RHYTHM 2017
Arrhythmias & Heart Failure
New Insights & Technological Advances
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Novotel PARIS Tour Eiffel

VT ablation in ischemic and non ischemic cardiomyopathy

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CHU Toulouse

www.rhythmcongress.com

Disclosure

I do not have any potential conflict of interest

2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Recommendations	Class[a]	Level[b]
Catheter ablation of RVOT VT/PVC is recommended in symptomatic patients and/or in patients with a failure of anti-arrhythmic drug therapy (e.g. beta-blocker) or in patients with a decline in LV function due to RVOT-PVC burden.	I	B

2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Recommendations	Class[a]	Level[b]
Catheter ablation of RVC recommended in sympto and/or in patients with a anti-arrhythmic drug ther beta-blocker) or in patie decline in LV function du RVOT-PVC burden.		

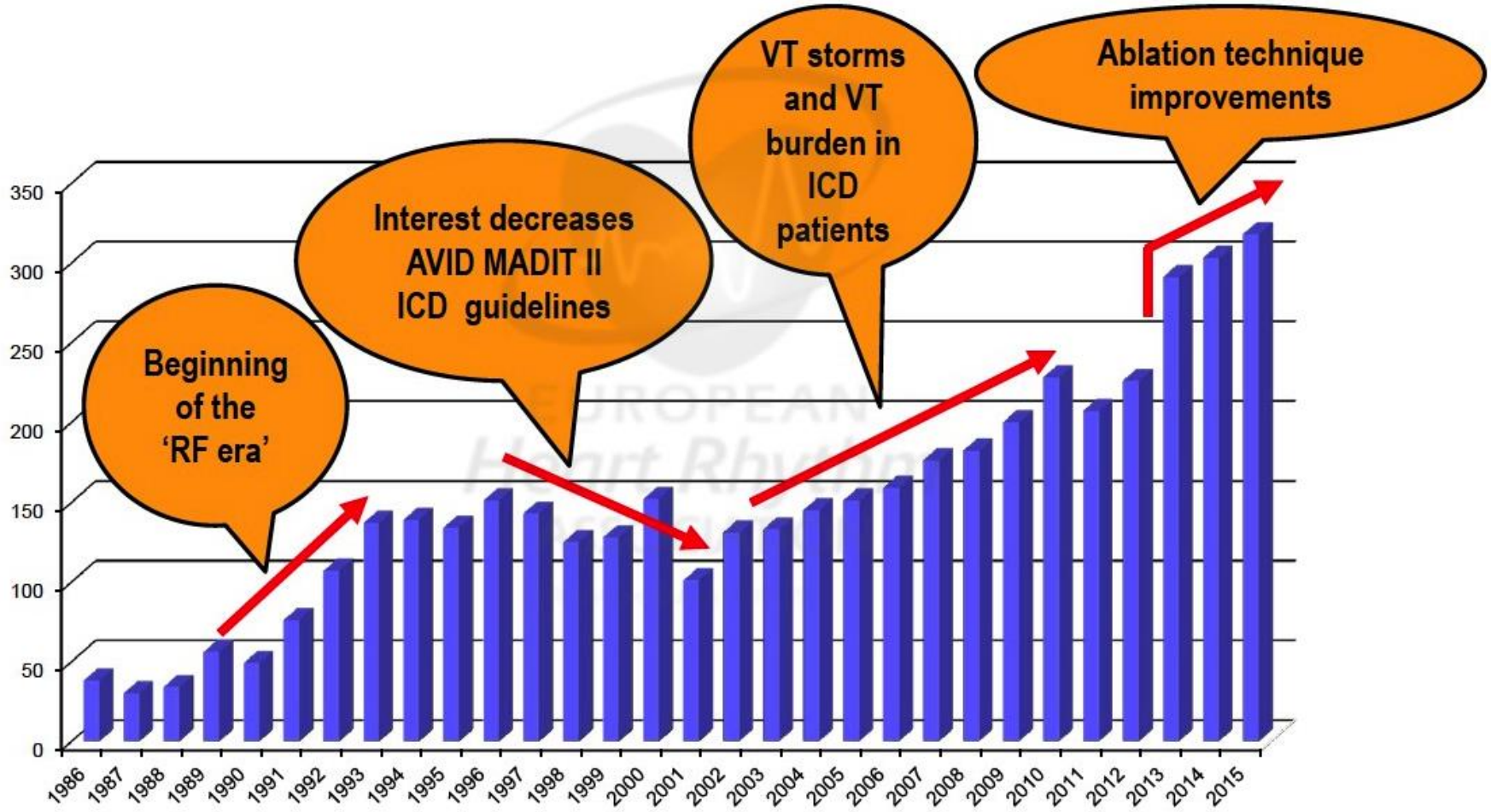
Recommendations	Class[a]	Level[b]
Urgent catheter ablation is recommended in patients with scar-related heart disease presenting with incessant VT or electrical storm.	I	B
Catheter ablation is recommended in patients with ischaemic heart disease and recurrent ICD shocks due to sustained VT.	I	B
Catheter ablation should be considered after a first episode of sustained VT in patients with ischaemic heart disease and an ICD.	IIa	B

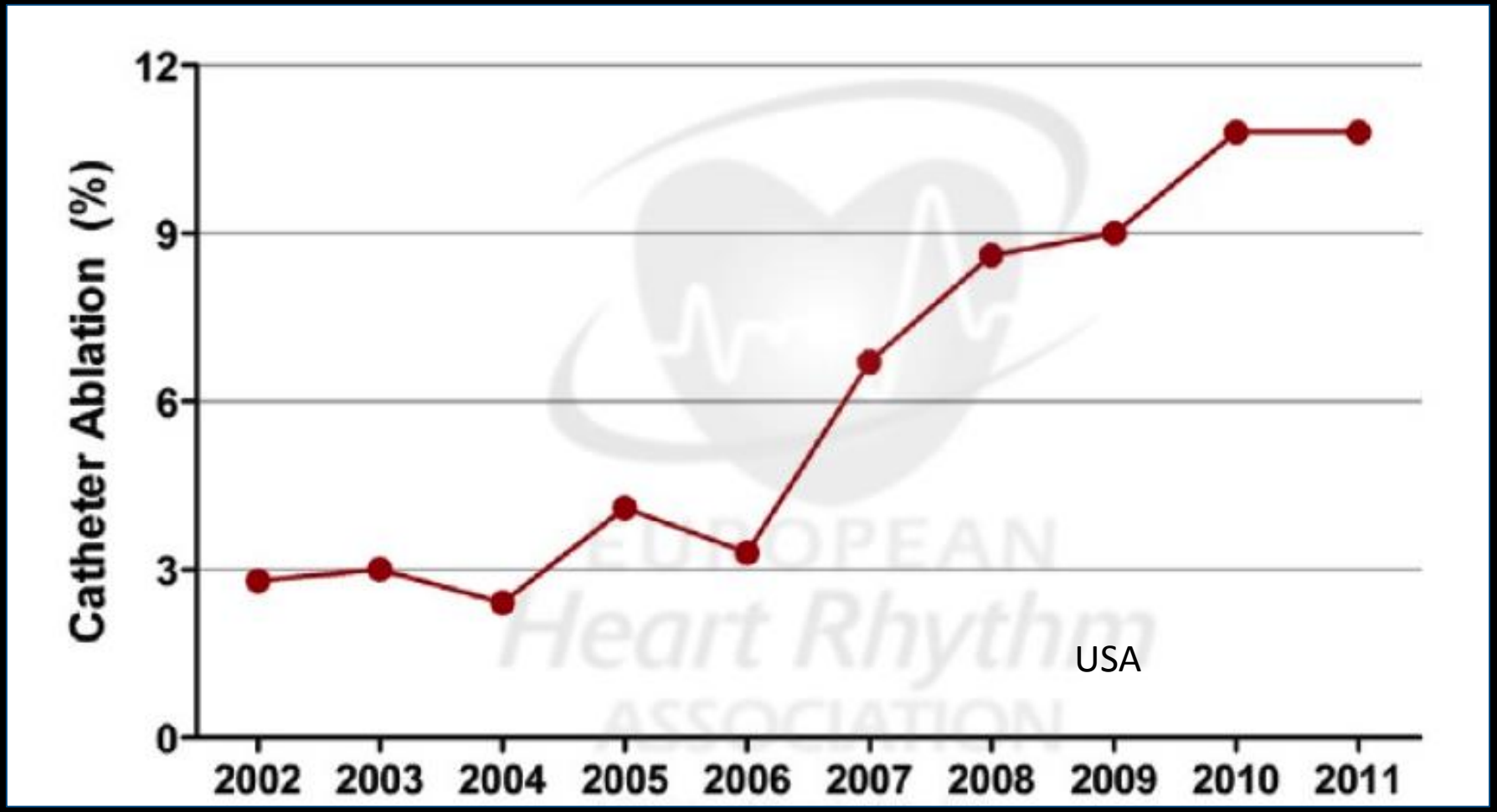
2015 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death

Recommendations	Class[a]	Level[b]
Catheter ablation of RVC recommended in sympto and/or in patients with a anti-arrhythmic drug ther beta-blocker) or in patie		
Catheter ablation is recommended in patients with DCM and bundle branch re-entry ventricular tachycardia refractory to medical therapy.	I	B
Catheter ablation may be considered in patients with DCM and VA not caused by bundle branch re-entry refractory to medical therapy.	IIb	C

Recommendations	Class[a]	Level[b]
Urgent catheter ablation is recommended in patients with scar-related heart disease presenting with incessant VT or electrical storm.	I	B
nded in disease to	I	B
onsidered d VT in disease and an ICD.	IIa	B

PubMed search :
"Ventricular AND Tachycardia AND Ablation"

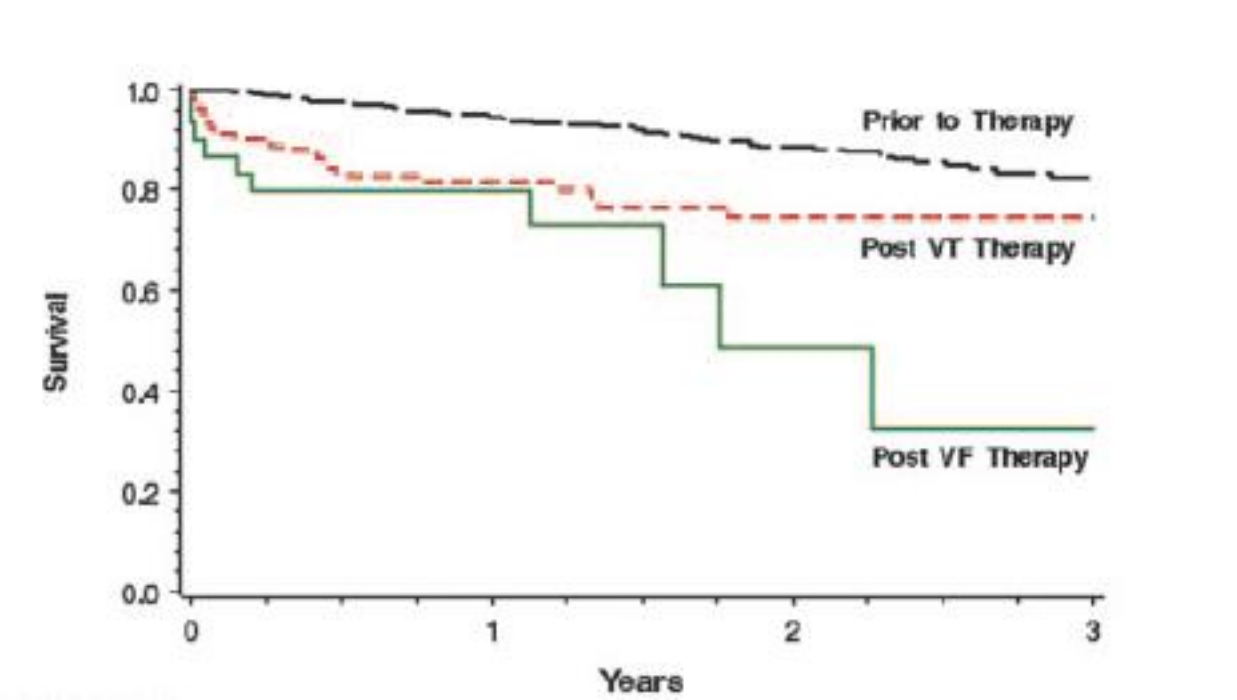




IHD and VT ablation

Palaniswamy C et al. Heart Rhythm 2014;11:2056-63

VT/VF as a surrogate for higher mortality

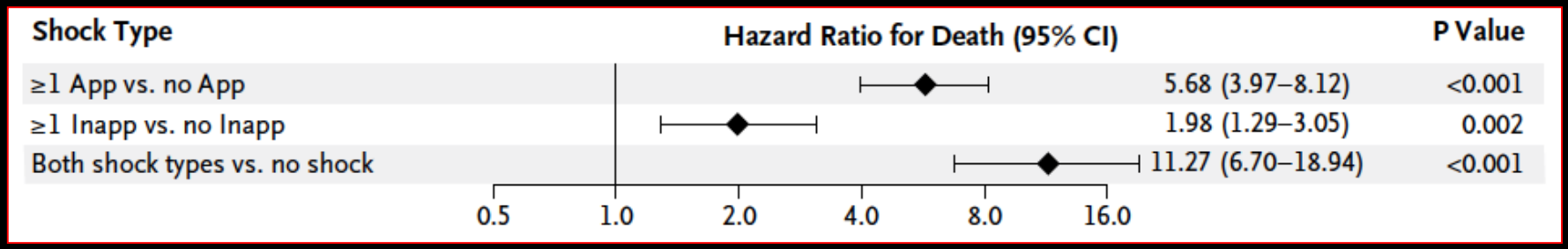


Variable	Hazard Ratio	95% CI	*P*
Time-dependent risk factors†			
First therapy for VT	3.4	1.9–5.9	<0.001
First therapy for VF	3.3	1.3–8.1	0.01

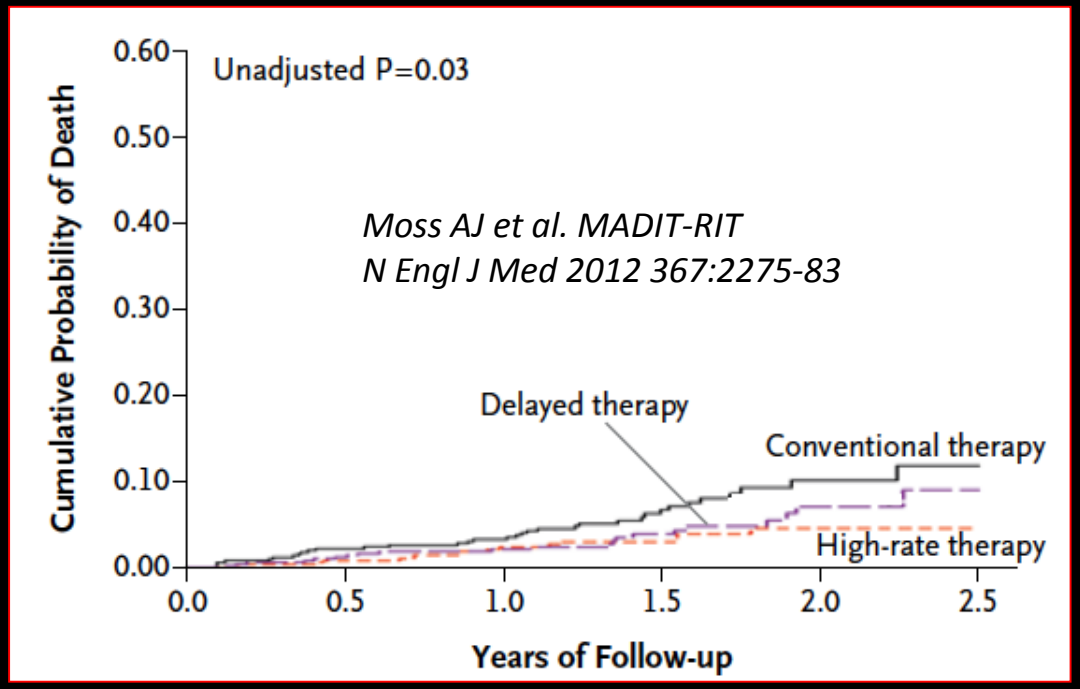
Moss A, et al. MADIT II population Circulation. 2004 Dec 21;110(25):3760-5.

