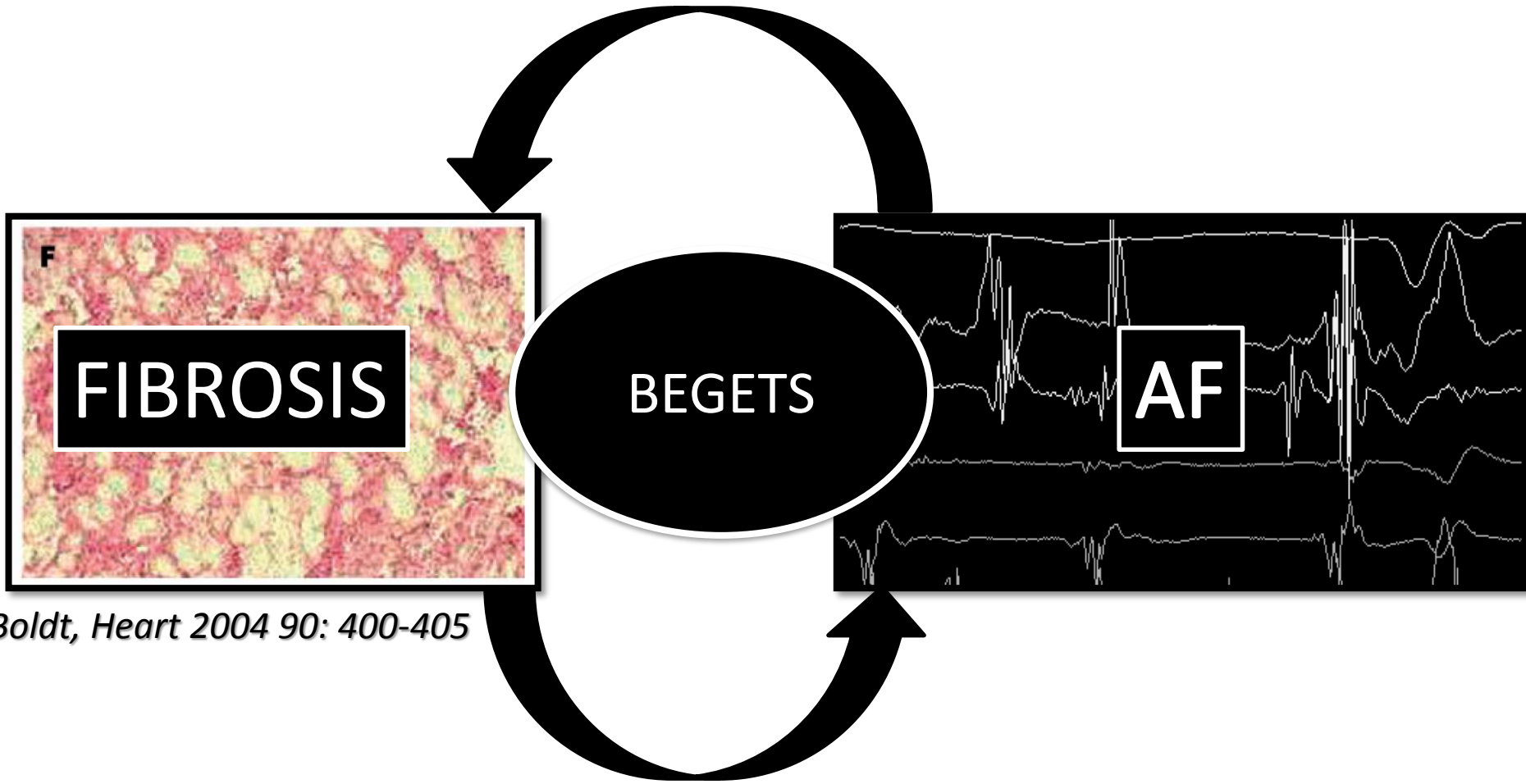
Disclosure

Speaker name: Jérôme Horvilleur

potential conflicts of interest to report:

NONE on this topic



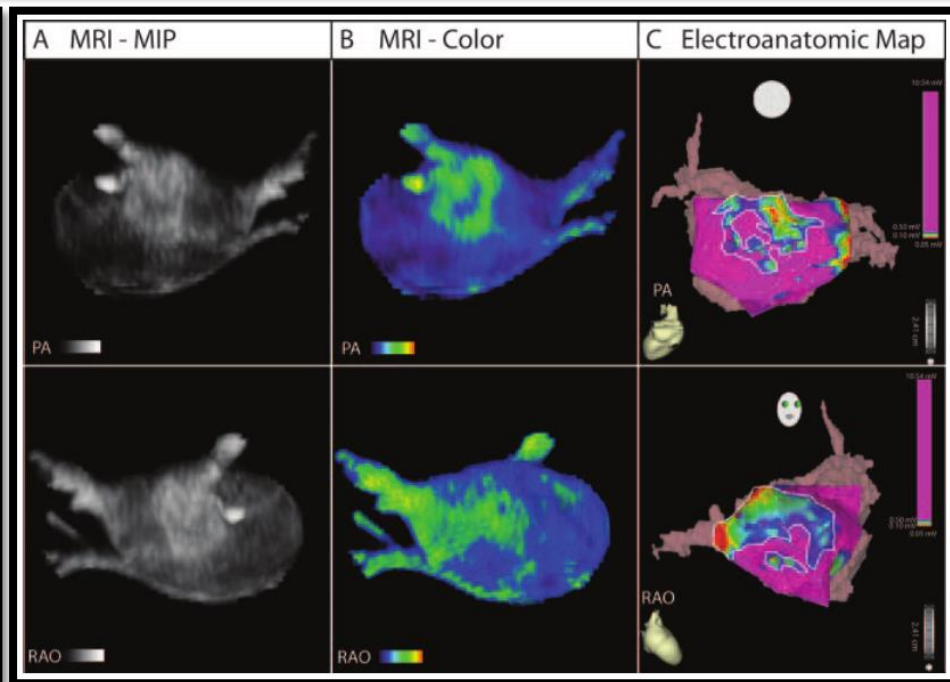
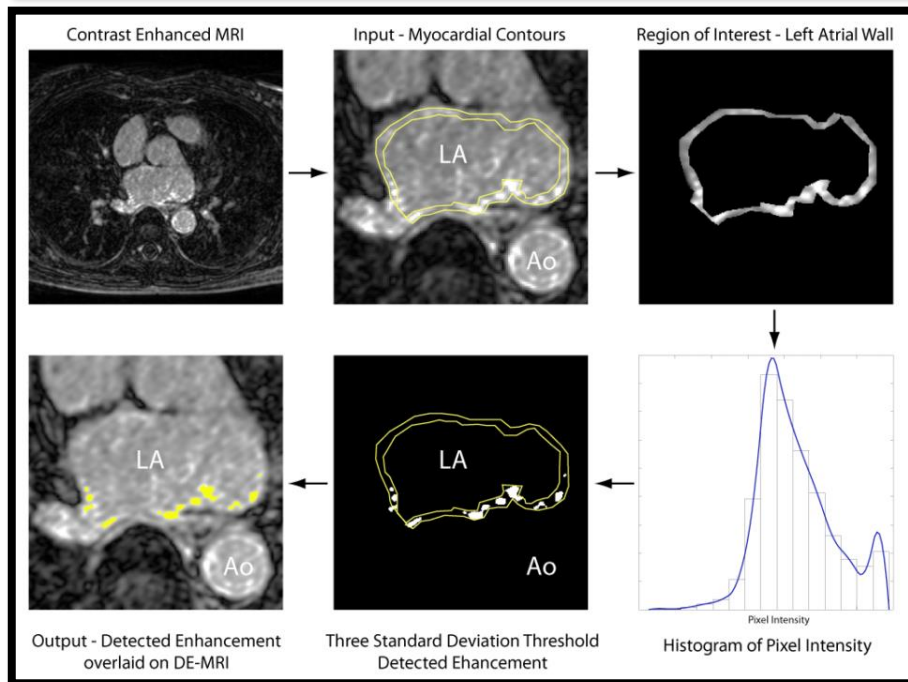


