Κολπική Μαρμαρυγή: Μια σύγχρονη επιδημία

Βασίλειος Π. Βασιλικός MD, FACC, FESC
Καθηγητής Καρδιολογίας
Διευθυντής Γ Καρδιολογικής Κλινικής ΑΠΘ

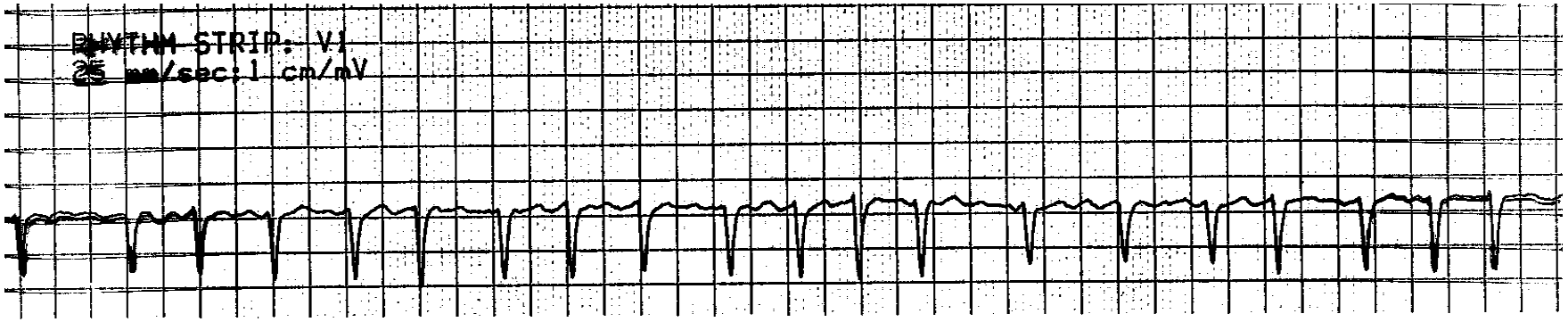
3η ΚΑΡΔΙΟΛΟΓΙΚΗ ΚΛΙΝΙΚΗ Α.Π.Θ.
ΔΙΕΥΘΥΝΤΗΣ: ΚΑΘΗΓΗΤΗΣ ΒΑΣΙΛΕΙΟΣ Π. ΒΑΣΙΛΙΚΟΣ

Conflict of interest