appropriated or inappropriated ICD therapies increase mortality

Larsen GK, et al. Heart Rhythm 2011 ; 8 : 1881-1886
Sweeney MO, et al. Heart Rhythm 2010 ; 7 : 353-360
Saxon LA, et al. Circulation 2010 ; 122 : 2359-2367

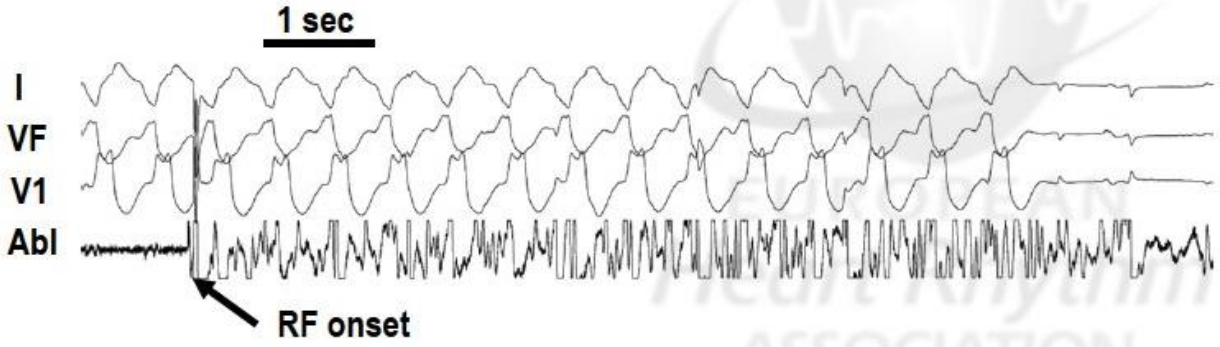


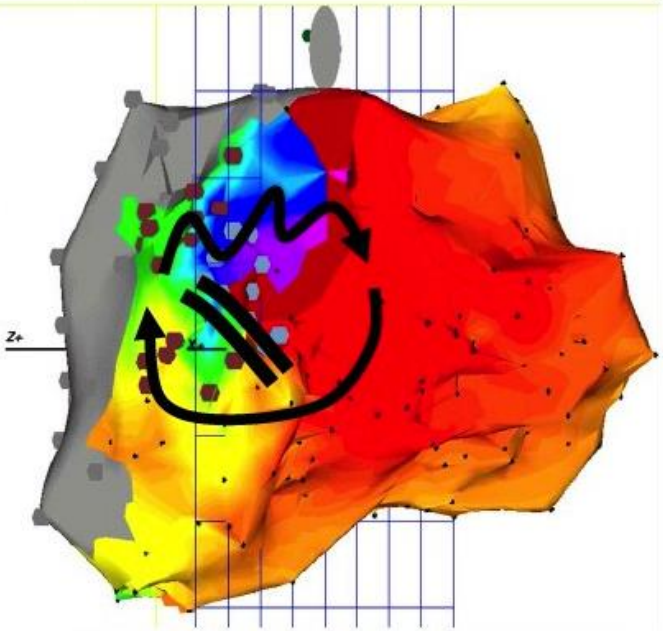
Poole JE, et al. N Engl J Med 2008 ; 359 : 1009-1017



History

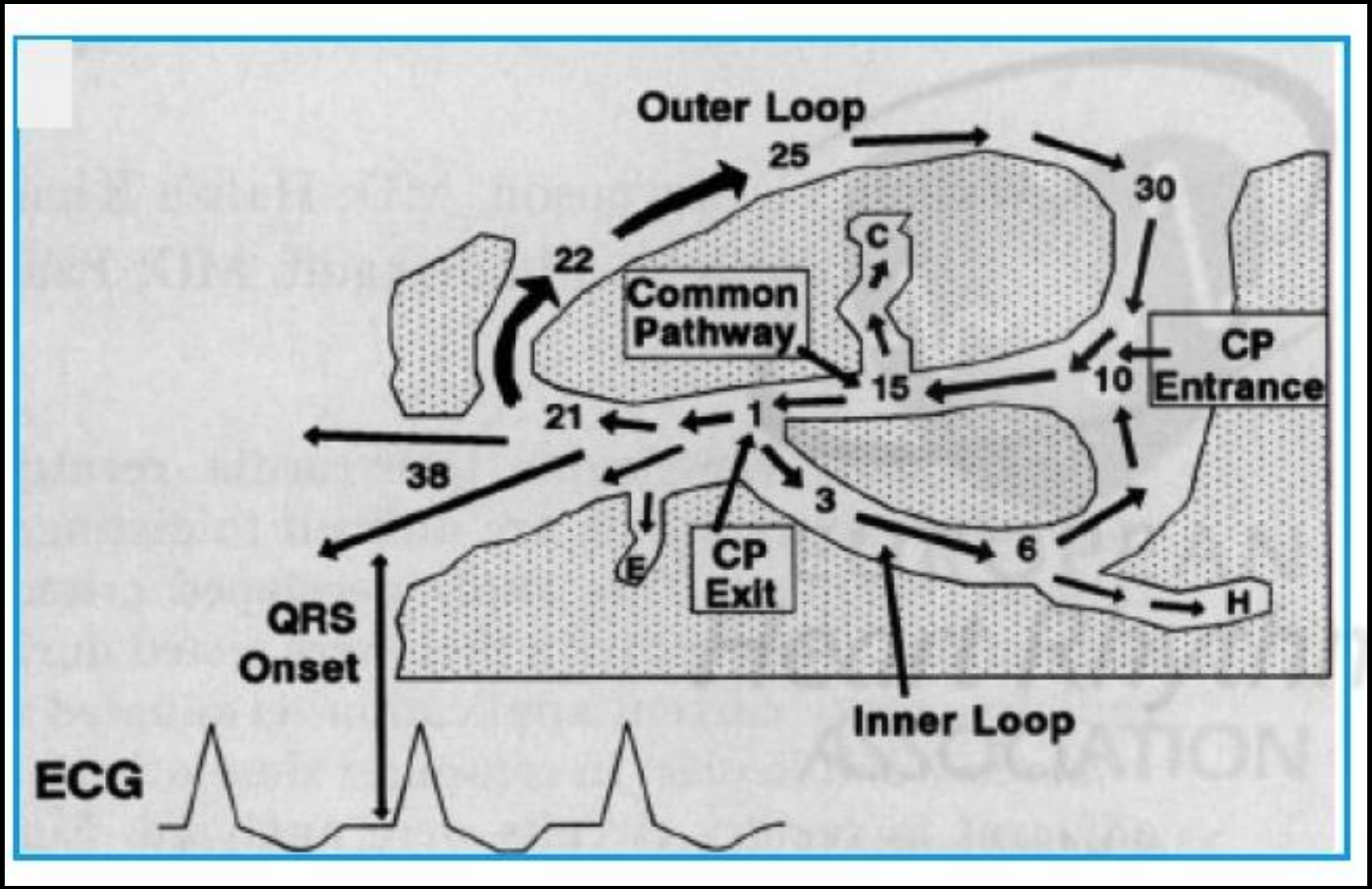
VT induction ➔ VT mapping ➔ definition of the ablation target



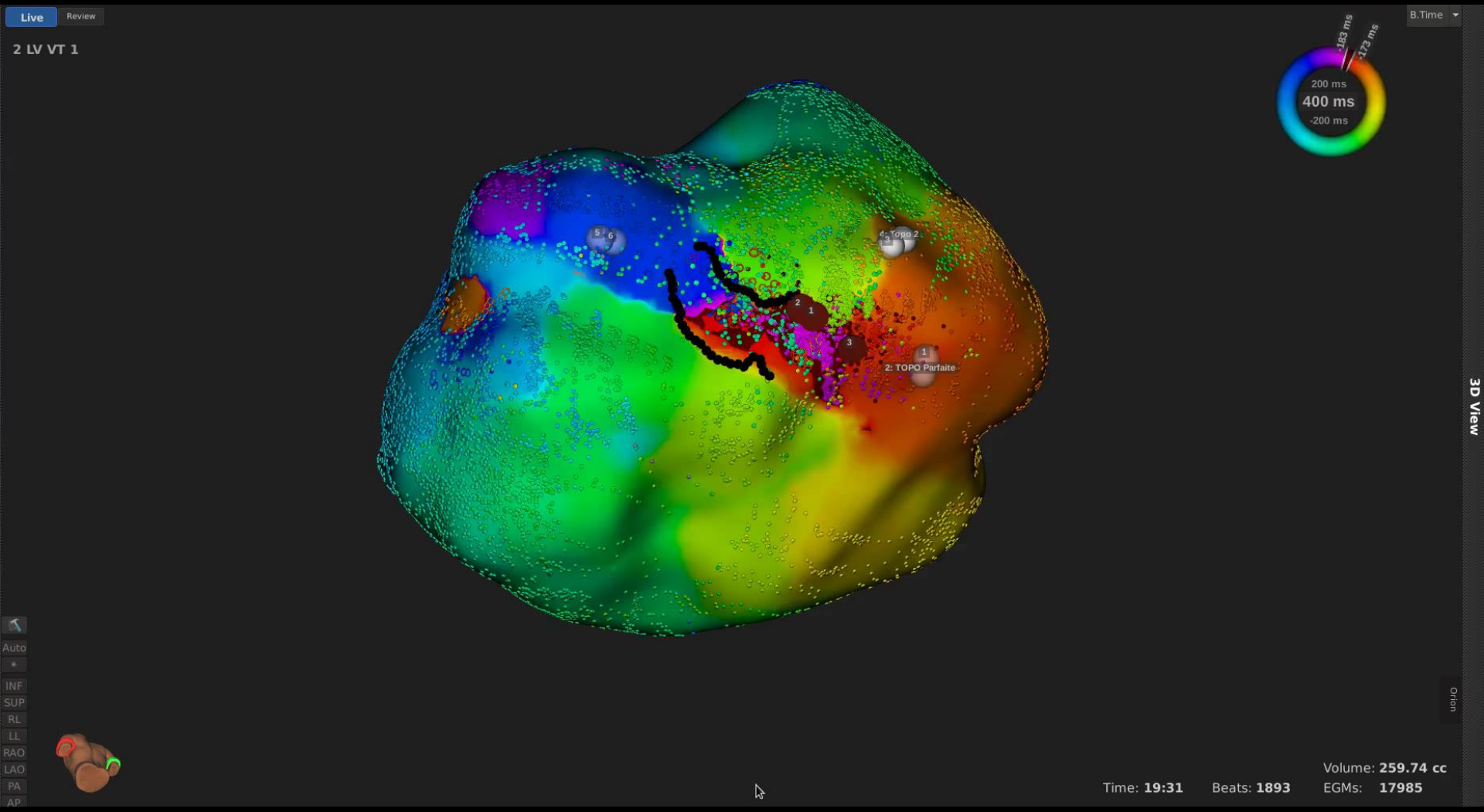


de Chillou C et la. Circulation 2002;102:726-31

When the VT is well-tolerated enough to allow VT mapping, the first procedure endpoint is VT termination during RF energy application

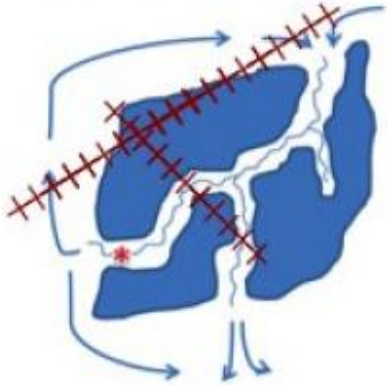


Stevenson, Circ 1993, 88, 1467


Live
Review
2 LV VT 1
B.Time
183 ms
173 ms
200 ms
400 ms
-200 ms
5
6
4: Topo 2
3
2
1
3
1
2: TOPO Parfaite
3D View
Auto
INF
SUP
RL
LL
RAO
LAO
PA
AP
Orion
Volume: 259.74 cc
Time: 19:31
Beats: 1893
EGMs: 17985

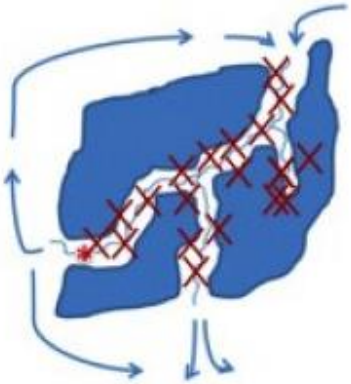
Substrate ablation – Different Approaches