Boldt, Heart 2004 90: 400-405

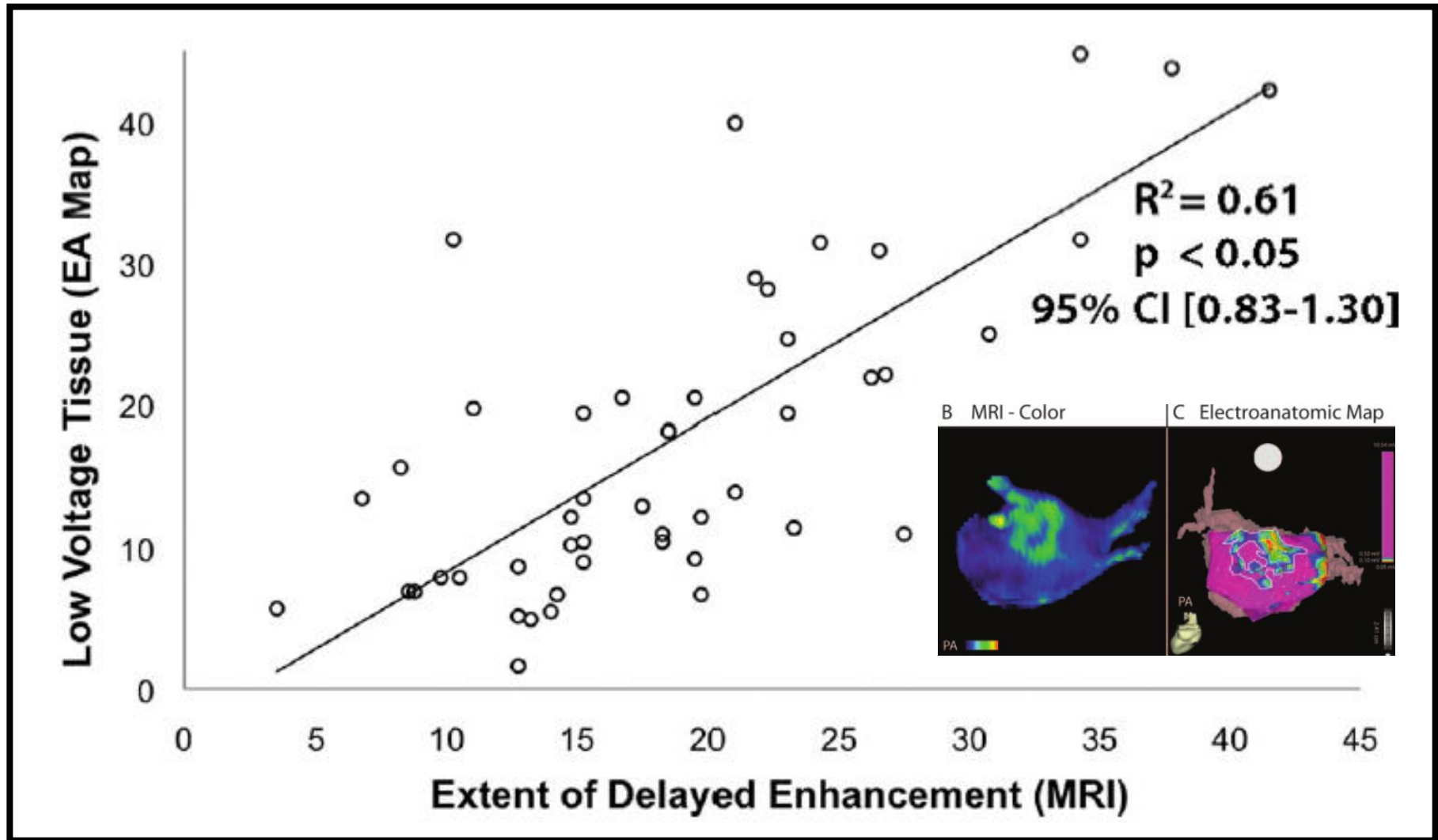
1 **LGE-MRI**
can identify LA fibrosis

Detection and Quantification of Left Atrial Structural Remodeling With Delayed-Enhancement Magnetic Resonance Imaging in Patients With Atrial Fibrillation

Robert S. Oakes, Troy J. Badger, Eugene G. Kholmovski, Nazem Akoum, Nathan S. Burgon, Eric N. Fish, Joshua J.E. Blauer, Swati N. Rao, Edward V.R. DiBella, Nathan M. Segerson, Marcos Daccarett, Jessiciah Windfelder, Christopher J. McGann, Dennis Parker, Rob S. MacLeod and Nassir F. Marrouche



DE-CMR vs Carto voltage map



**2 LGE-MRI (fibrosis)
predicts AF substrate**

Original Investigation

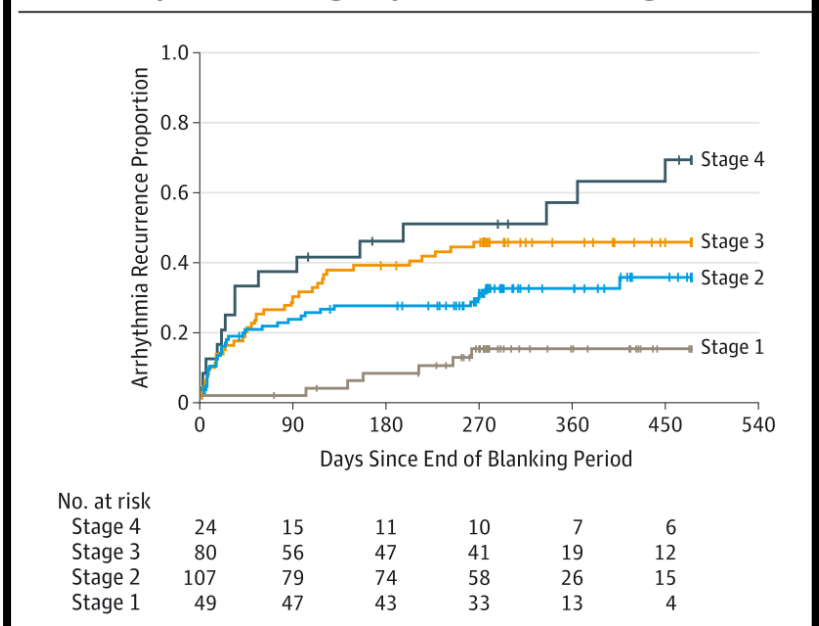
Association of Atrial Tissue Fibrosis Identified by Delayed Enhancement MRI and Atrial Fibrillation Catheter Ablation

The DECAAF Study

Nassir F. Marrouche, MD; David Wilber, MD; Gerhard Hindricks, MD; Pierre Jais, MD; Nazem Akoum, MD; Francis Marchlinski, MD; Eugene Kholmovski, PhD; Nathan Burgon, BSc; Nan Hu, PhD; Lluís Mont, MD; Thomas Deneke, MD; Mattias Duytschaever, MD; Thomas Neumann, MD; Moussa Mansour, MD; Christian Mahnkopf, MD; Bengt Herweg, MD; Emile Daoud, MD; Erik Wissner, MD; Paul Bansmann, MD; Johannes Brachmann, MD