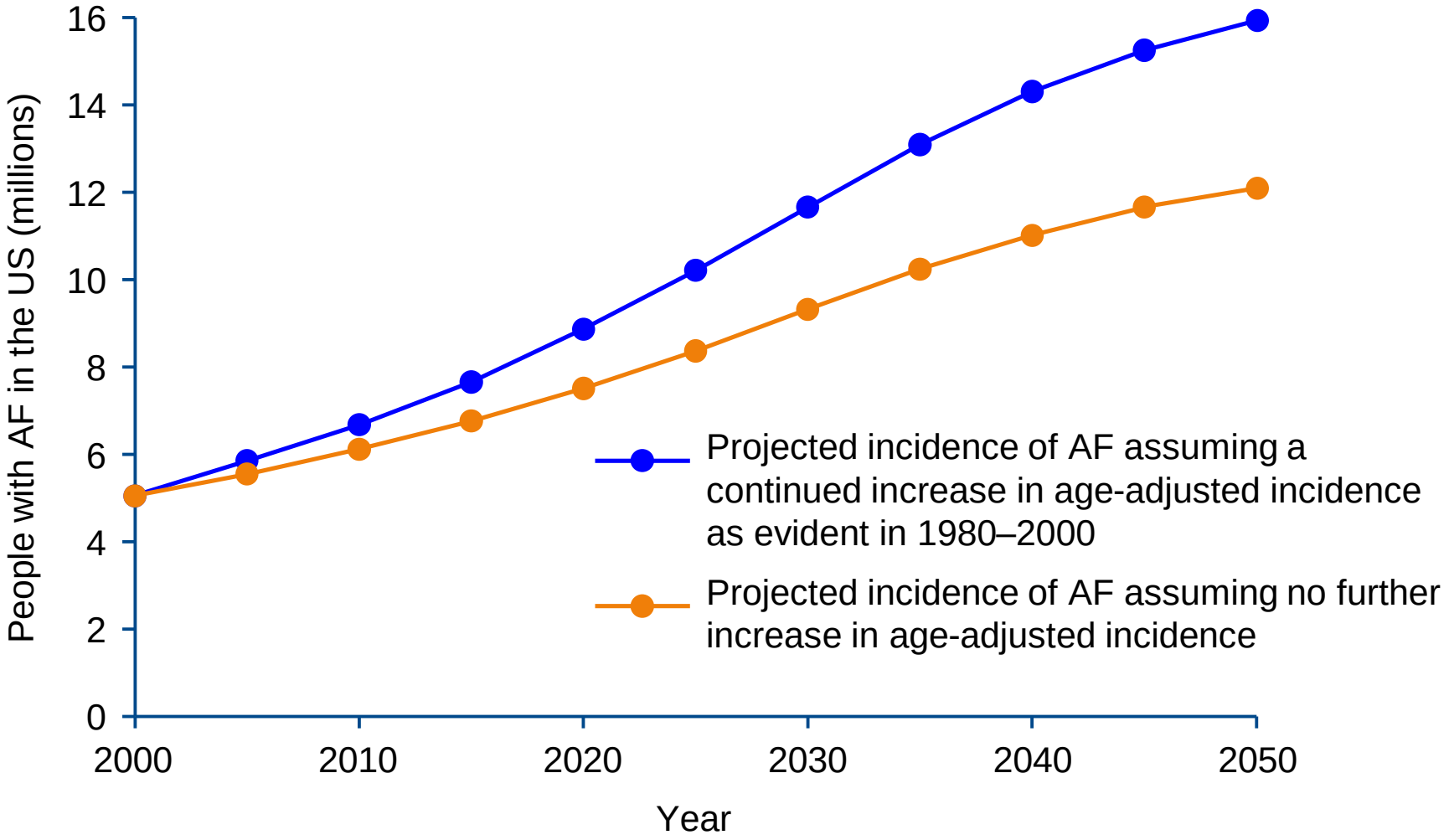
- Advisory board for Boehringer Ingelheim, Bayer

2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation

- AF is a common supraventricular arrhythmia that is characterized by rapid and irregular activation in the atria without discrete P waves on the surface ECG