Linear ablation



Short linear ablation

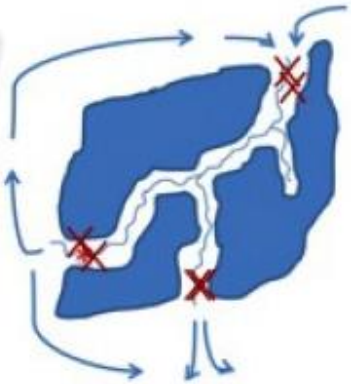
LAVA ablation



LP ablation

Encircling

Scar dechanneling

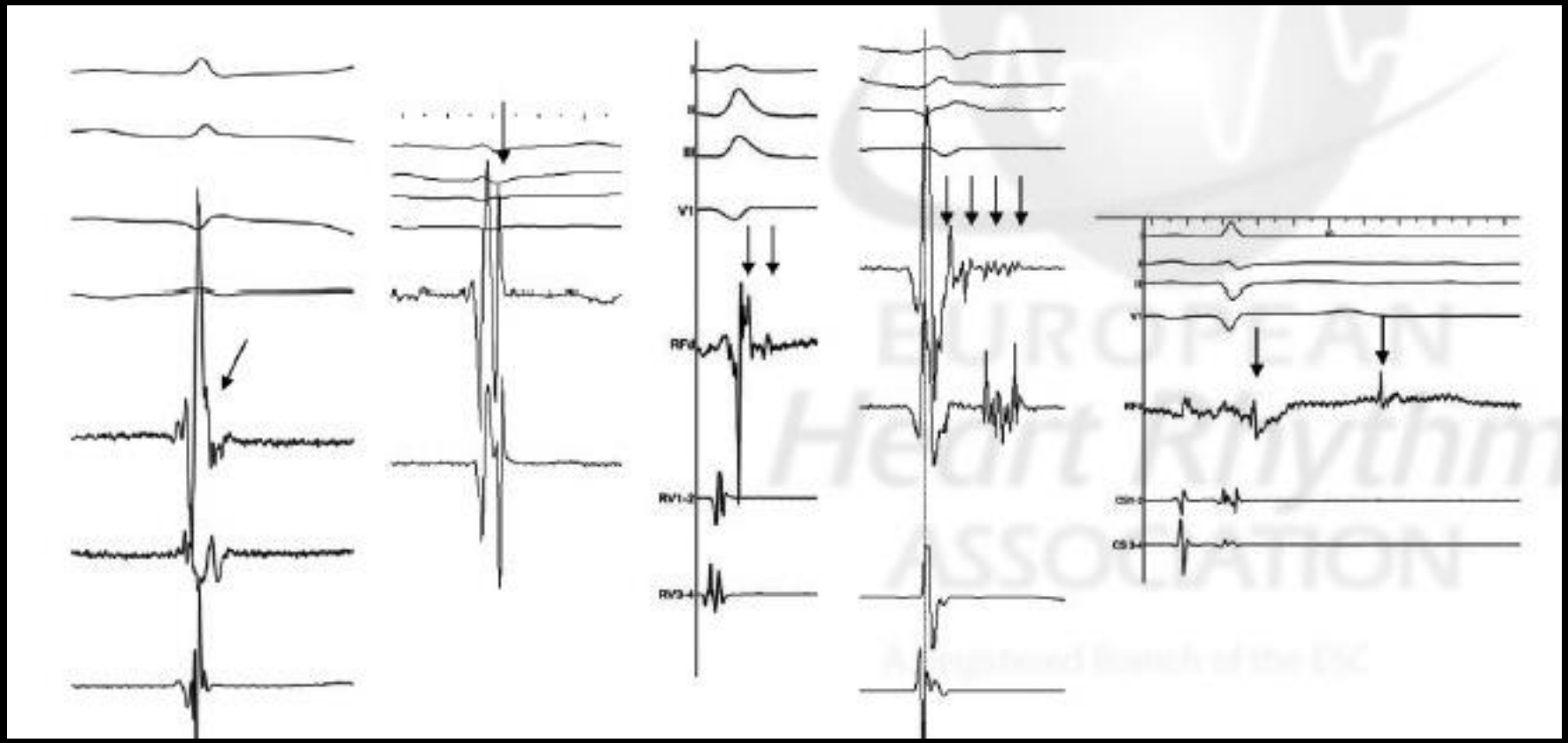


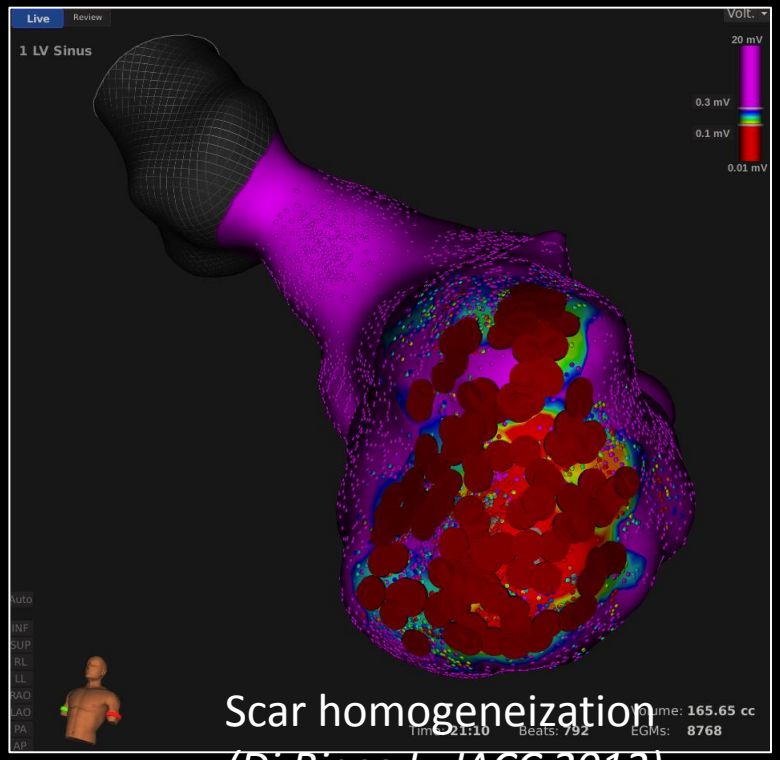
Marchlinski FE, et al. Circulation 2000. Arenal A, et al. Circulation 2003. Reddy VY, et al. JACC 2003. Jais P, et al. Circulation 2012. Jais P, et al Circulation 2013. Berruezo A et al. Circ AE 2012.

Elimination of Local Abnormal Ventricular Activities

A New End Point for Substrate Modification in Patients With Scar-Related Ventricular Tachycardia

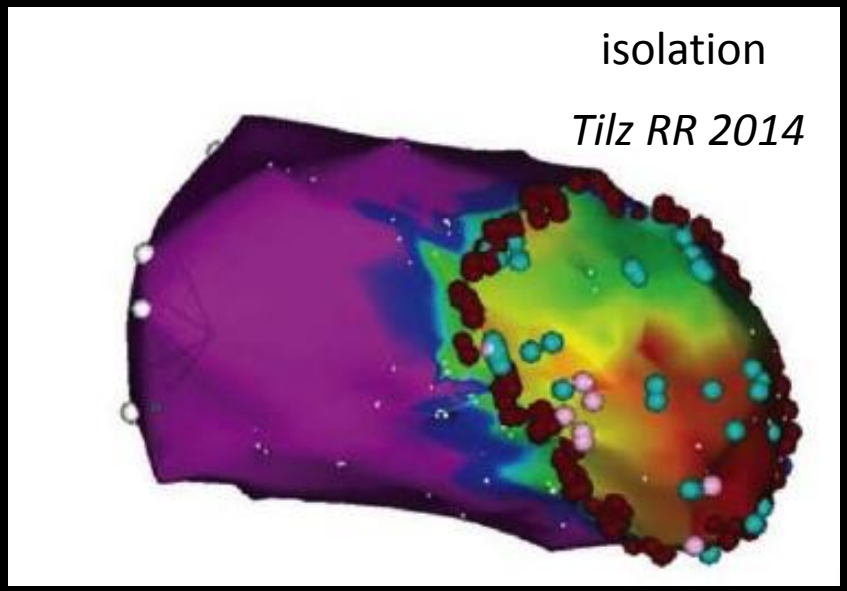
Pierre Jaïs, MD; Philippe Maury, MD; Paul Khairy, MD, PhD; Frédéric Sacher, MD; Isabelle Nault, MD, FRCPC; Yuki Komatsu, MD; Mélèze Hocini, MD; Andrei Forclaz, MD; Amir S. Jadidi, MD; Rukshen Weerasooryia, MBBS; Ashok Shah, MD; Nicolas Derval, MD; Hubert Cochet, MD; Sebastien Knecht, MD; Shinsuke Miyazaki, MD; Nick Linton, MEng, MRCP; Lena Rivard, MD; Matthew Wright, MBBS, PhD; Stephen B. Wilton, MD; Daniel Scherr, MD; Patrizio Pascale, MD; Laurent Roten, MD; Michala Pederson, MD; Pierre Bordachar, MD; François Laurent, MD; Steven J. Kim, MEng; Philippe Ritter, MD; Jacques Clementy, MD; Michel Haïssaguerre, MD





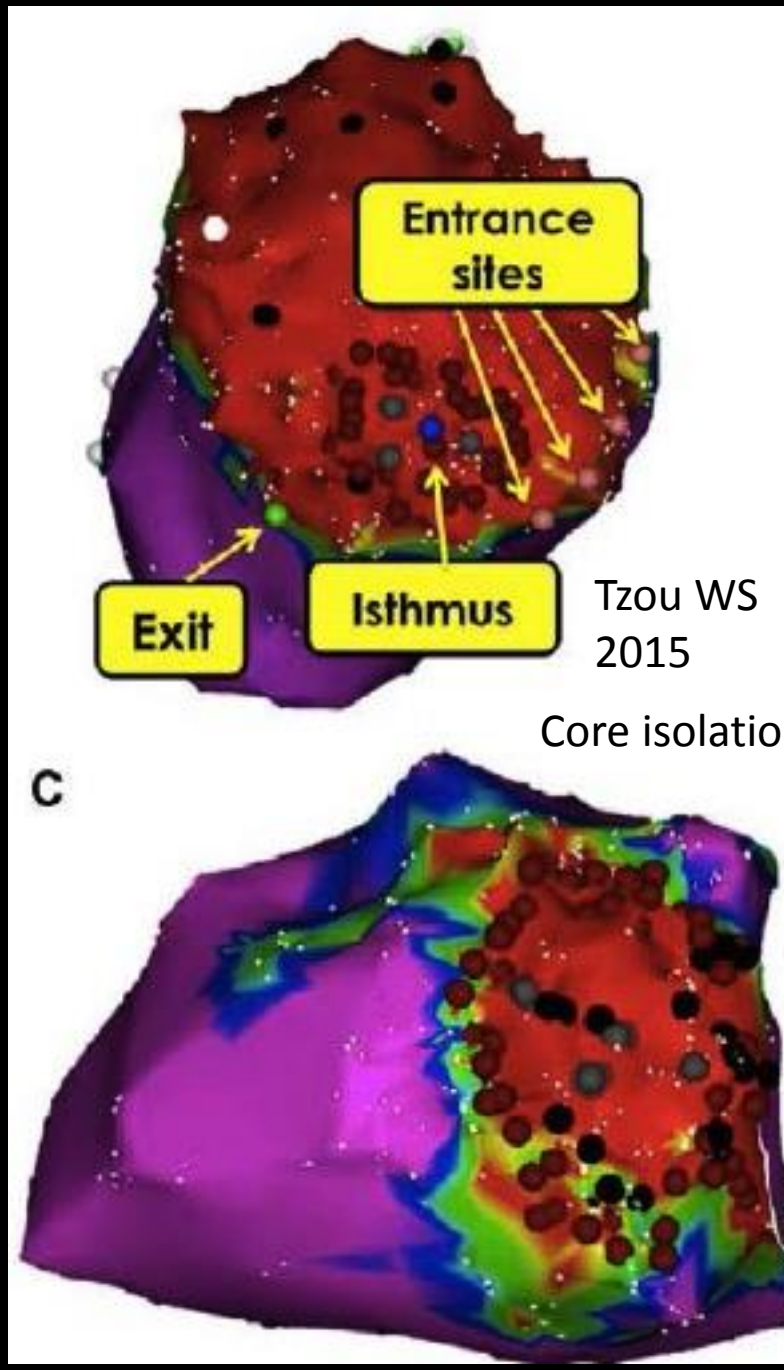
Scar homogeneization

(Di Biase L, JACC 2012)



isolation

Tilz RR 2014

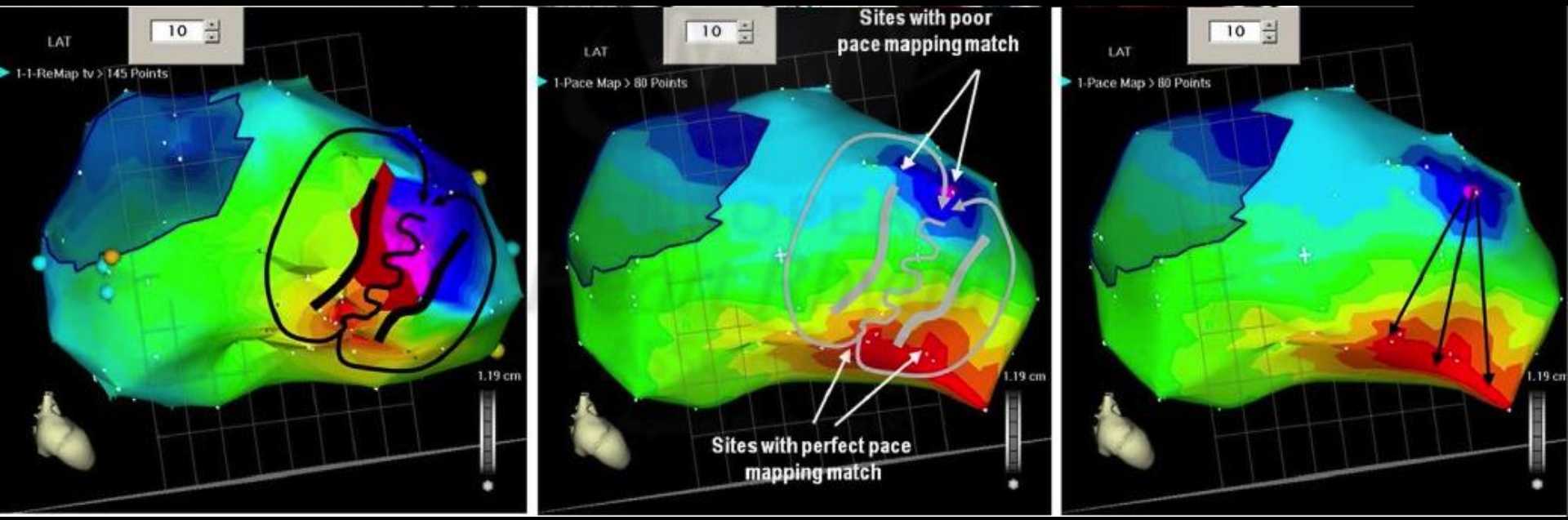


Tzou WS 2015

Core isolatio

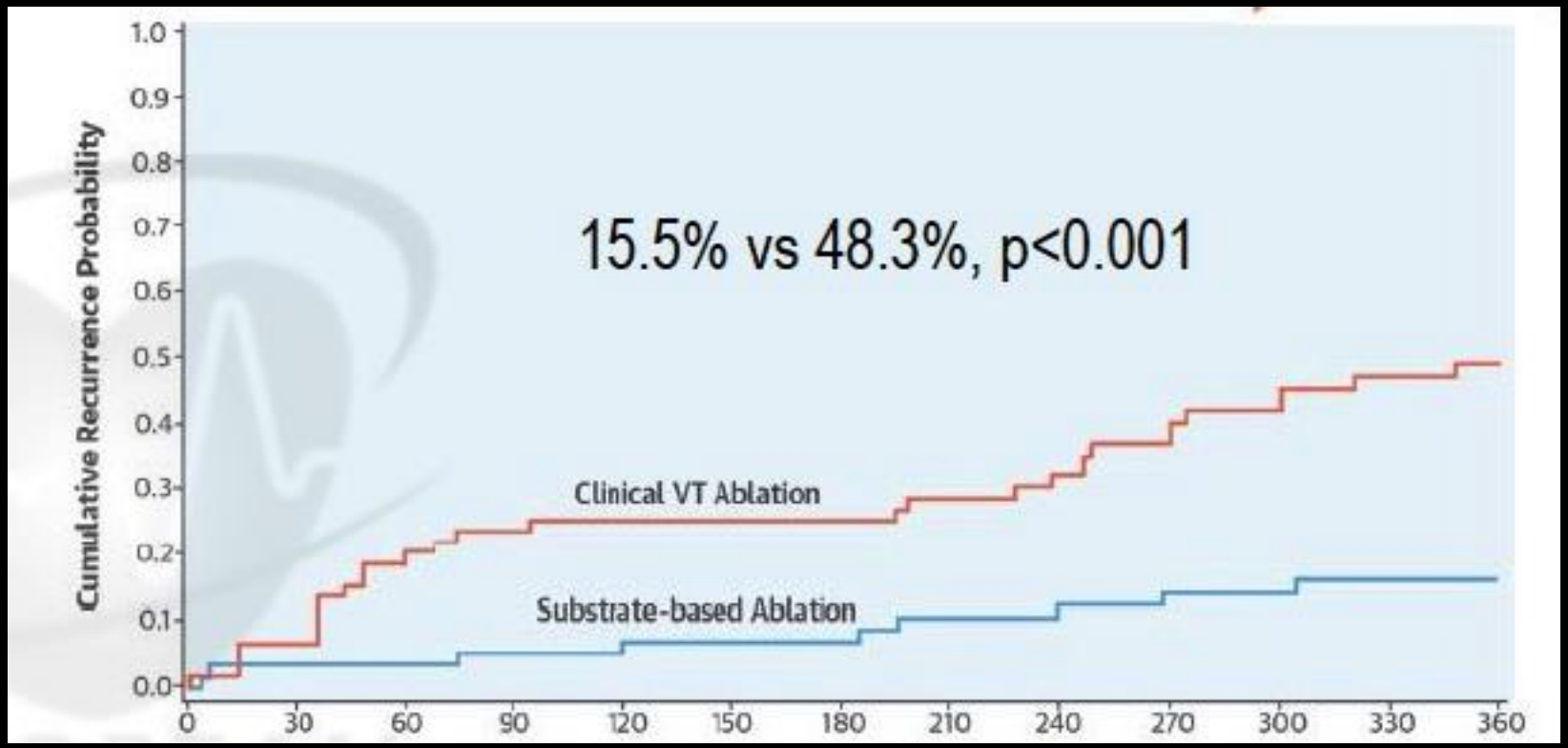
Back to electrophysiology !!!!