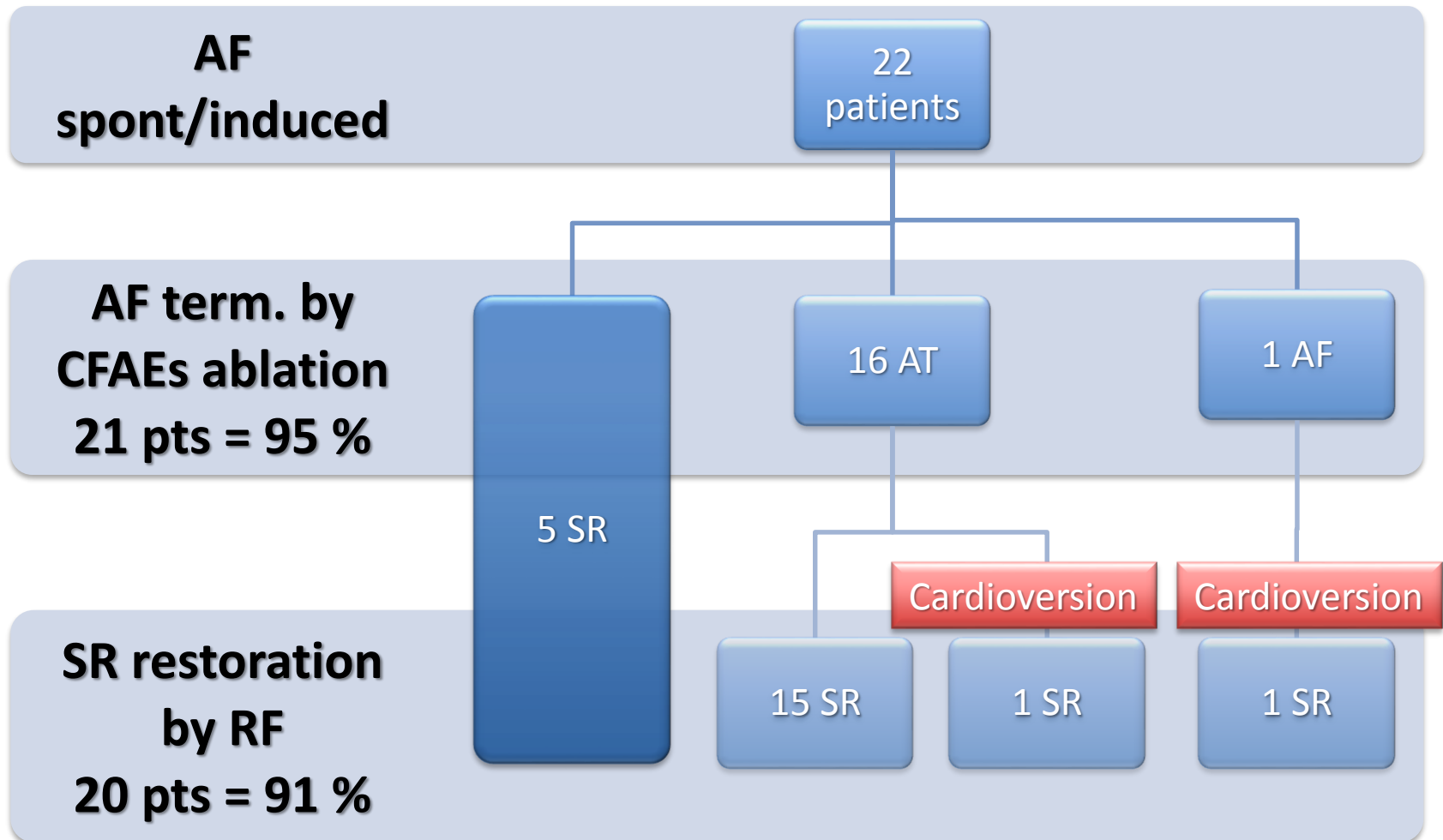
	No. (%) of Patients in Final Cohort	
	Included (n = 260)	Excluded (n = 69)
Sex		
Male	178 (68.5)	51 (73.9)
Female	82 (31.5)	18 (26.1)
AF type ^a		
Paroxysmal	168 (64.6)	36 (52.2)
Persistent	75 (28.8)	28 (40.6)
Permanent	17 (6.5)	3 (4.3)
Missing	0	2 (2.9)
Paroxysmal AF by fibrosis stage ^b		
1	49 (18.8)	
2	107 (41.2)	
3	80 (30.8)	
4	24 (9.2)	

Figure 4. Cumulative Incidence of Arrhythmia Recurrence Without Covariate Adjustment Through Day 475 After the Blanking Period

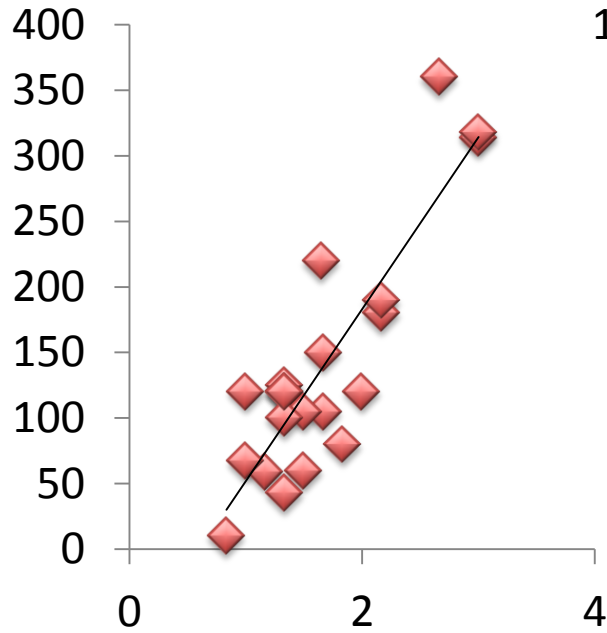


ICPS study

n=22, max AF duration 34.1 ± 61.2 months



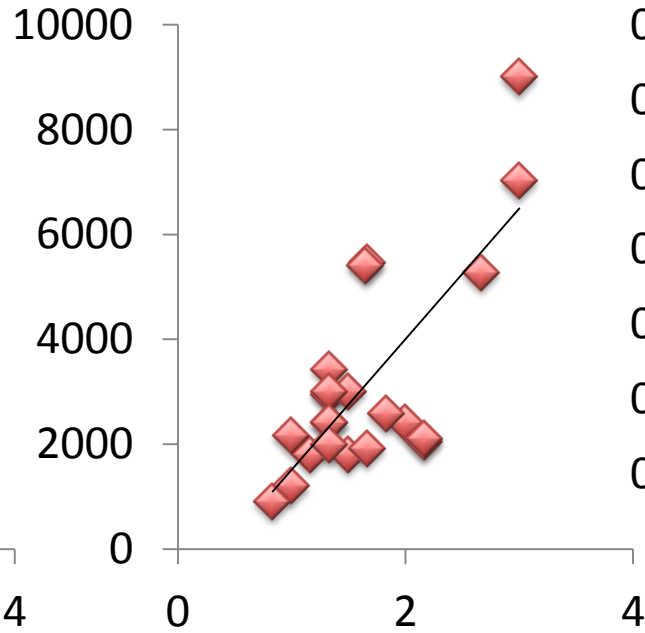
Time to terminate AF (min)