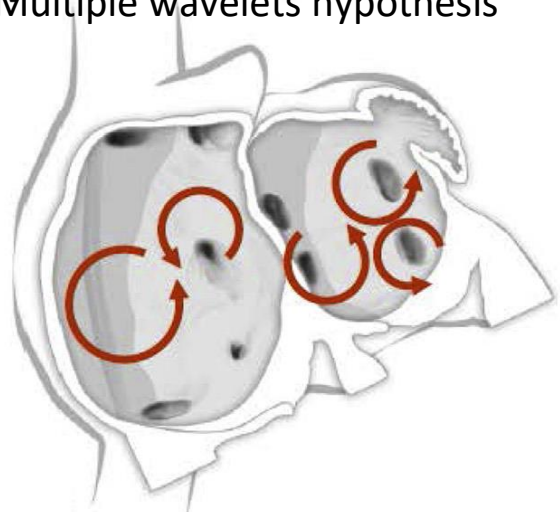


Prevalence of AF predicted to more than double by 2050

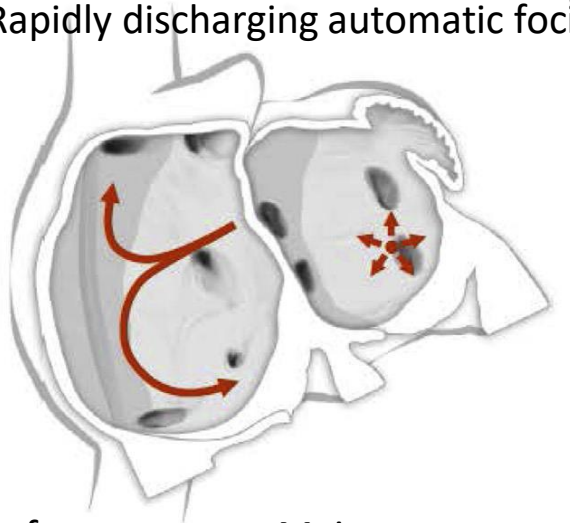


Miyasaka Y et al. Circulation 2006;114:119–25

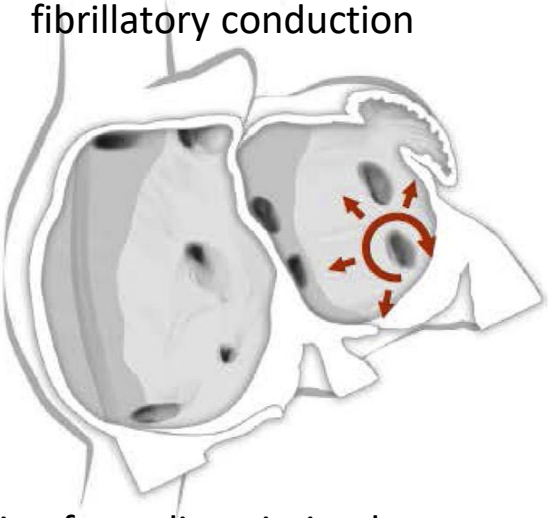
A Multiple wavelets hypothesis



B Rapidly discharging automatic foci

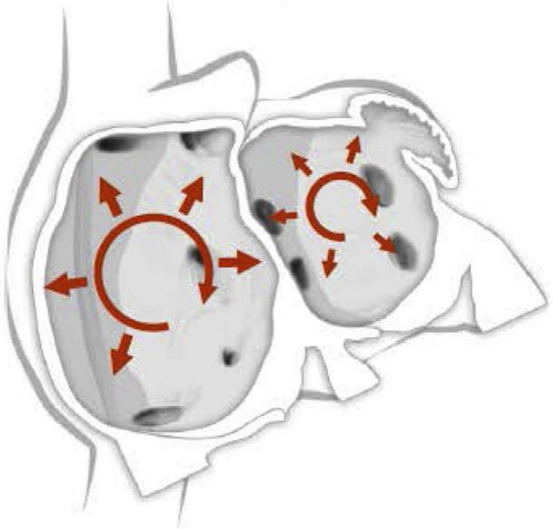


C Single reentrant circuit with fibrillatory conduction



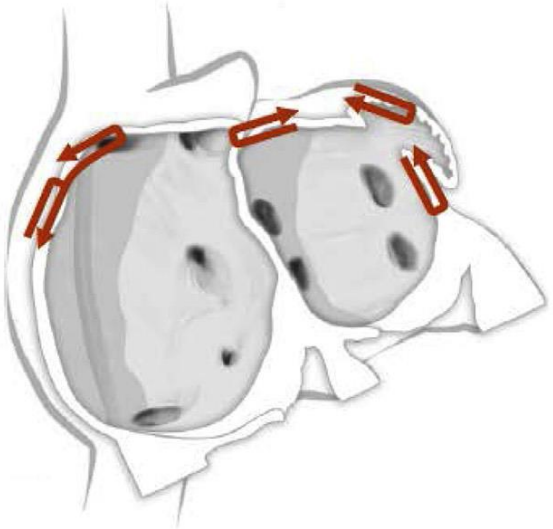
: Functional reentry resulting from rotors or spiral waves