Pace mapping



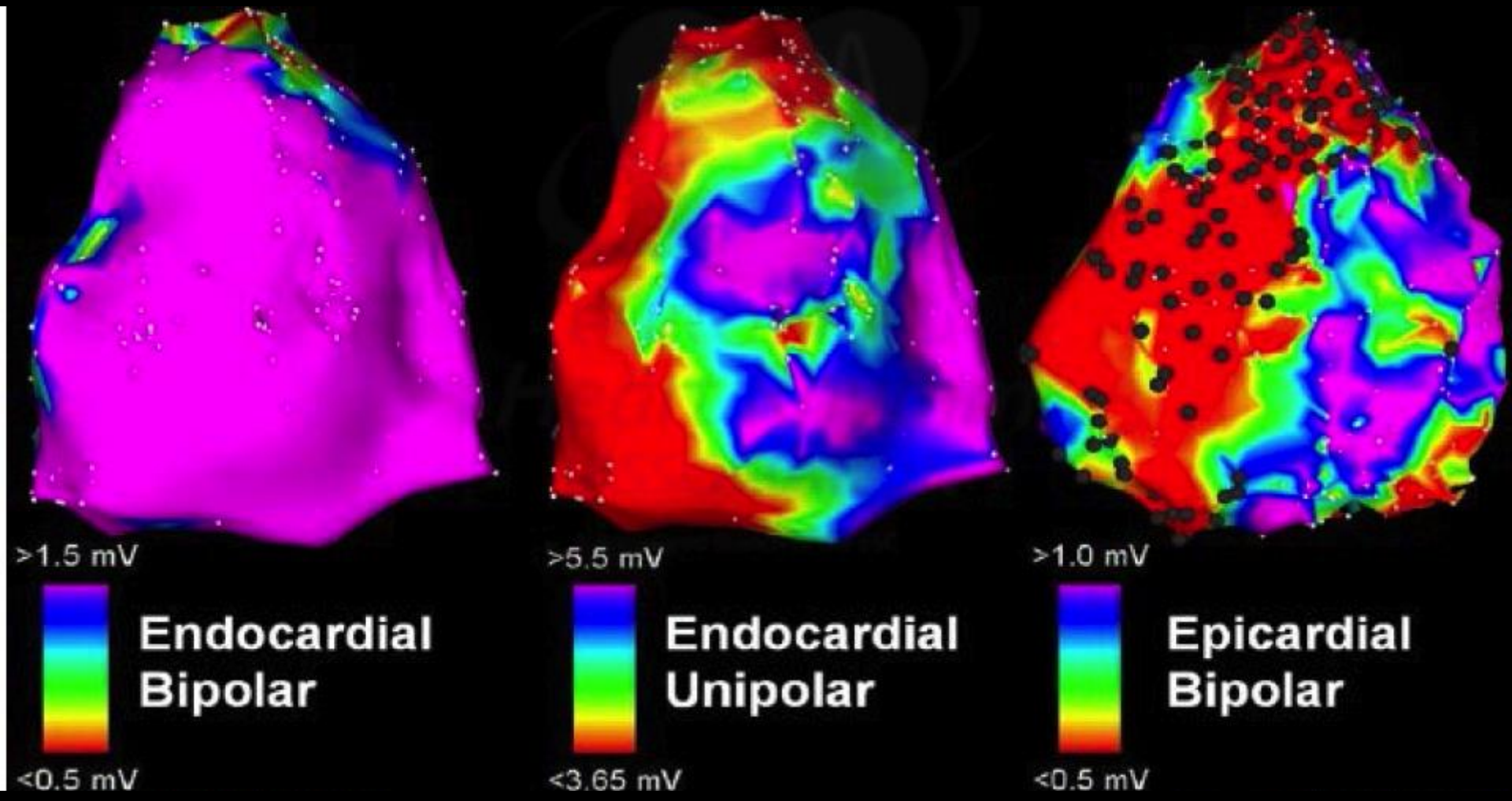
De Chillou, Heart Rhythm 2014;11:175–181

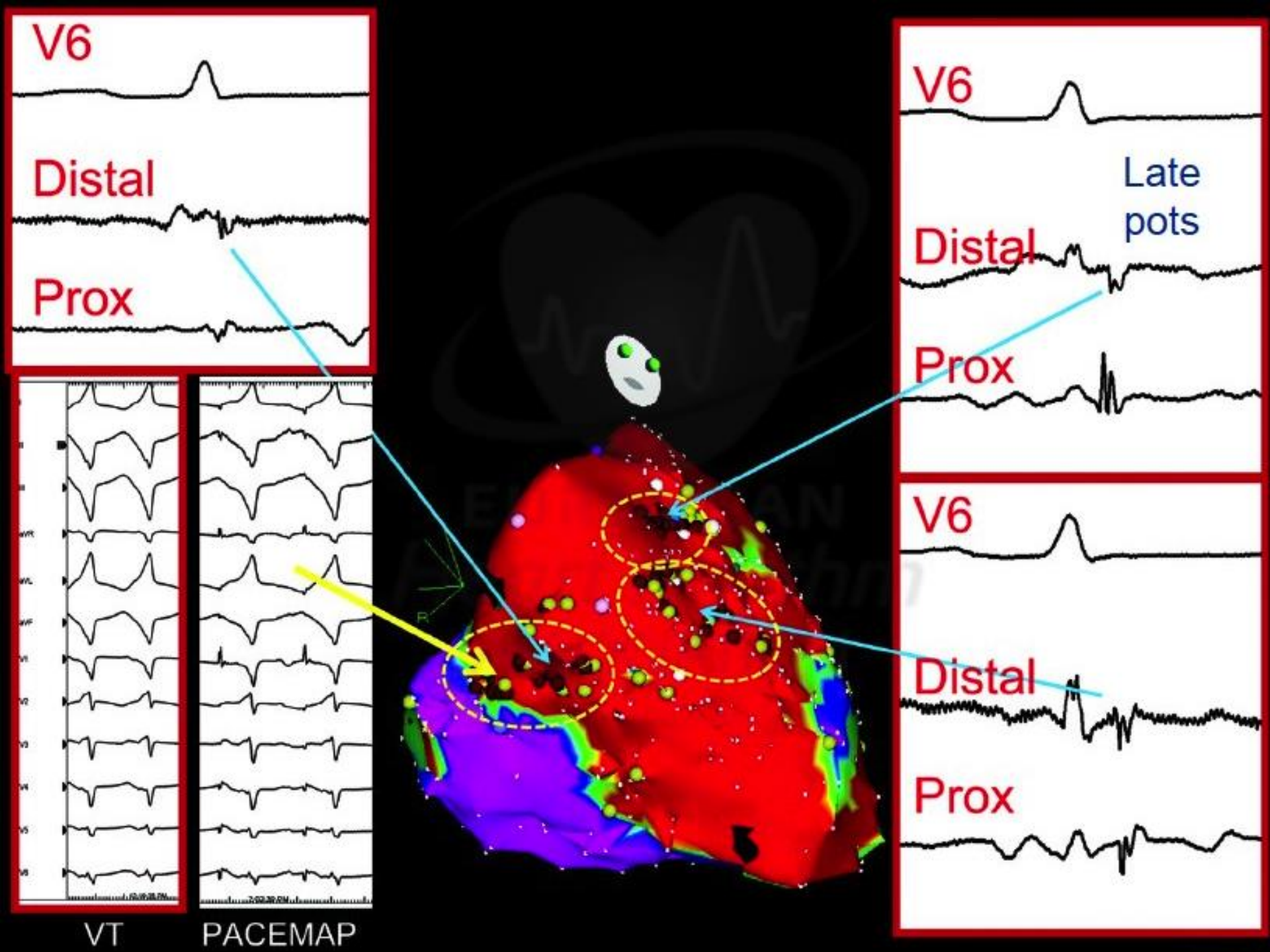
from (more exciting) activation mapping ….
…..to (more realistic) substrate mapping



Di Biase L et al. J Am Coll Cardiol 2015;66:2872-82

and what on the epicardial side ?




V6
Distal
Prox
V6
Late pots
Distal
Prox
V6
Distal
Prox
VT
PACEMAP

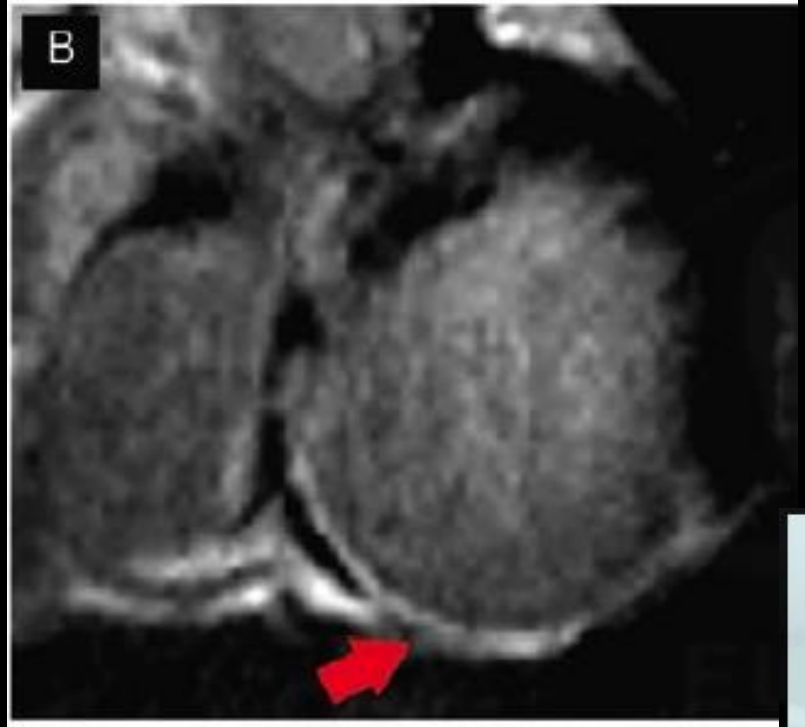
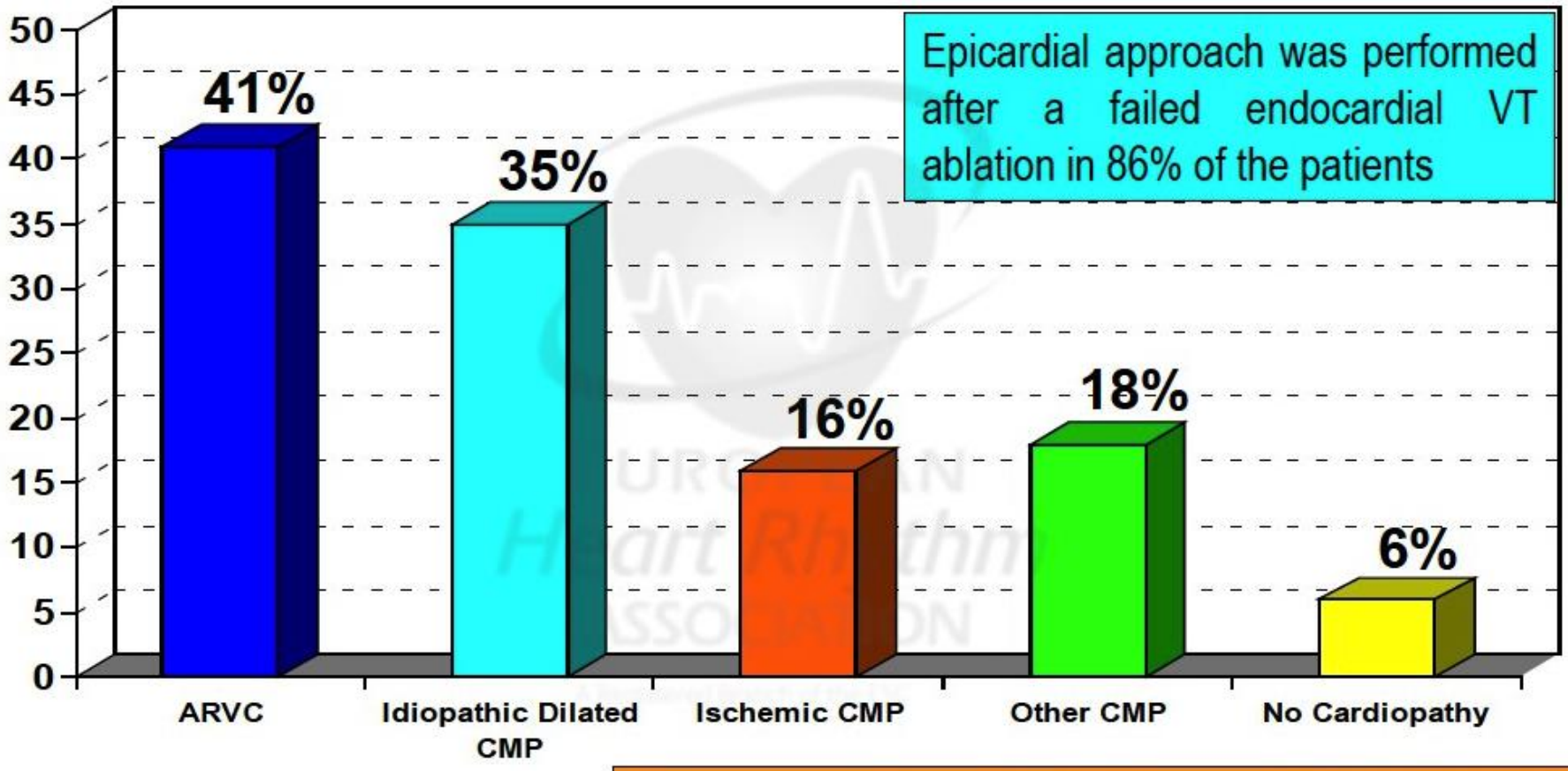


Table 2 Comparison between the endocardial and epicardial site of successful ablation and the type of structural heart disease ($n = 77$)