LA DE-CMR grade

Rho = 0.7 p = 0.0003

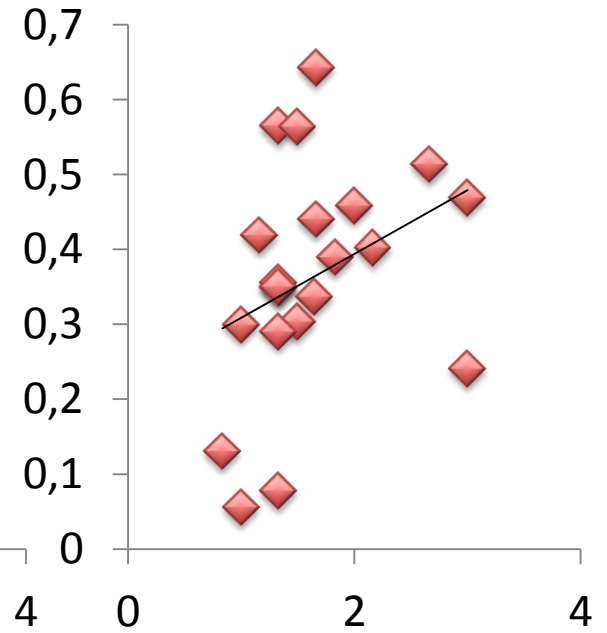
RF time (sec)



LA DE-CMR grade

Rho = 0.65 p = 0.001

CFAE area % LA surface



LA DE-CMR grade

Rho = 0.47 p = 0.003

3

LGE-MRI

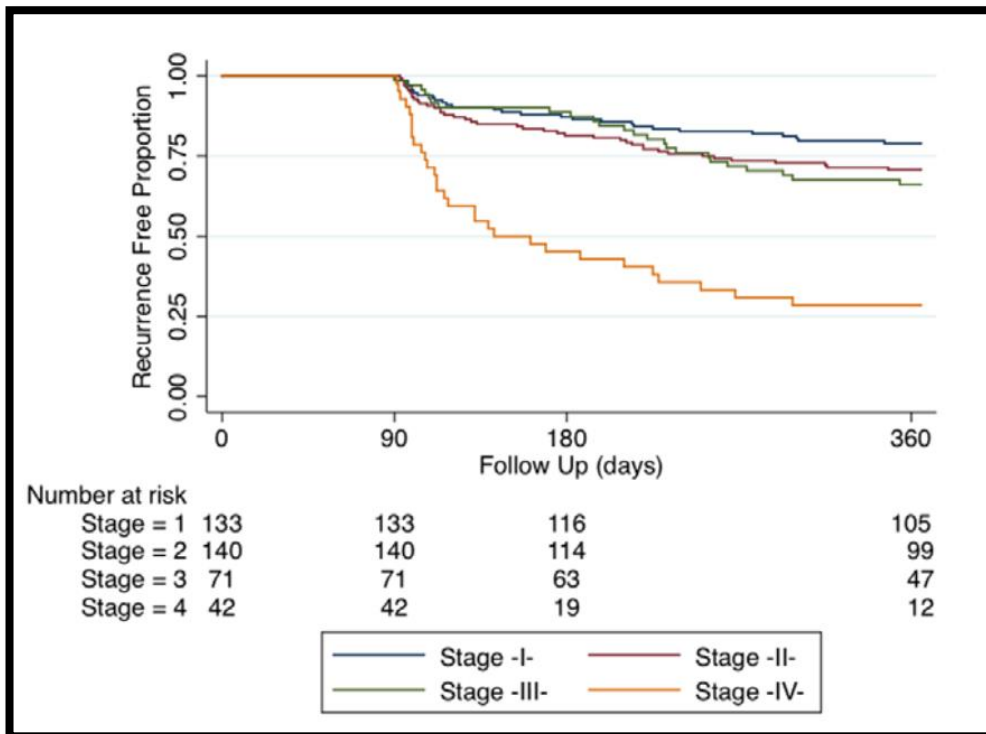
better than AF type?

(paroxysmal/persistent)

426 PAF/PsAF

PV isolation, posterior wall and septal debulking

	Stage I (n=133)	Stage II (n=140)	Stage III (n=71)	Stage IV (n=42)	P Value
Age, y	63±13	65±11	66±13	67±12	0.17
Women, %	33.8	30.7	42.3	47.6	0.06
Hypertension, %	62.9	61.4	57.8	66.7	0.81
Diabetes mellitus, %	11.4	12.9	21.1	21.4	0.08
Coronary disease, %	13.6	12.5	24.4	14.3	0.10
Congestive heart failure, %	6.1	13.0	12.7	7.1	0.41
LV ejection fraction, %	58±12	59±10	57±12	56±13	0.16
CVA/TIA, %	6.1	7.9	11.3	16.7	0.03
Paroxysmal AF, %	61.7	46.4	49.3	26.2	0.002
Persistent AF, %	38.4	53.6	50.7	73.8	0.002
Previous AAD use (%)	22.6	12.9	18.5	15.0	0.11
Atrial volume/BSA, mL/m ²	48±18	51±18	52±21	64±24	<0.0001
LA fibrosis, %	6.7±2.0	15.2±2.9	23.3±2.8	40.9±10.4	<0.0001