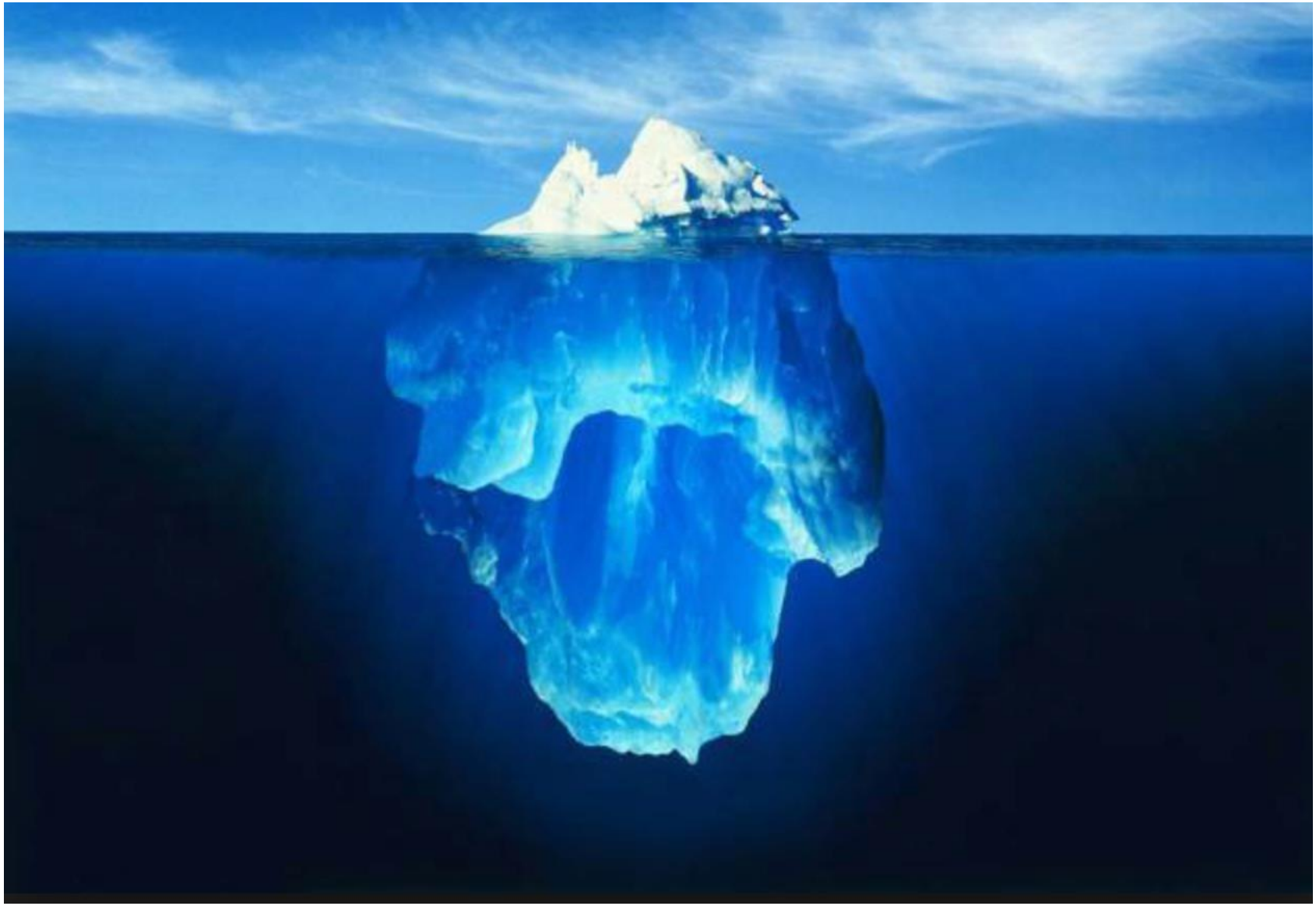
D



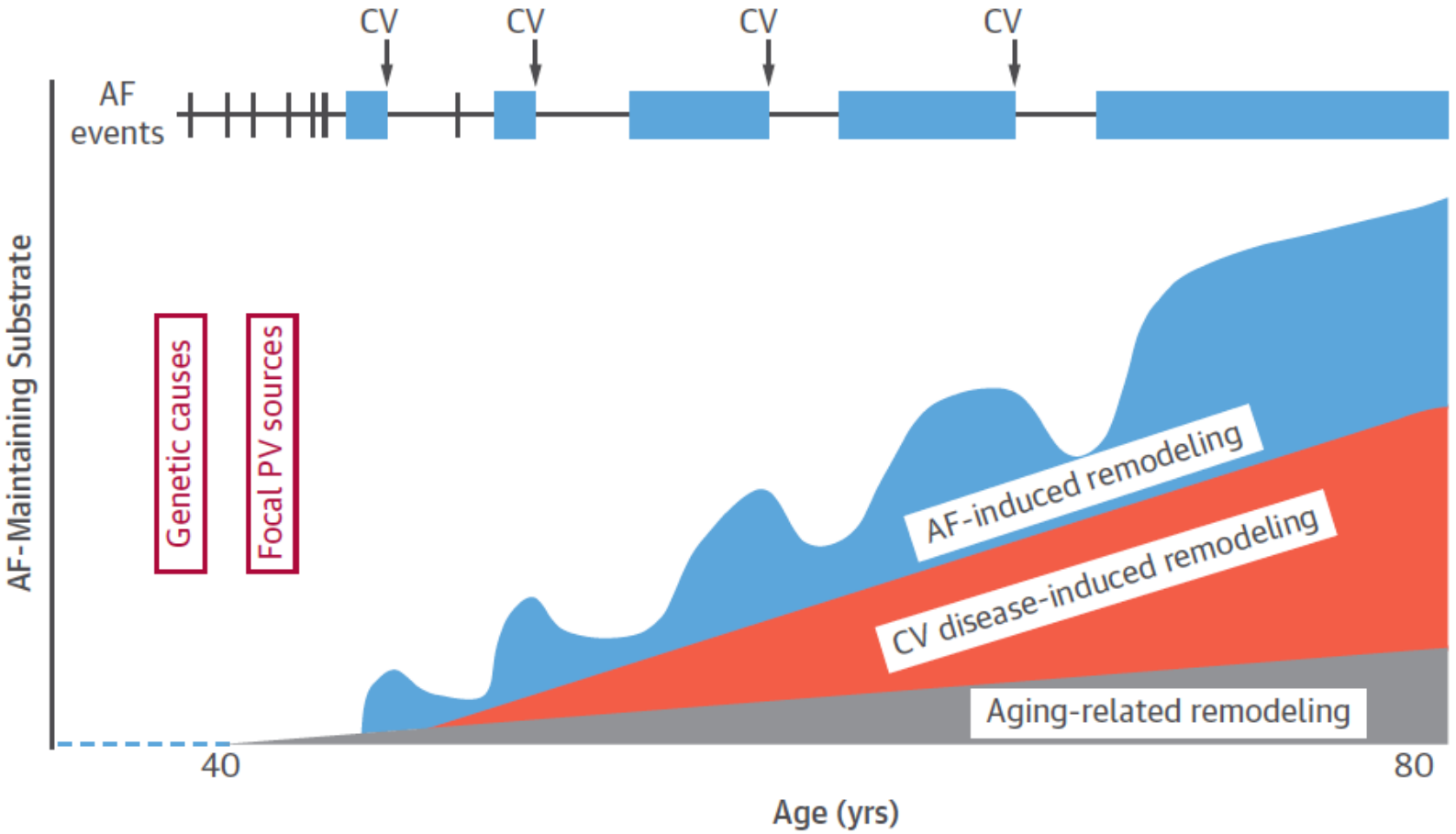
Maintenance resulting from dissociation between epicardial and endocardial layers,