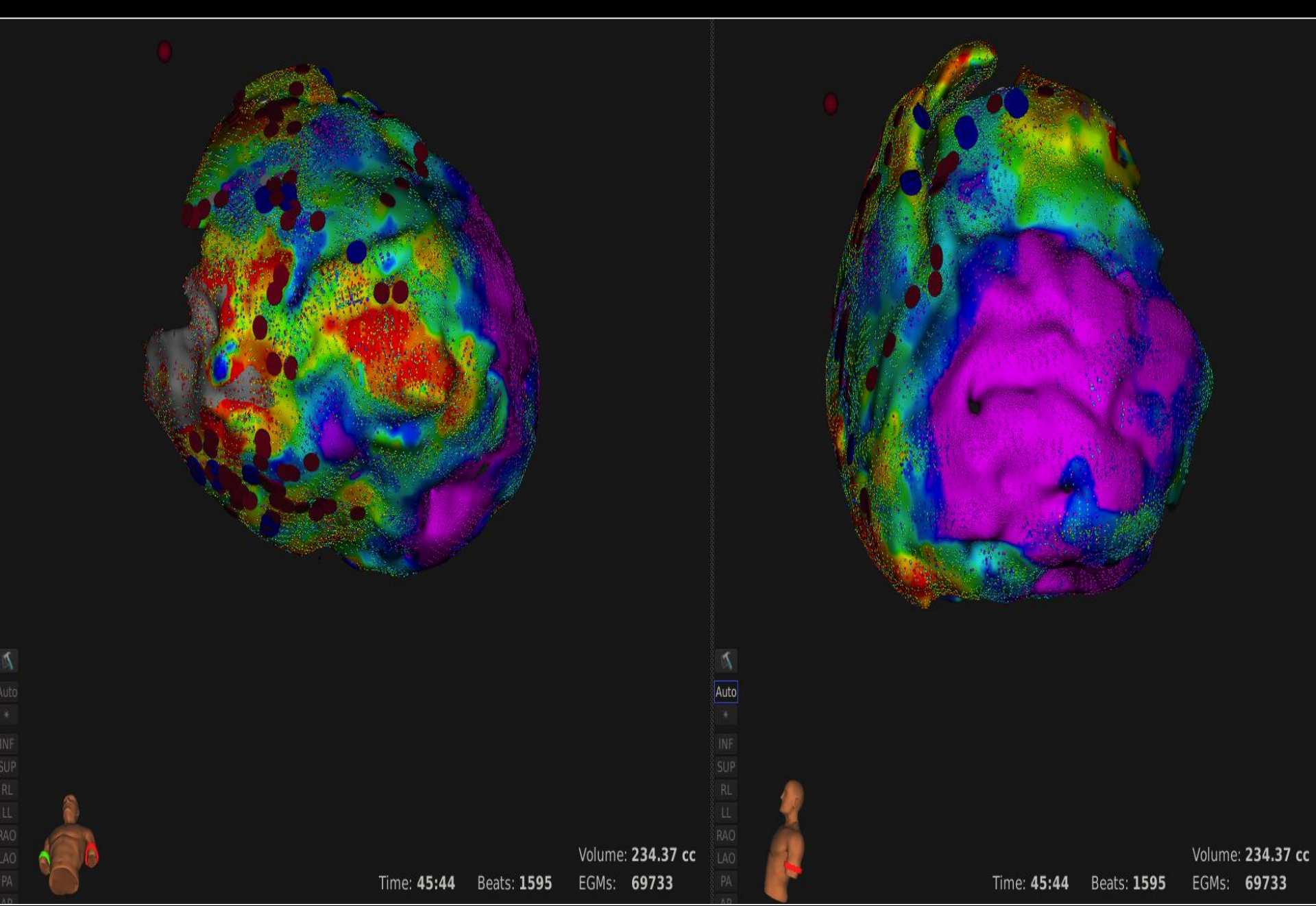
	Endocardial successful ablation, *n* (%)	Epicardial successful ablation, *n* (%)
Ischaemic	46 (93.9%)	3 (6.1%)
Non-ischaemic	16 (57.1%)	12 (42.9%)

Andreu D et al, EHJ 2014

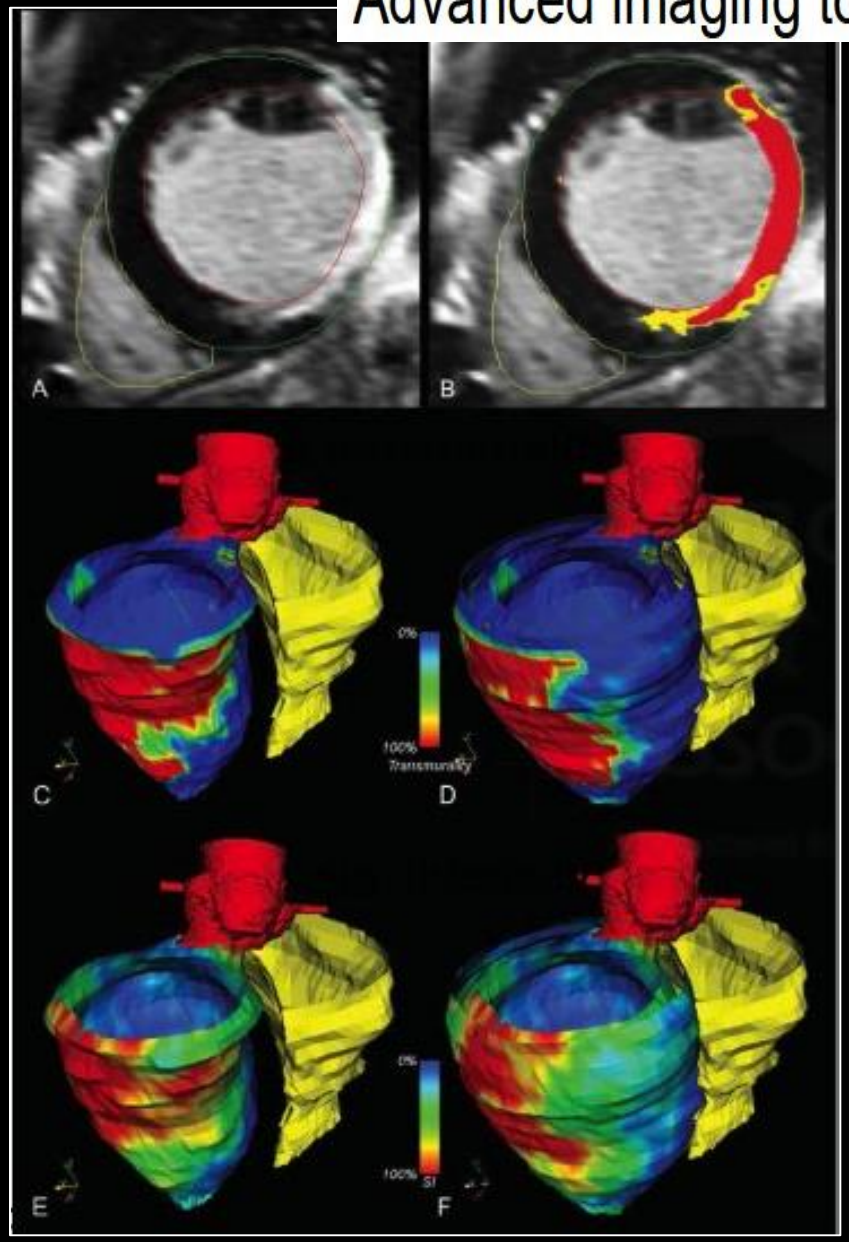


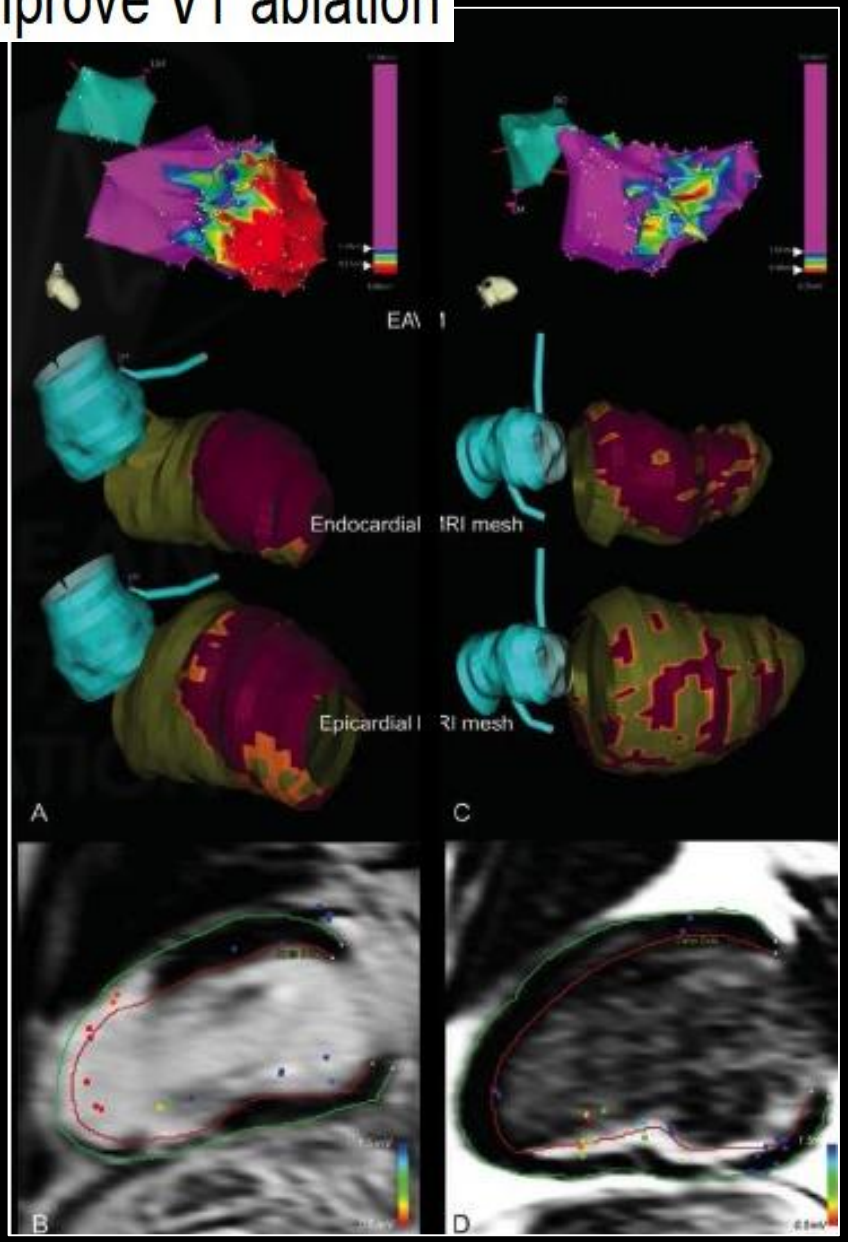
Sacher F et al. JACC 2010;55:2366-72

Percentage of an epicardial approach for VT ablation in relation to the underlying heart disease


Auto
INF
SUP
RL
LL
RAO
LAO
PA
Volume: 234.37 cc
Time: 45:44
Beats: 1595
EGMs: 69733
Auto
INF
SUP
RL
LL
RAO
LAO
PA
Volume: 234.37 cc
Time: 45:44
Beats: 1595
EGMs: 69733