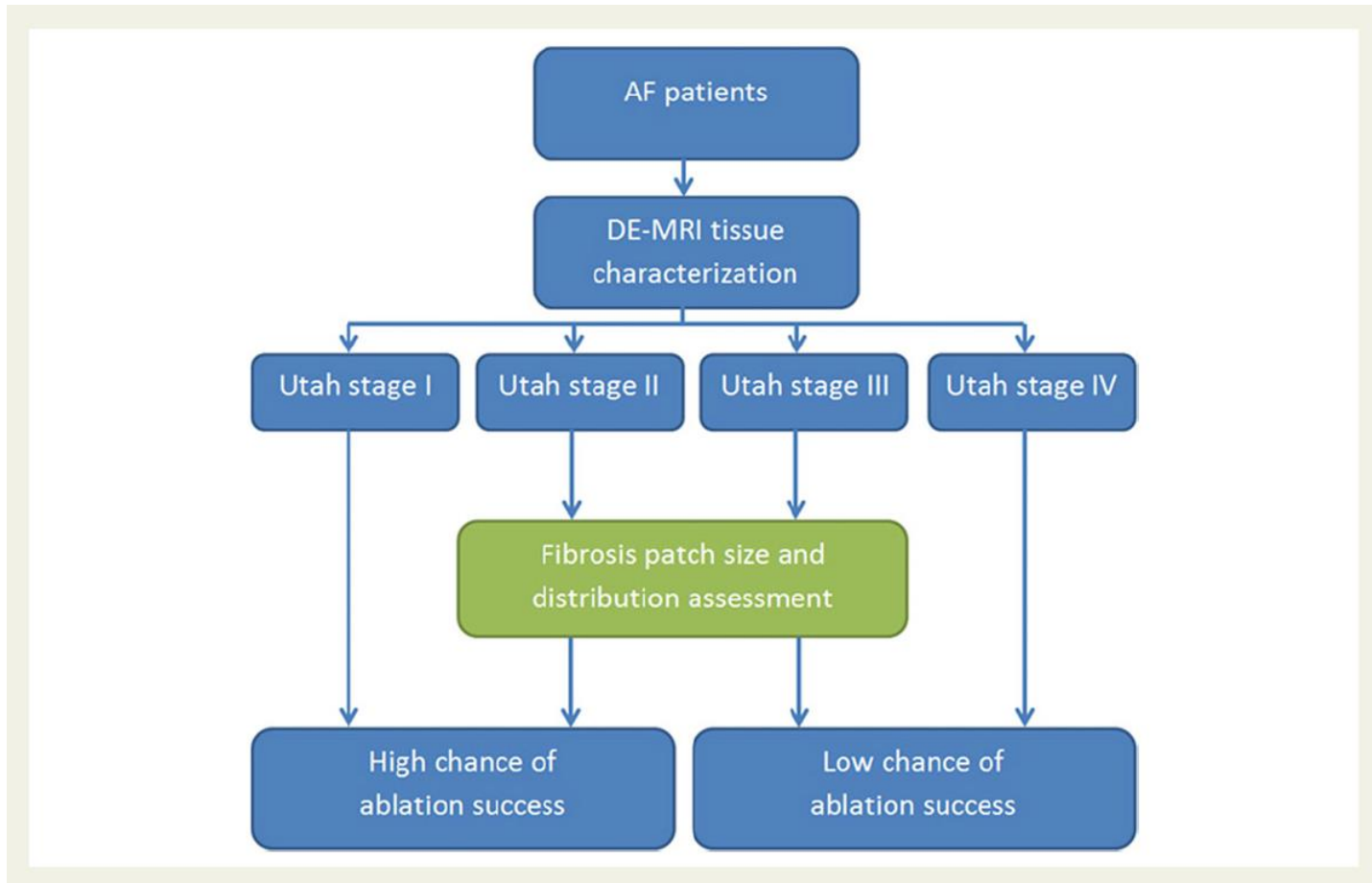


Multivariate Predictors of AF recurrences

	Univariate Analysis			Multivariate Analysis		
	Hazard Ratio	95% CI	<i>P</i> Value	Hazard Ratio	95% CI	<i>P</i> Value
Age (per 10-y increase)	1.22	1.05–1.43	0.011	1.12	0.94–1.34	0.192
Women	1.09	0.75–1.57	0.636	0.84	0.56–1.25	0.393
Hypertension	1.61	1.09–2.38	0.016	1.33	0.86–2.04	0.195
Diabetes mellitus	1.80	1.18–2.75	0.006	1.64	1.03–2.61	0.036
Coronary disease	1.19	0.75–1.88	0.465	0.75	0.45–1.24	0.260
Congestive heart failure	1.19	0.68–2.07	0.543	1.17	0.65–2.09	0.607
Persistent AF	1.47	1.08–1.99	0.014	1.09	0.76–1.55	0.648
SRM stage						
Stage I	Referent			Referent		
Stage II	1.47	0.91–2.38	0.116	1.29	0.81–1.82	0.303
Stage III	1.65	0.96–2.86	0.069	1.49	0.92–2.32	0.166
Stage IV	5.47	3.26–9.2	<0.0001	4.89	2.37–6.28	<0.0001
LA volume index (10 mL/m ²)	1.16	1.07–1.26	<0.0001	1.05	0.96–1.17	0.279

Magnetic resonance imaging of atrial fibrosis: redefining atrial fibrillation to a syndrome

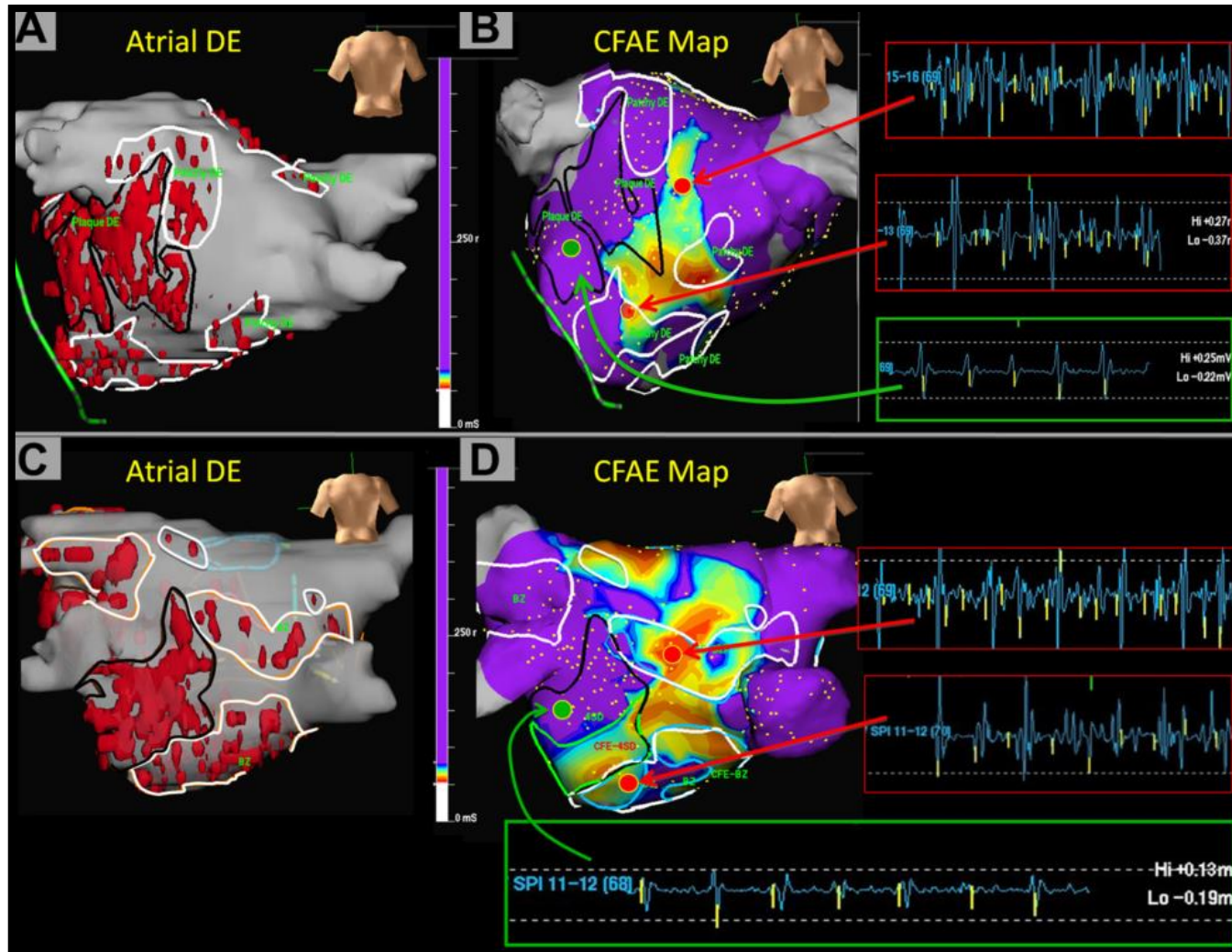
Pim Gal and Nassir F. Marrouche*



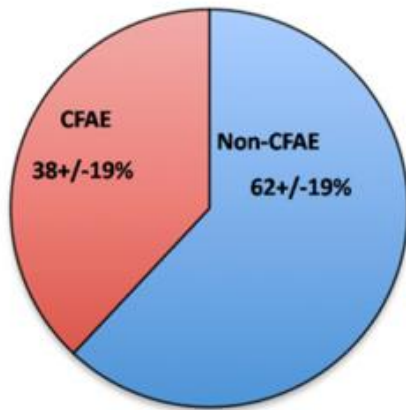
4 MRI identifying targets?