E





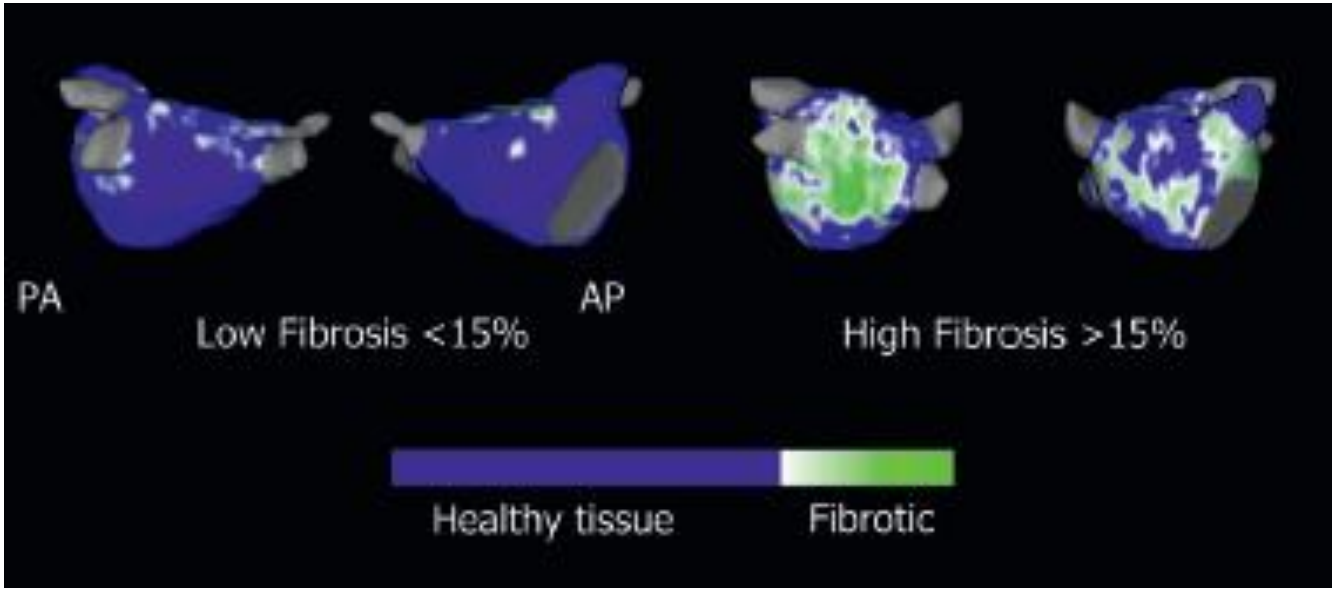
A Schematic Representation of the Natural History of AF