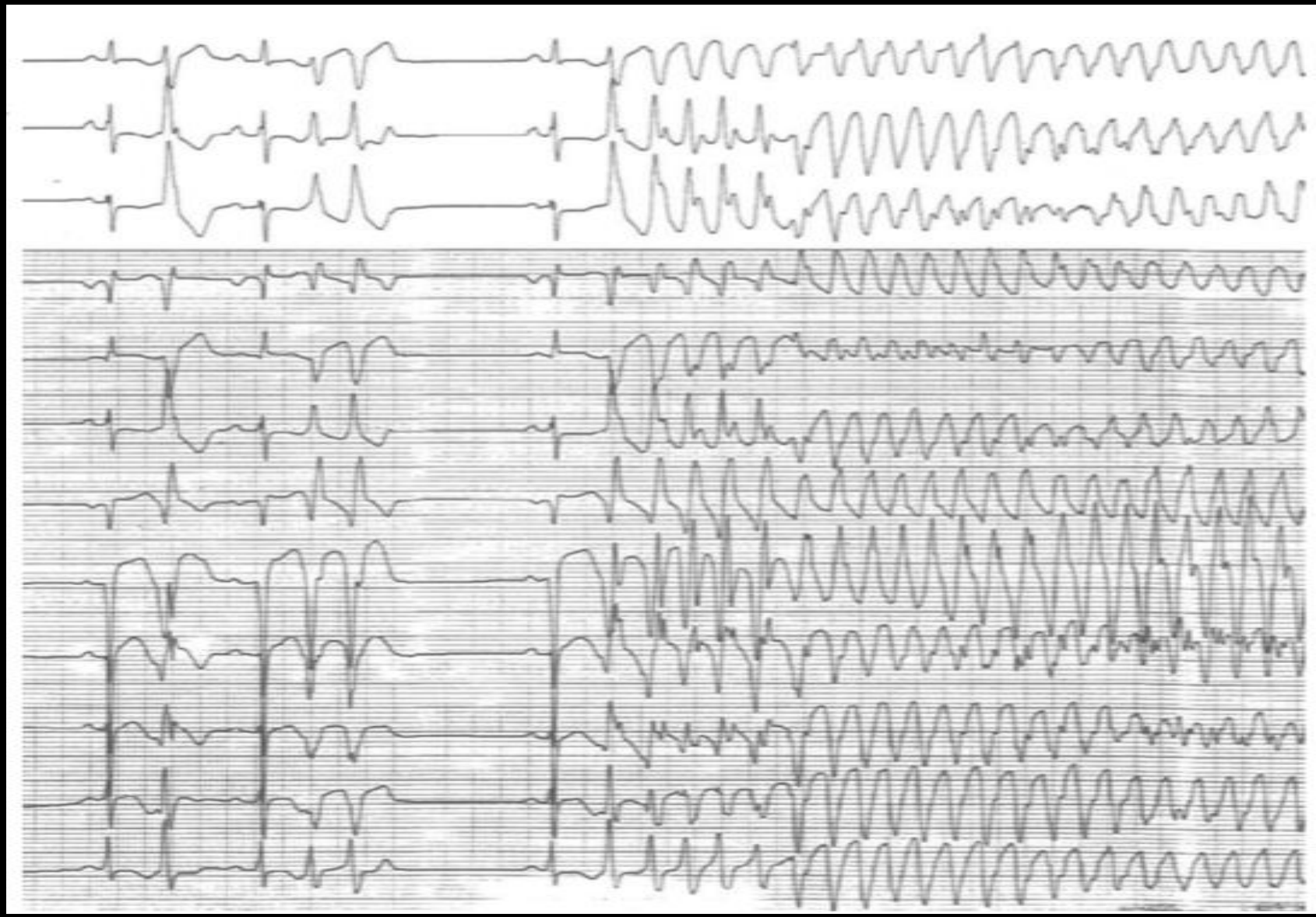
Advanced imaging to improve VT ablation

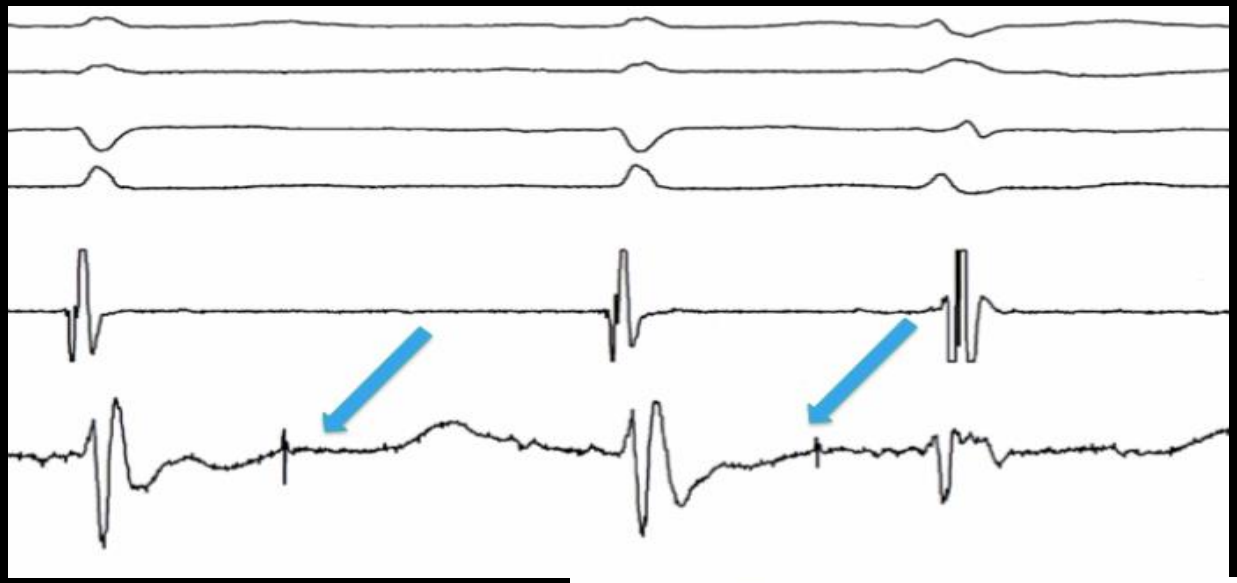


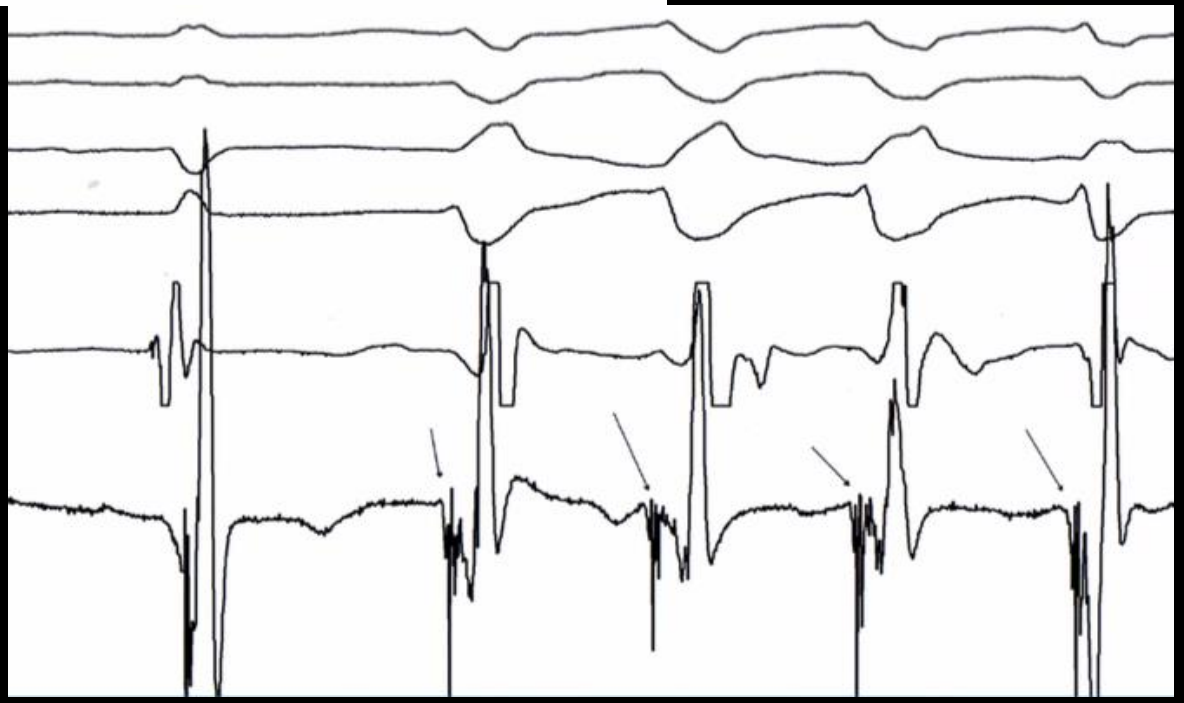


Wijnmaalen AP, Zeppenfeld K, EHJ 2011

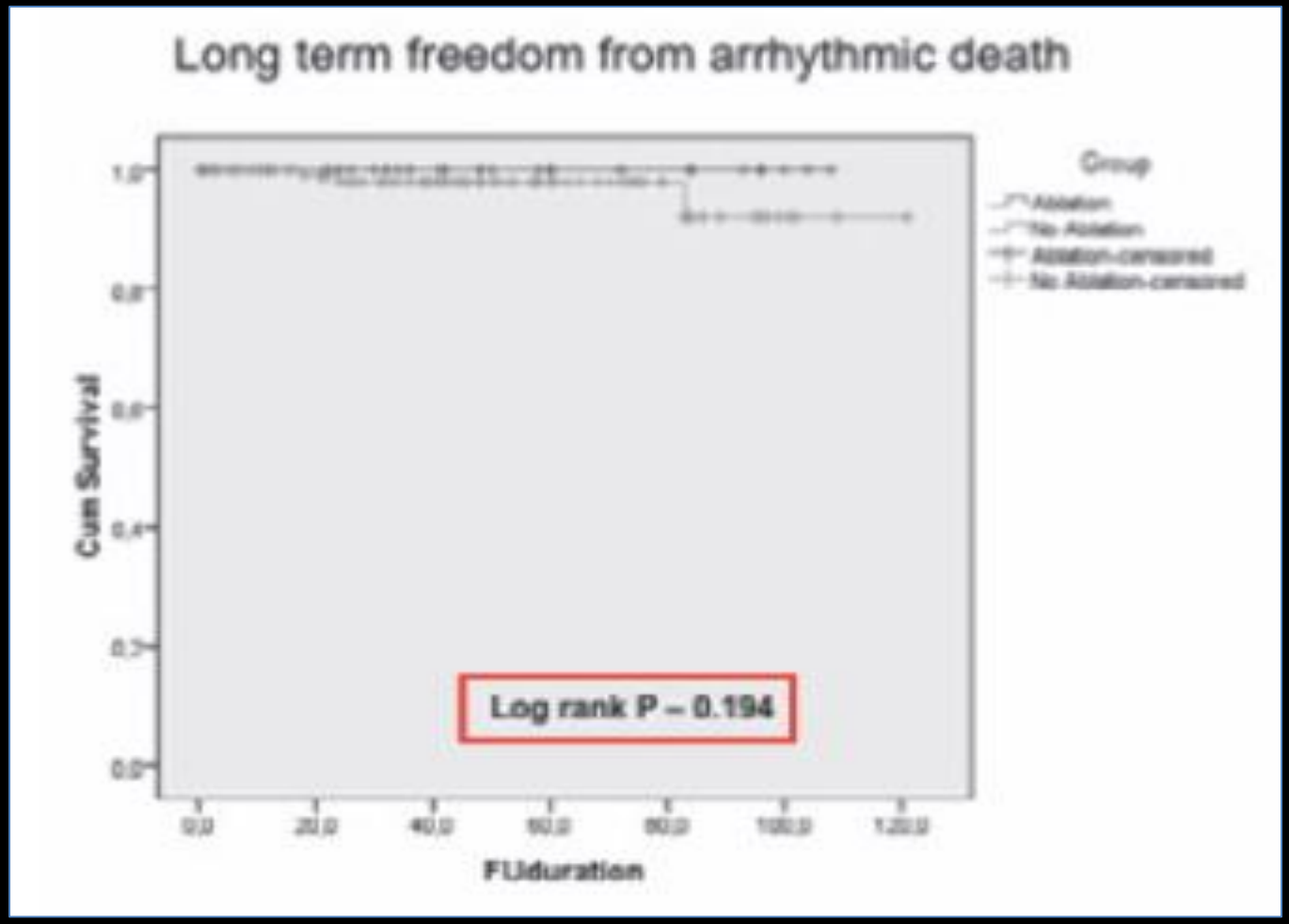
Post ischemic VF



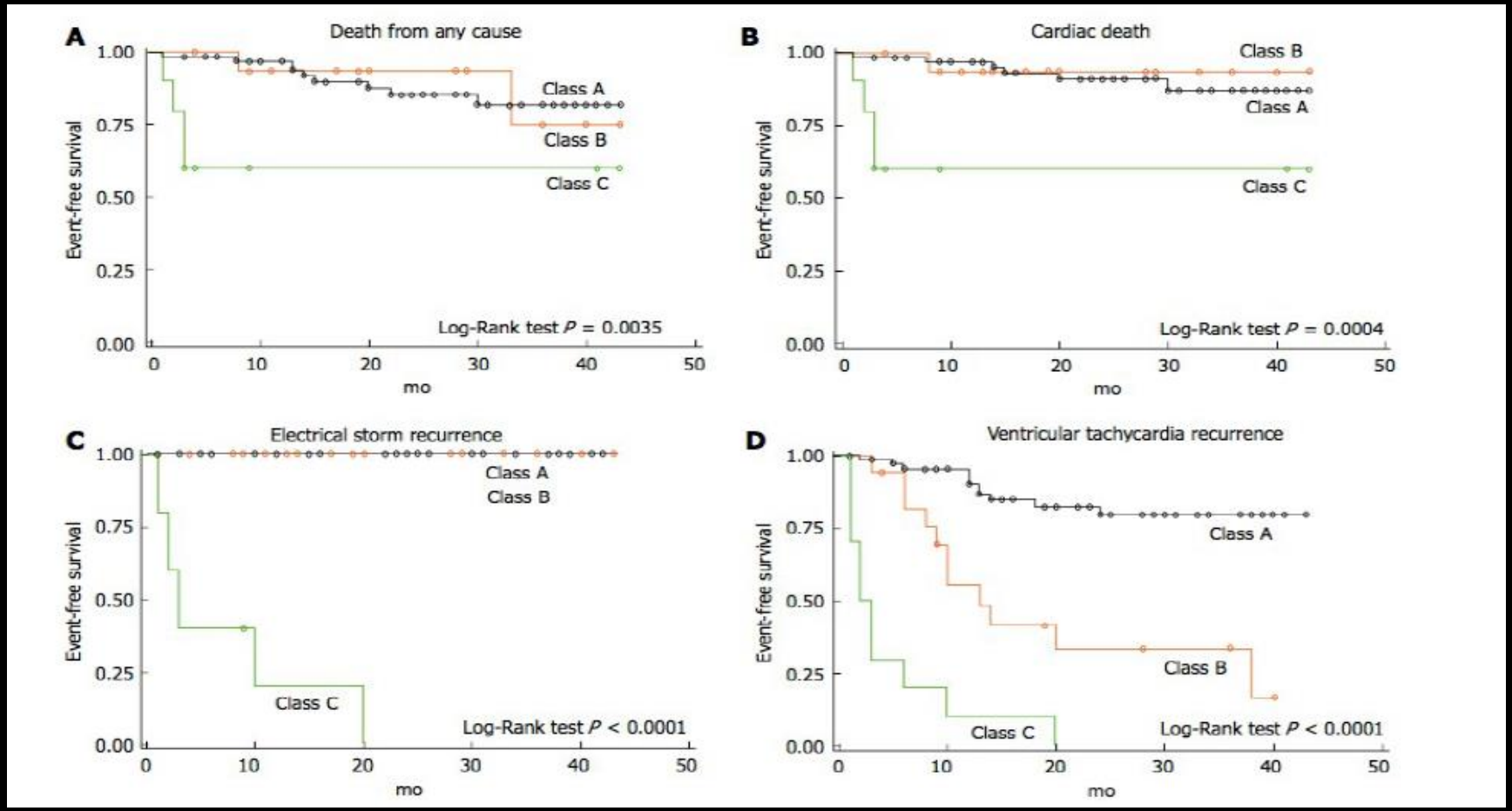




60 patients with post-ischemic refractory VF

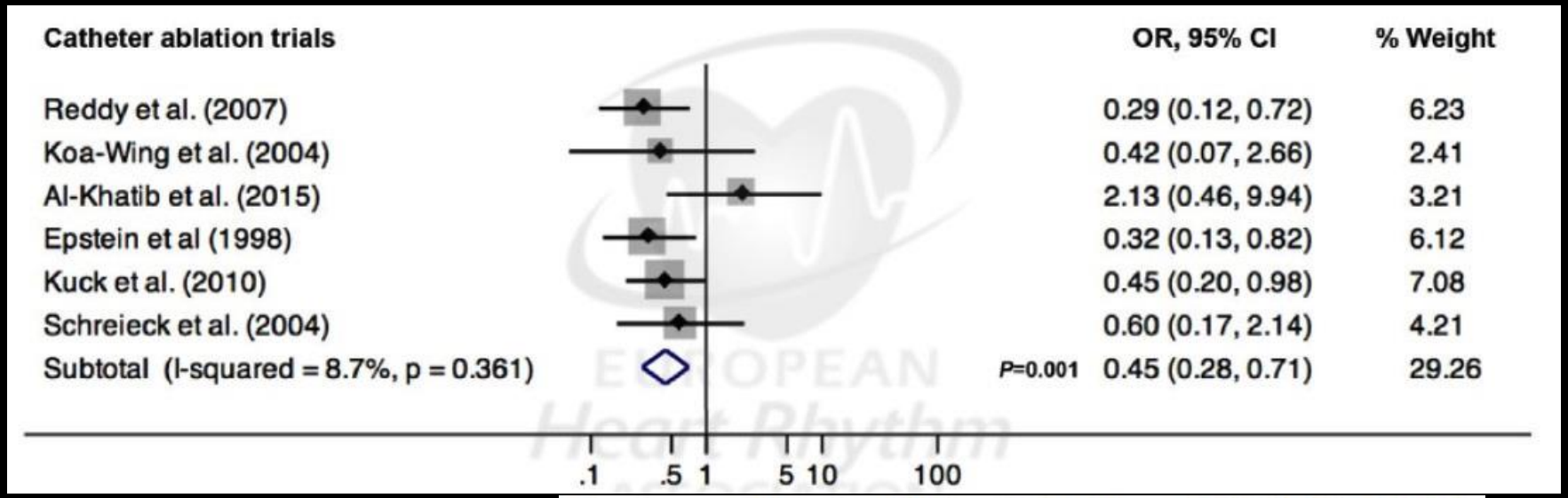


…. but does all this works ???