18 (long) persistent AF pt

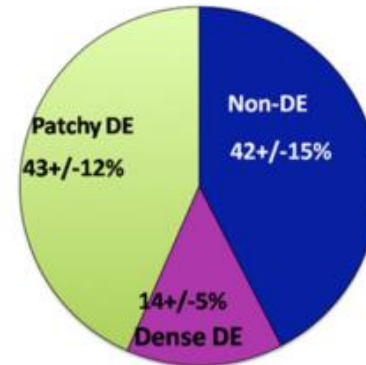
Patchy vs Dense DE / continuous CAFE



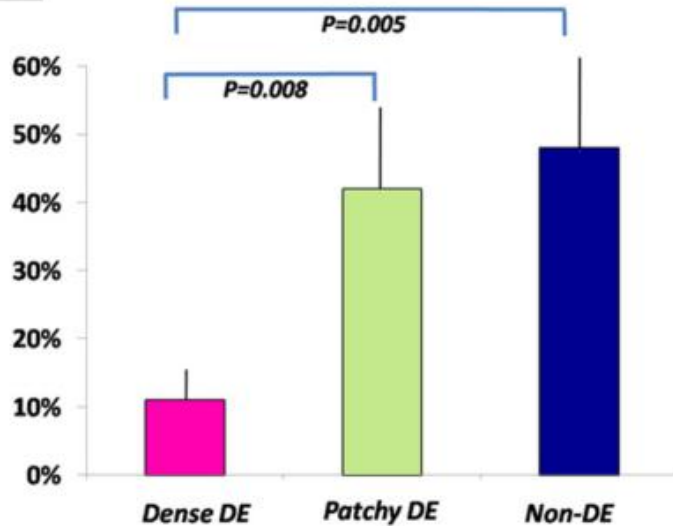
B CFAE as a Percentage of LA Surface



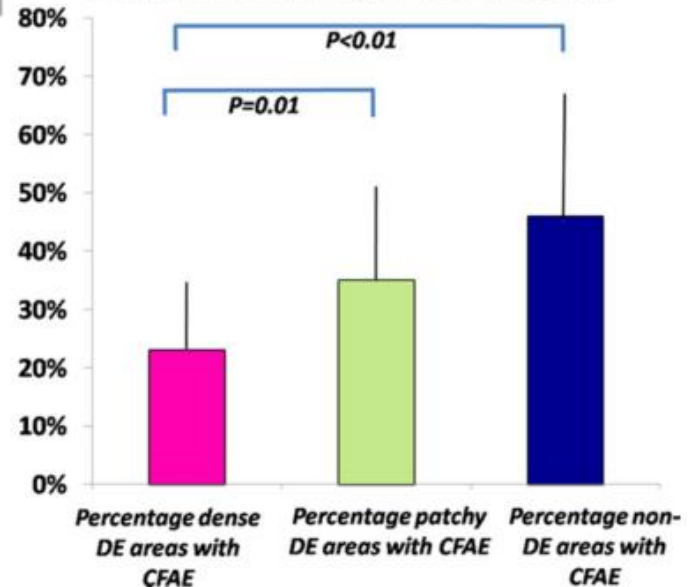
C DE as a Percentage of LA Surface



D DE as Percentage of CFAE

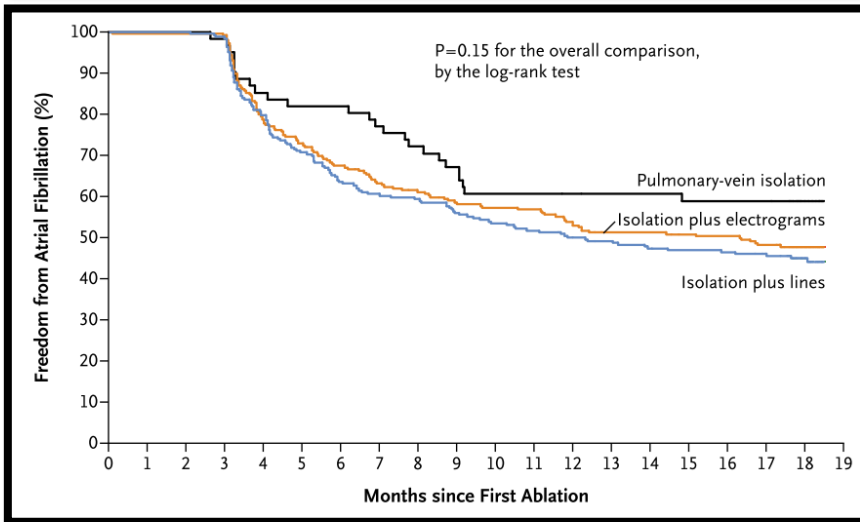


E CFAE as Percentage of DE Region



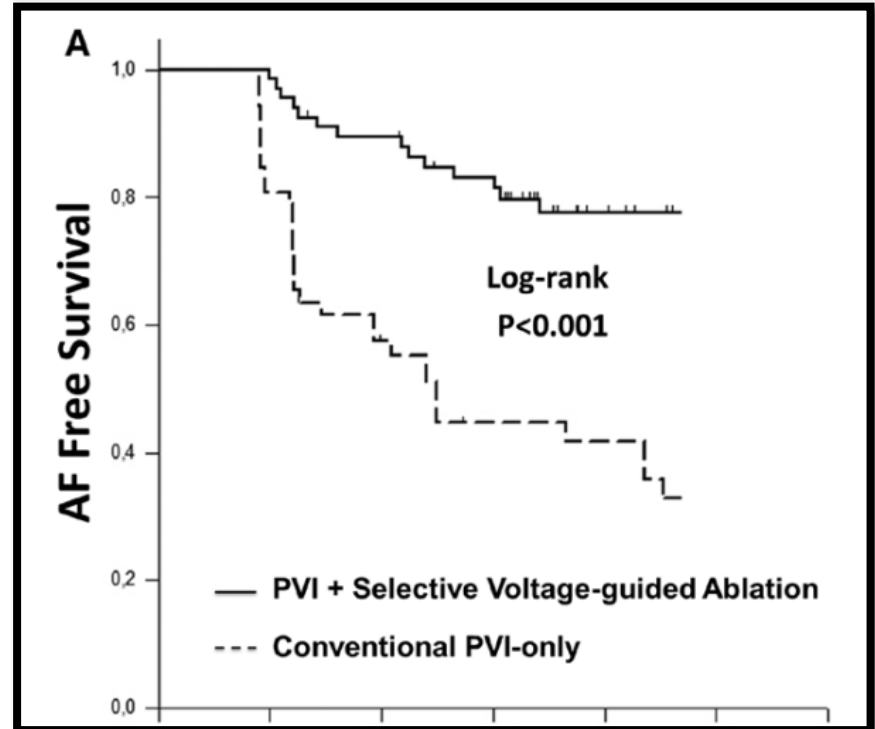
Approaches to Catheter Ablation for Persistent Atrial Fibrillation