Guichard and Nattel. JACC 2017

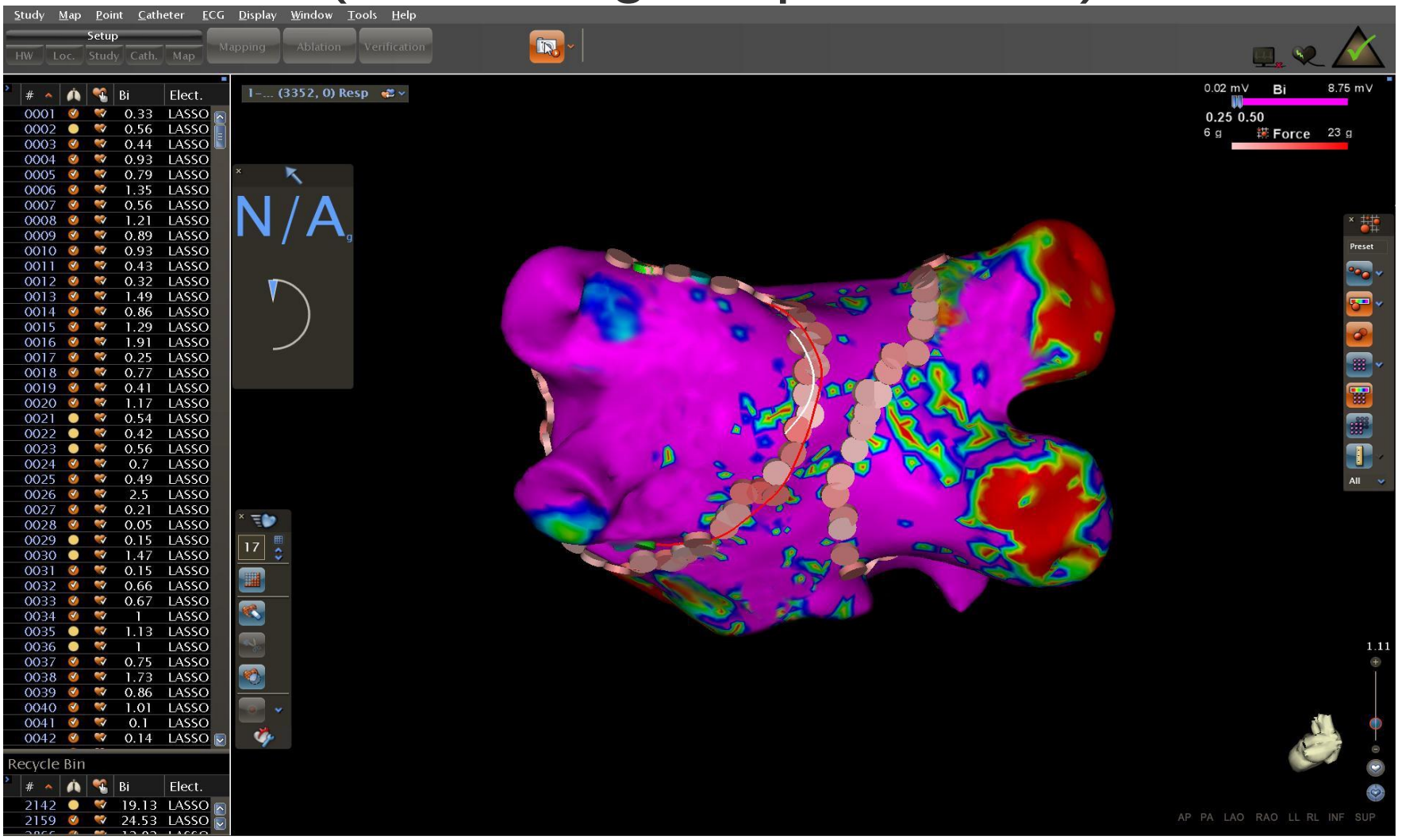
Left Atrial Fibrosis and Risk of Cerebrovascular and Cardiovascular Events in Patients With Atrial Fibrillation

Jordan B. King, PharmD, MS,[a,b] Peyman N. Azadani, MD,[b,c] Prompom Suksaranjit, MD, MS,[b] Adam P. Bress, PharmD, MS,[d] Daniel M. Witt, PharmD,[e] Frederick T. Han, MD,[b] Mihail G. Chelu, MD, PhD,[b] Michelle A. Silver, MSPH,[b] Joseph Biskupiak, PhD, MBA,[e] Brent D. Wilson, MD, PhD,[b] Alan K. Morris, MS,[b] Eugene G. Kholmovski, PhD,[b,f] Nassir Marrouche, MD[b]