Carbuccichio C, et al. Circulation. 2008 Jan 29;117(4):462-9

But does it works ???



for recurrent VT

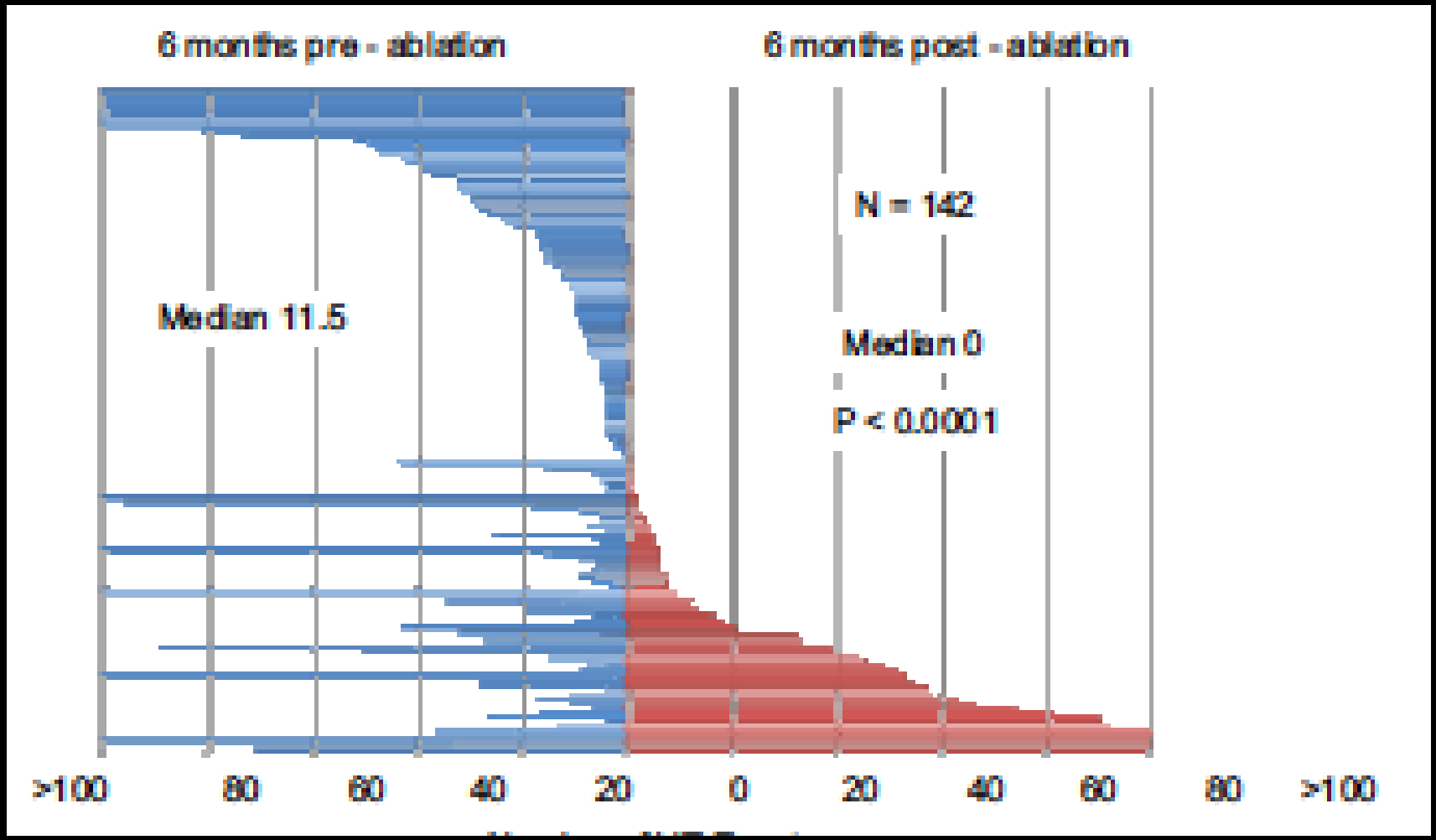
Santangeli P et al. Heart Rhythm 2016;13:1552-9

But does it works ???

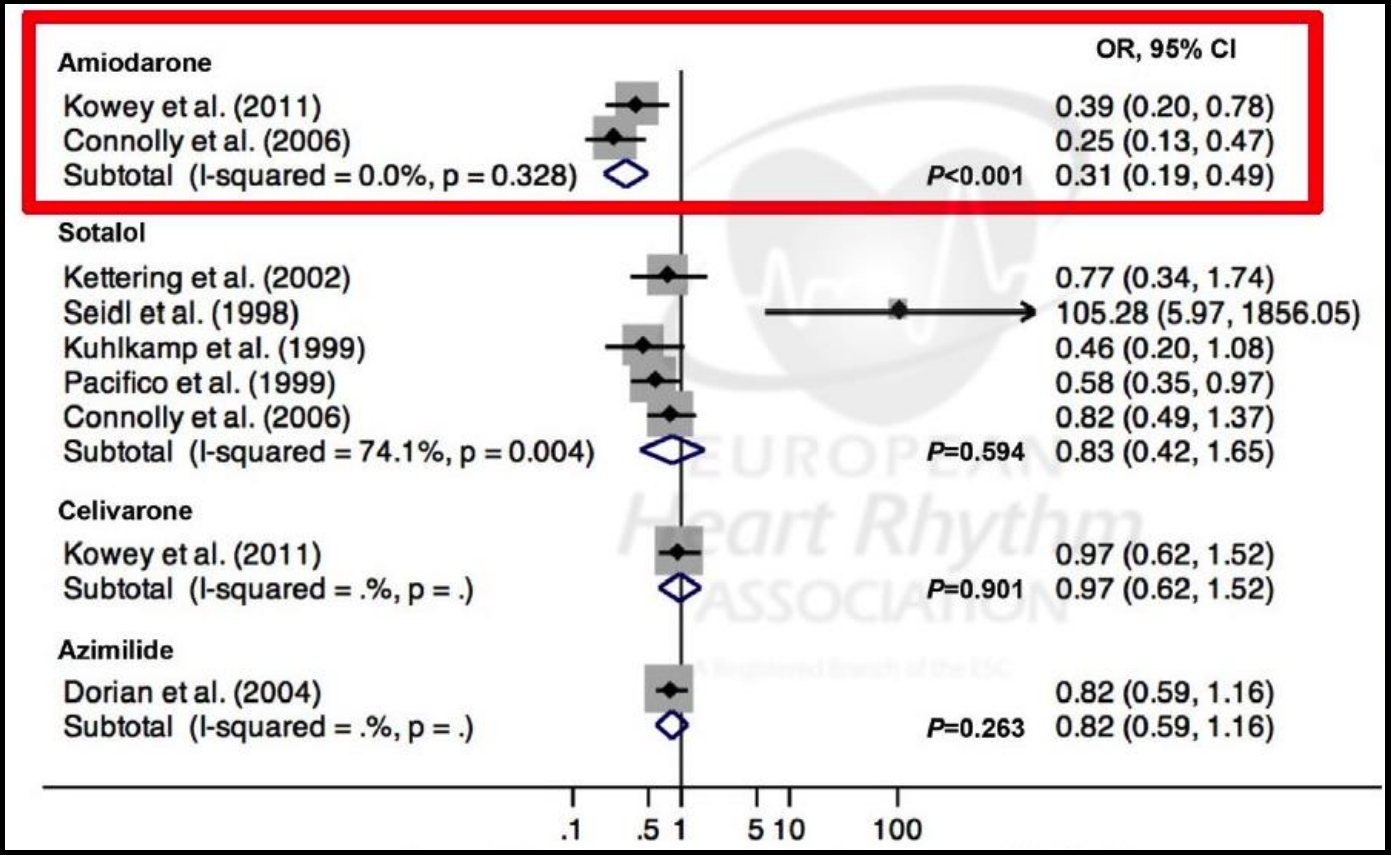
Irrigated Radiofrequency Catheter Ablation Guided by Electroanatomic Mapping for Recurrent Ventricular Tachycardia After Myocardial Infarction

The Multicenter Thermocool Ventricular Tachycardia Ablation Trial

William G. Stevenson, MD; David J. Wilber, MD; Andrea Natale, MD; Warren M. Jackman, MD; Francis E. Marchlinski, MD; Timothy Talbert, MD; Mario D. Gonzalez, MD; Seth J. Worley, MD; Emile G. Daoud, MD; Chun Hwang, MD; Claudio Schuger, MD; Thomas E. Bump, MD; Mohammad Jazayeri, MD; Gery F. Tomassoni, MD; Harry A. Kopelman, MD; Kyoko Soejima, MD; Hiroshi Nakagawa, MD; for the Multicenter Thermocool VT Ablation Trial Investigators



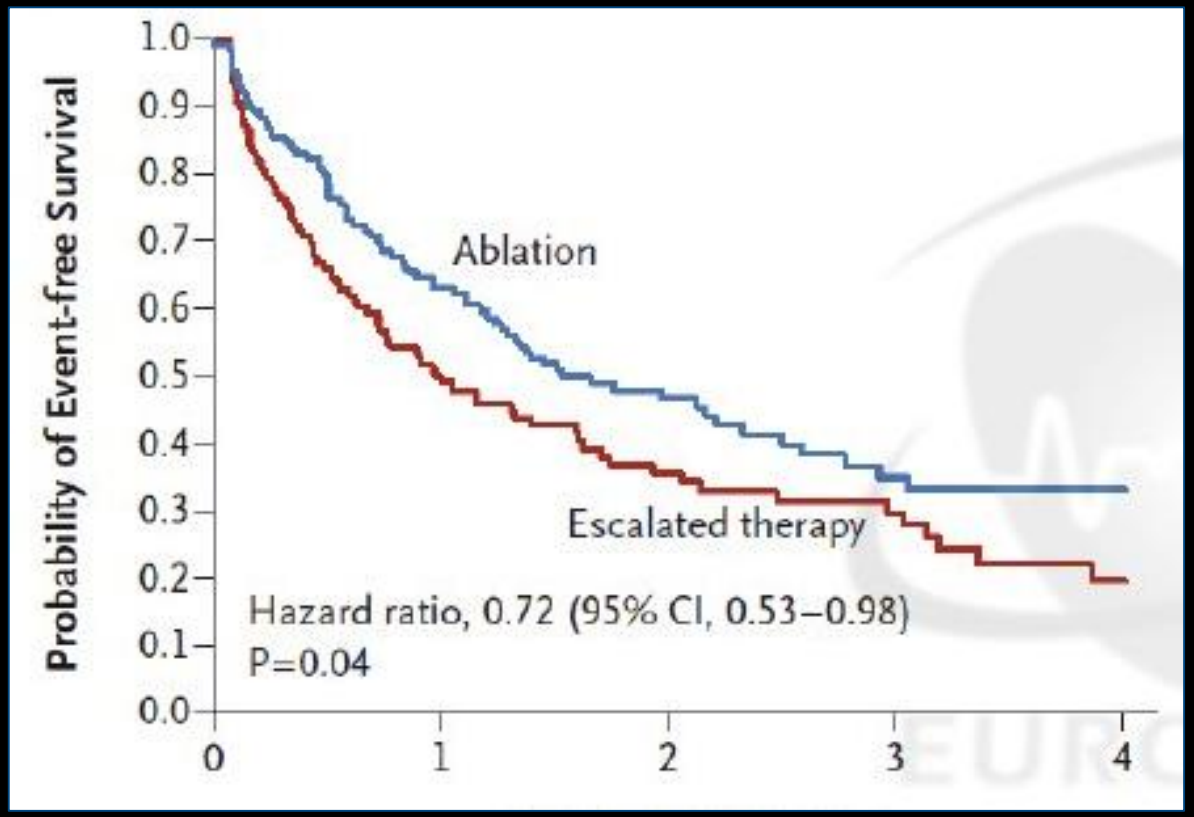
Do anti-arrhythmic drugs also work ?



Santangeli P et al. Heart Rhythm 2016;13:1552-9

Ablation vs drugs ?