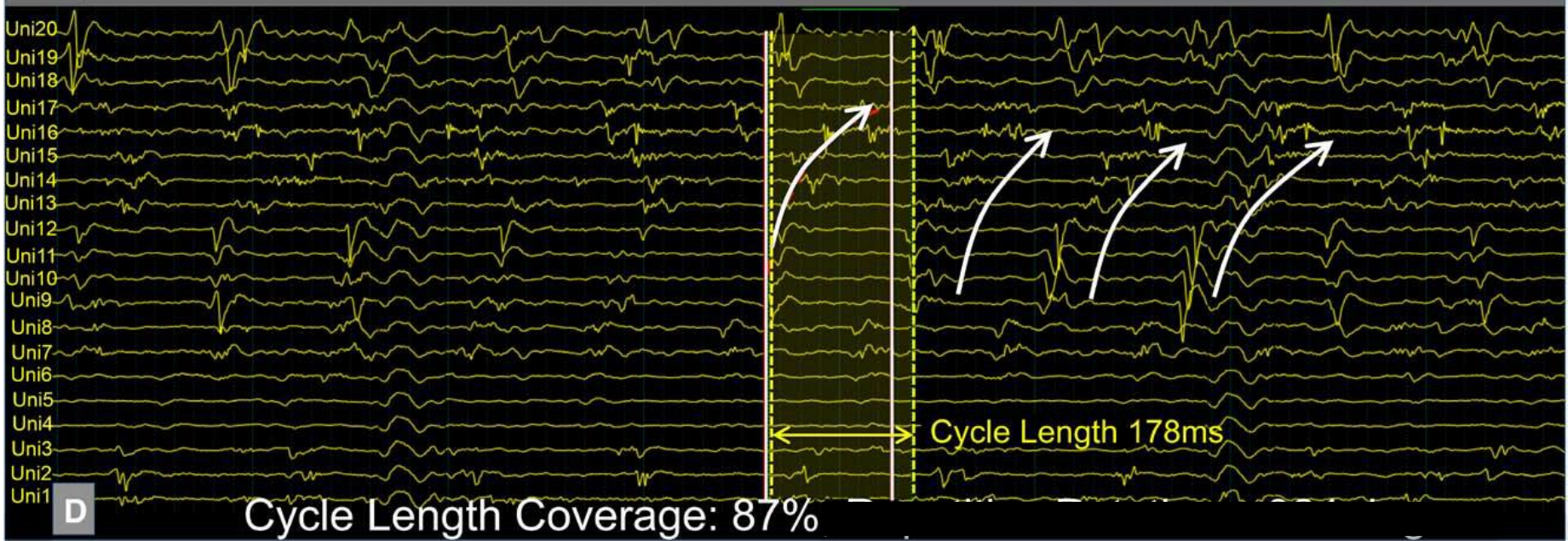
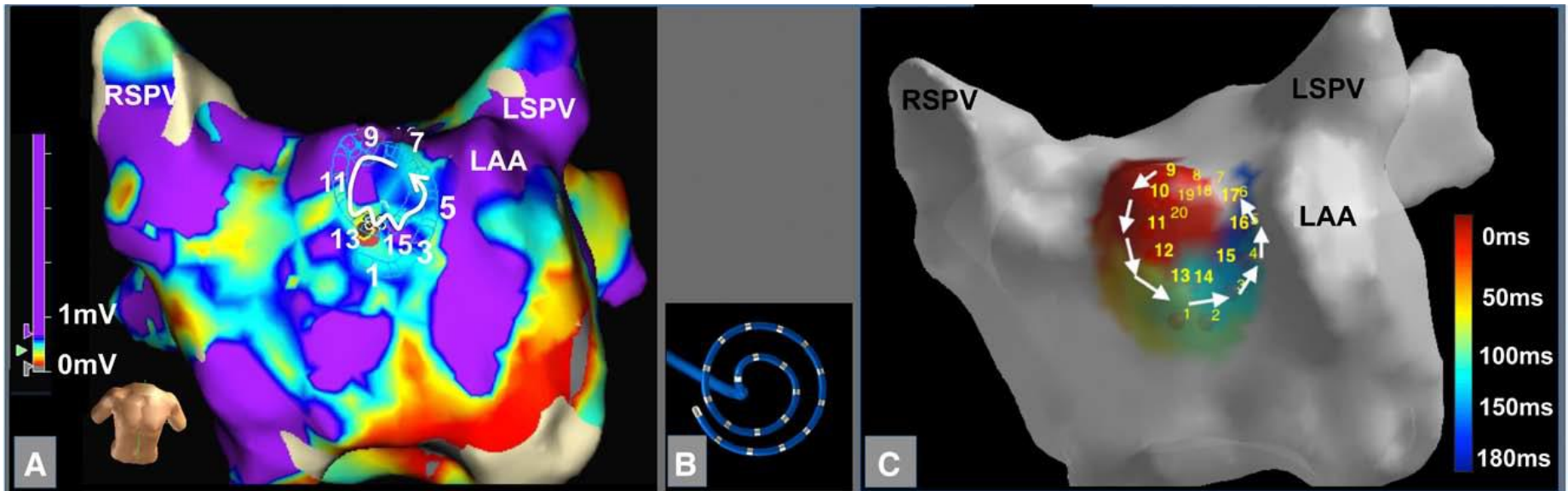
Atul Verma, M.D., Chen-yang Jiang, M.D., Timothy R. Betts, M.D., M.B., Ch.B., Jian Chen, M.D., Isabel Deisenhofer, M.D., Roberto Mantovan, M.D., Ph.D., Laurent Macle, M.D., Carlos A. Morillo, M.D., Wilhelm Haverkamp, M.D., Ph.D., Rukshen Weerasooriya, M.D., Jean-Paul Albenque, M.D., Stefano Nardi, M.D.,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

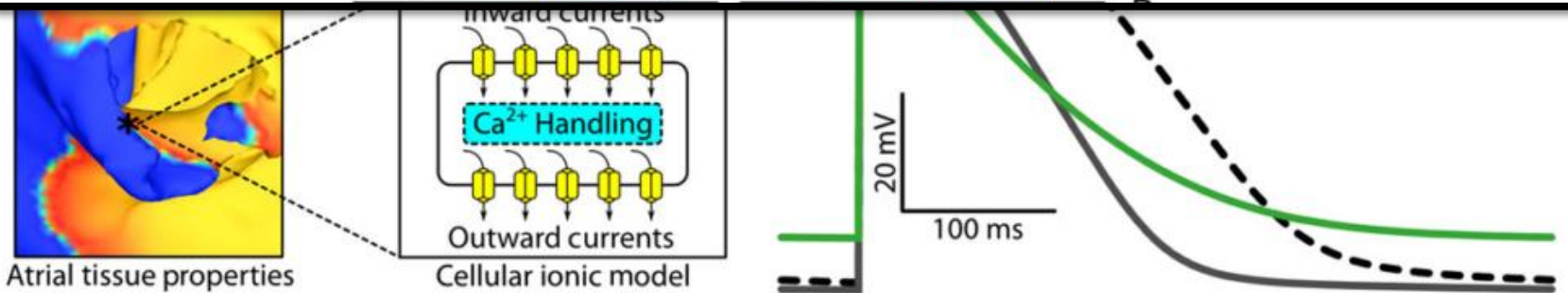
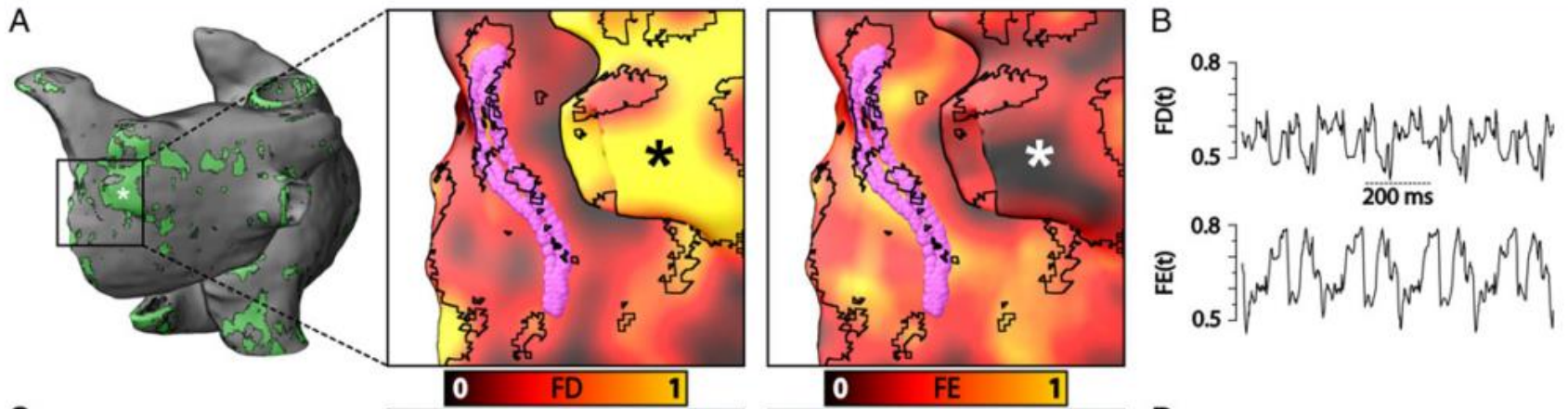
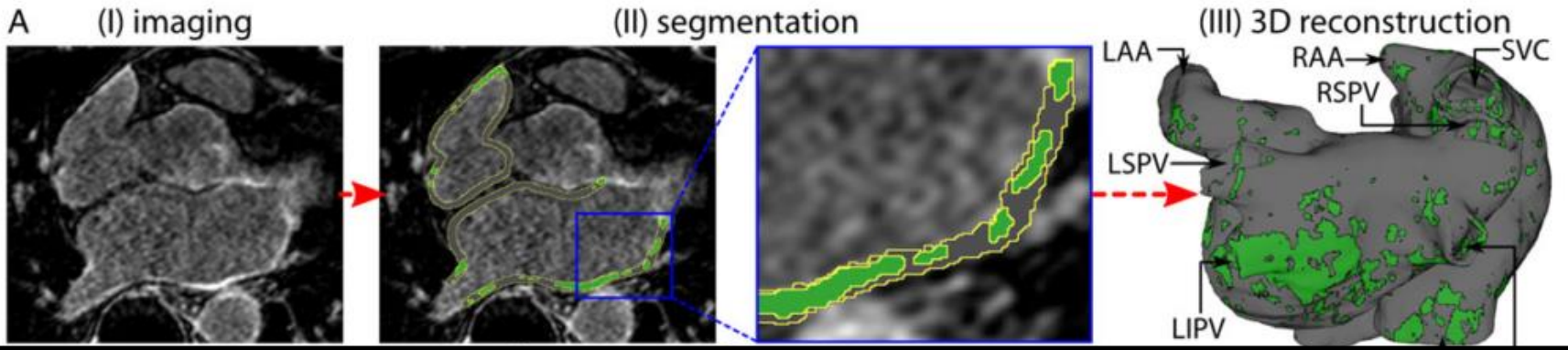