VT
Death
ICD shocks



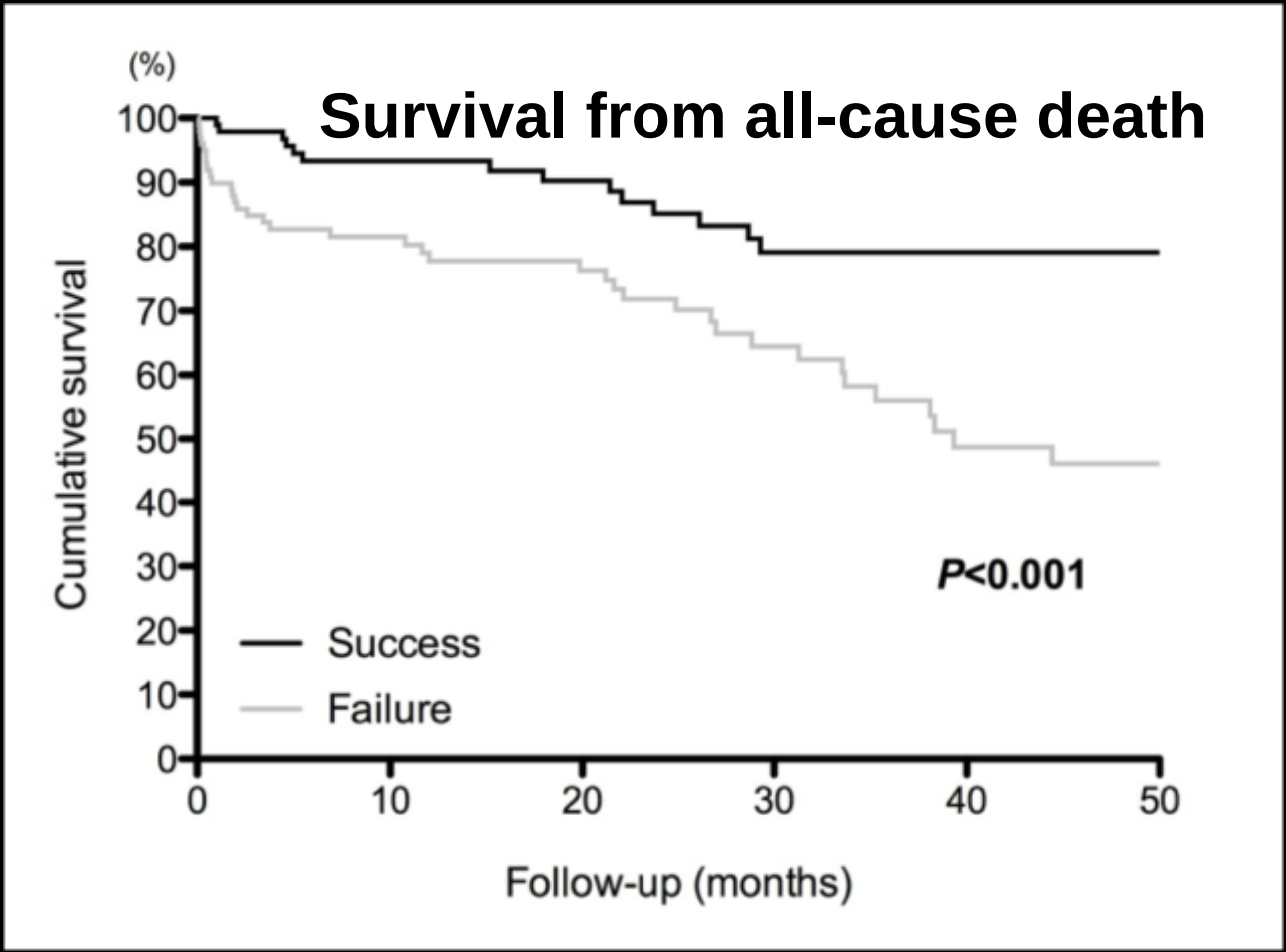
Ischemic cardiomyopathy

VT despite AA drugs

VANISH trial, Sapp J, et al. N Engl J Med. 2016 Jul 14;375(2):111-21

Ablation may save life

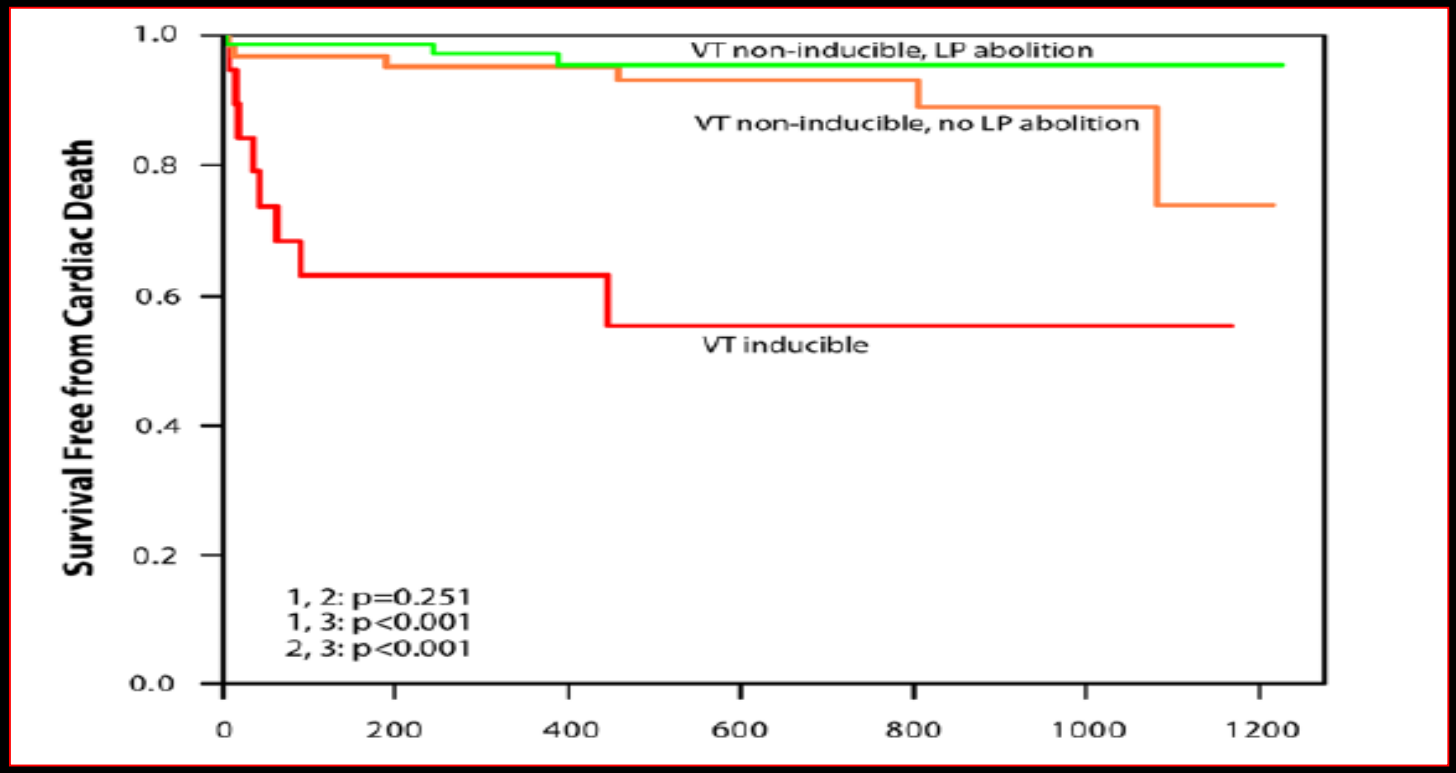
195 implanted pts (NICM, IHD)



acute procedural success was defined as achievement of both elimination of all identified LAVA and VT non-inducibility post-ablation

(Komatsu, et al. JCE 2015)

Ablation may save life



166 post MI patients
> 90% with ICD

Noninducibility and Late Potential Abolition

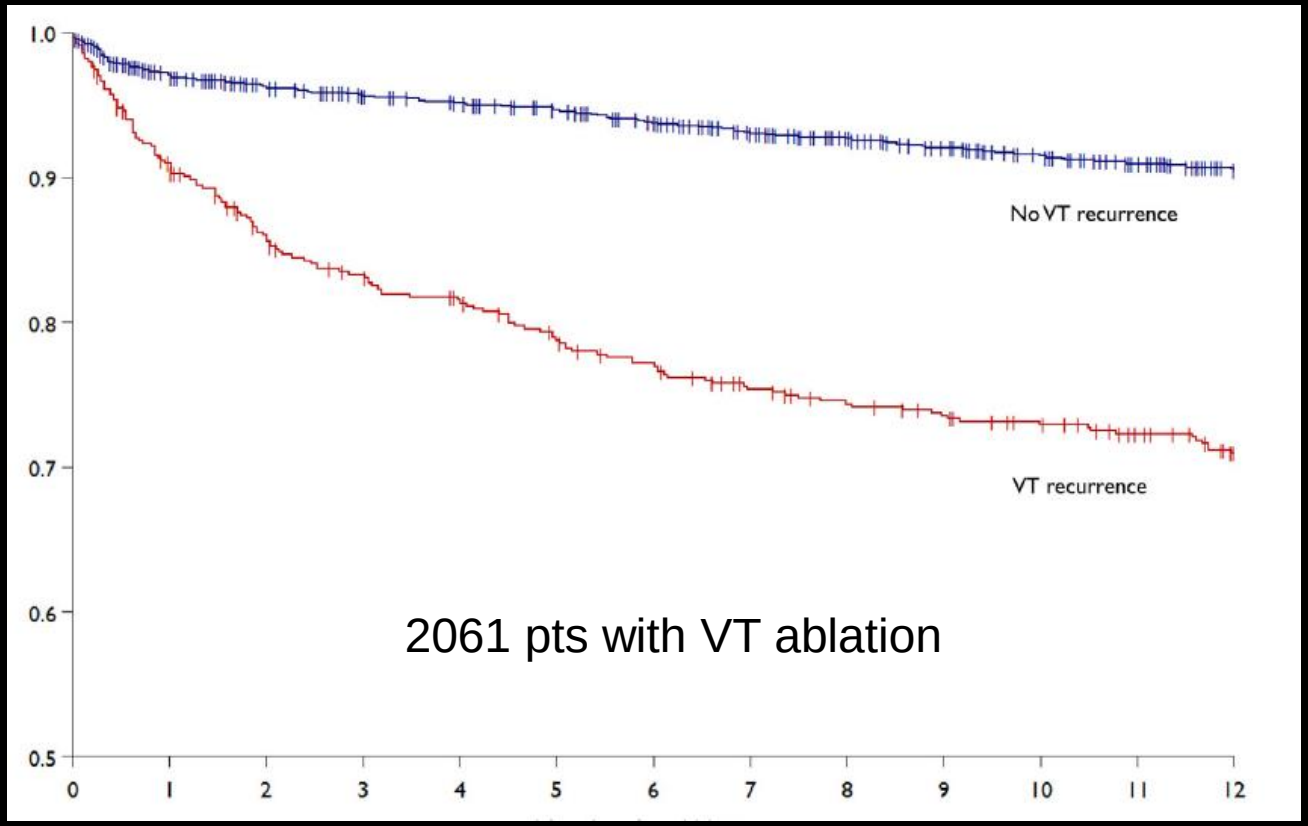
A Novel Combined Prognostic Procedural End Point for Catheter Ablation of Postinfarction Ventricular Tachycardia

John Silberbauer, MA, MD (Res), MRCP; Teresa Oloriz, MD; Giuseppe Maccabelli, MD; Dimitris Tsiachris, MD, PhD; Francesca Baratto, MD; Pasquale Vergara, MD, PhD; Hiroya Mizuno, MD, PhD; Caterina Bisceglia, MD, PhD; Alessandra Marzi, MD; Nicoleta Sora, MD; Fabrizio Guarracini, MD; Andrea Radinovic, MD; Manuela Cireddu, MD; Simone Sala, MD; Simone Gulletta, MD; Gabriele Paglino, MD; Patrizio Mazzone, MD; Nicola Trevisi, MD; Paolo Della Bella, MD

(*Circ Arrhythm Electrophysiol.* 2014;7:424-435.)

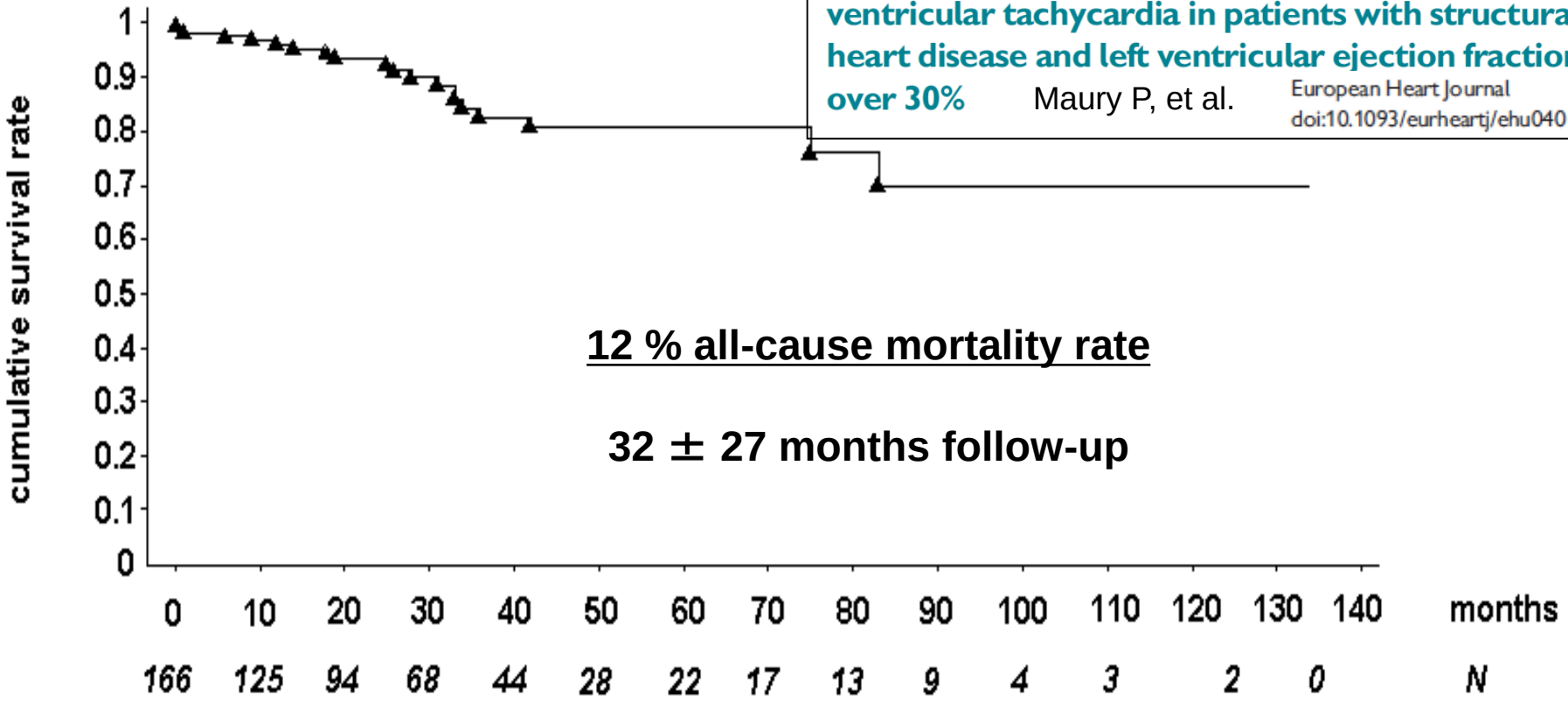
Ablation may save life

Freedom from recurrent ventricular tachycardia after catheter ablation is associated with improved survival in patients with structural heart disease: An International VT Ablation Center Collaborative Group study



Tung R, et al. Heart Rhythm 2015;12:1997

Radio-frequency ablation as primary management of well-tolerated sustained monomorphic ventricular tachycardia in patients with structural heart disease and left ventricular ejection fraction over 30% Maury P, et al. European Heart Journal doi:10.1093/eurheartj/ehu040



12 % all-cause mortality rate

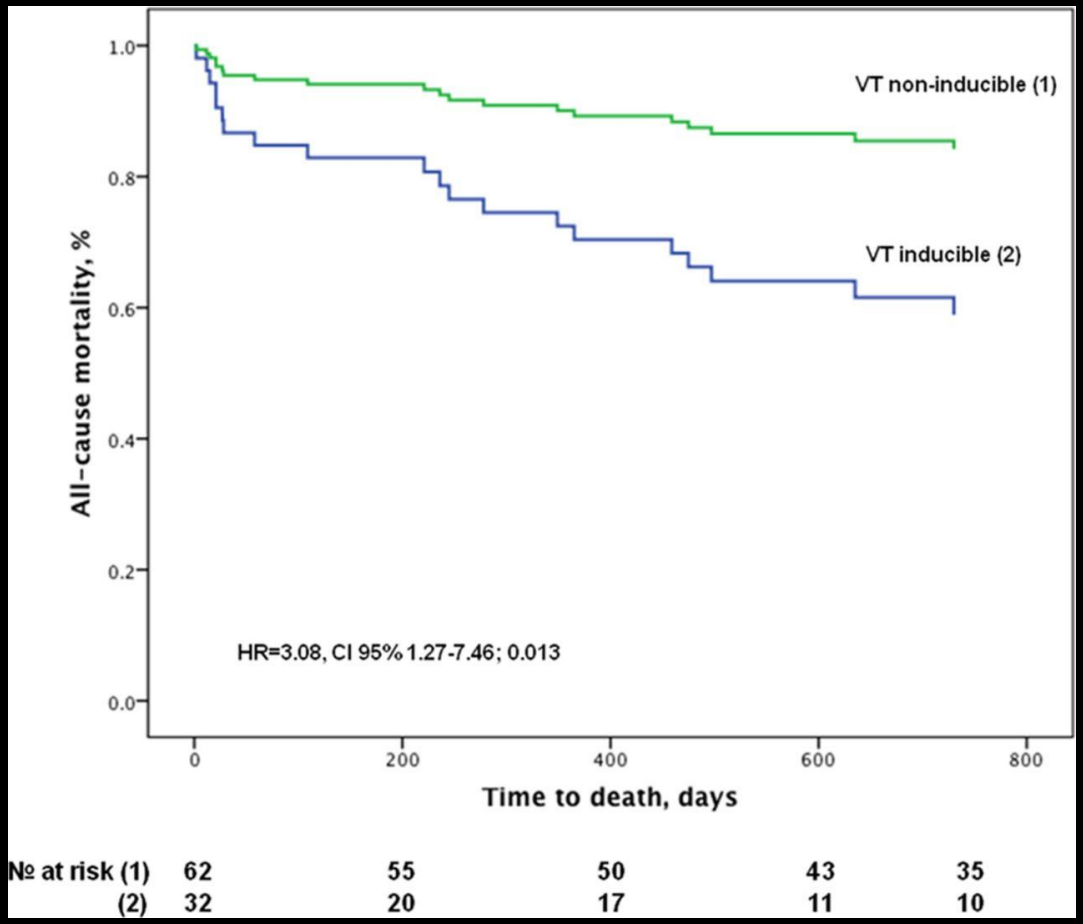
32 ± 27 months follow-up

similar patients with SHD and well-tolerated VT implanted with ICD in the same institutions and at the same time (control group) **mortality 12 %**

Total mortality	AVID (ICD)	at 30 months	18 %
	AVID registry	at 30 months	>20%
	CIDS (ICD)	at 30 months	14 %
	CASH (ICD)	at 30 months	16 %

Results in NICM ?

Catheter Ablation of Ventricular Tachycardia and Mortality in Patients With Nonischemic Dilated Cardiomyopathy (HELP-VT)



Dinov B, et al.
Circ Arrhythm Electrophysiol
Volume 8:598-605

Conclusions

VT ablation in IHD or NICM is effective and reduce VT burden and ICD shocks

From activation mapping to substrate mapping

Need for better scar imaging

Toward enlarged indications ? (prophylactic ablation)