Ablation of Persistent Atrial Fibrillation Targeting Low-Voltage Areas With Selective Activation Characteristics

Amir S. Jadidi, MD; Heiko Lehrmann, MD; Cornelius Keyl, MD; Jérémie Sorrel, MD; Viktor Markstein, BSc; Jan Minners, MD; Chan-Il Park, MD; Arnaud Denis, MD; Pierre Jaïs, MD; Méléze Hocini, MD; Clemens Potocnik, MD; Juergen Allgeier, MD; Willibald Hochholzer, MD; Claudia Herrera-Siklody, MD; Steve Kim, MSEE; Youssef El Omri, MD; Franz-Josef Neumann, MD; Reinhold Weber, MD; Michel Haïssaguerre, MD; Thomas Arentz, MD







5 MRI in daily practice: How to?

MRI substrate prediction could improve

- Patient selection / Response to ablation
- Cath Lab scheduling
- Target identification / Ablation strategy

ICPS AF ablation strategy *and schedule...*

Lone AF

Paroxysmal – « short persistent »
Poor – no fibrosis on MRI

PVAI alone

1H30 - 2H

Substrate AF

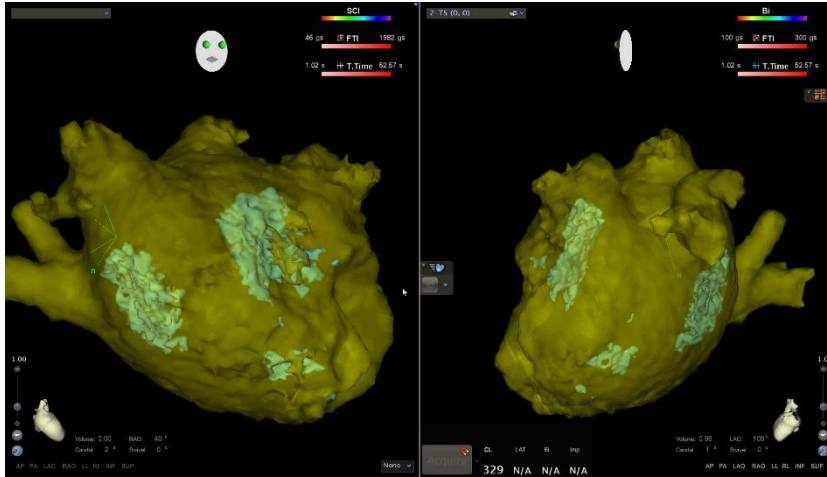
Comorbiddities
Mild – important fibrosis on MRI

**Substrate
+/- PVAI (CL in PV?)**

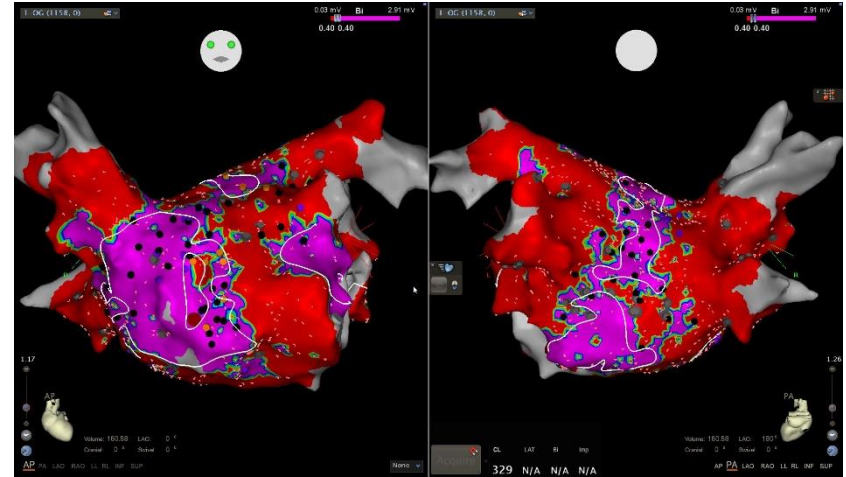
2H - 4H

53 years female, 15 mo PsAF, CHADSVasc 2, LA 175ml, AF cycle 150ms/amio

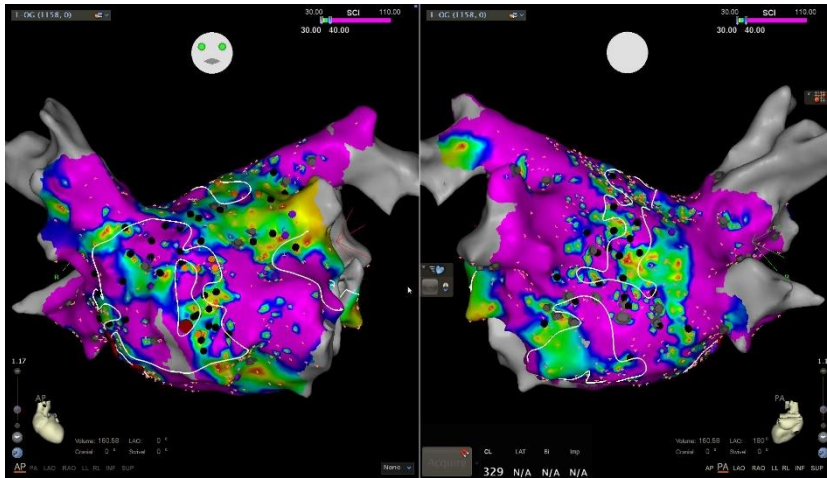
MRI Segmentation



Bipolar < 0,5 mV



CFAE SCI 30-40



Ablation