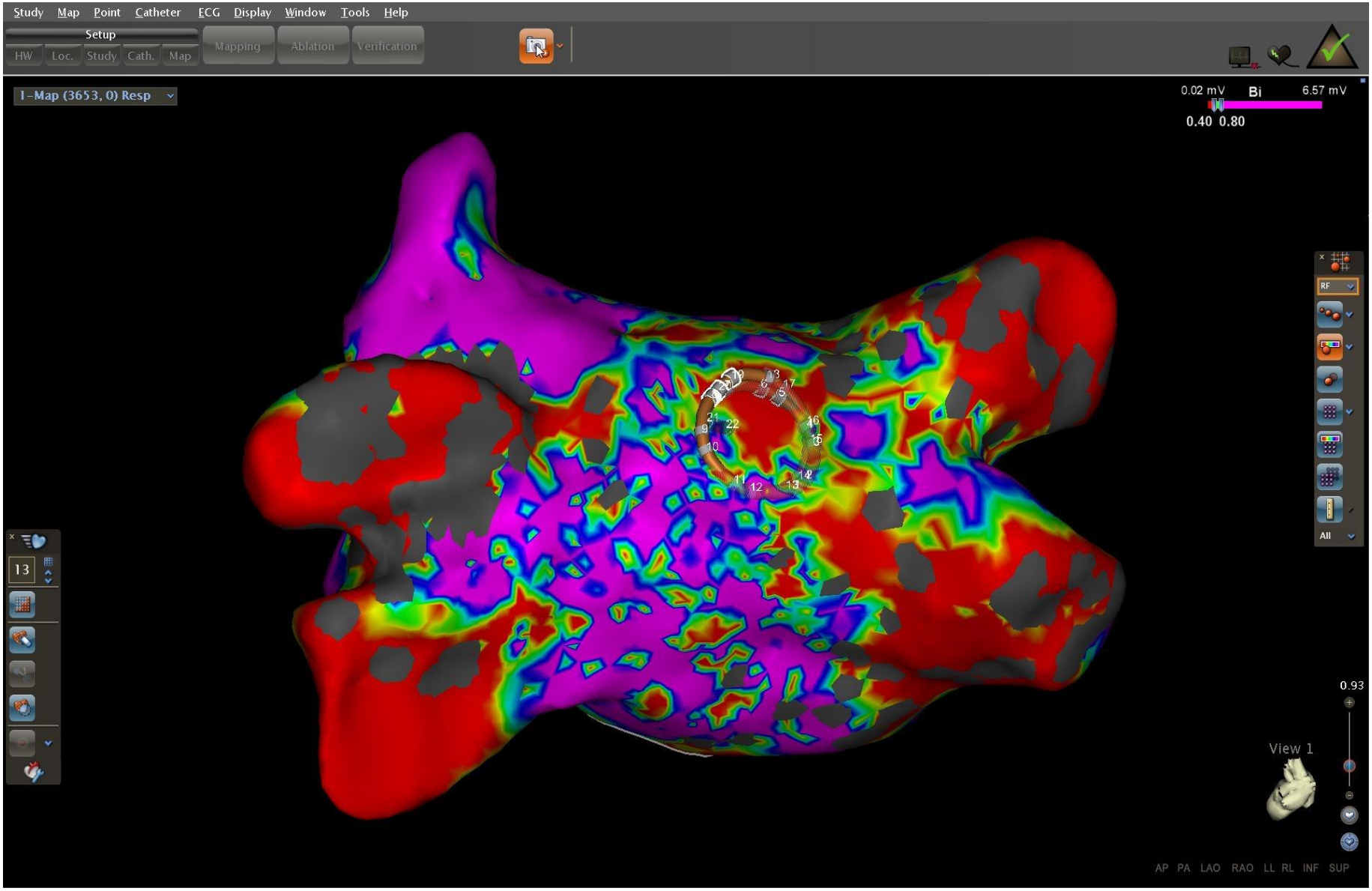
JACC 2017 (70): 11

32 y old male with Persistent AF (SR during RF procedure)



Courtesy of Dr Efraimidis, Evaggelismos Hospital, Athens

46 y old pt with Persistent AF



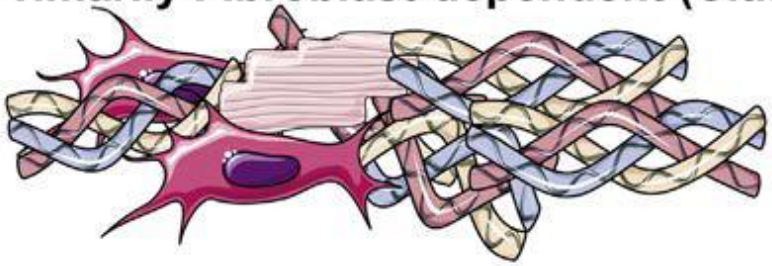
Courtesy of Dr Efraimidis, Evaggelismos Hospital, Athens

EHRAS classification

Primarily Cardiomyocyte-dependent (Class I)

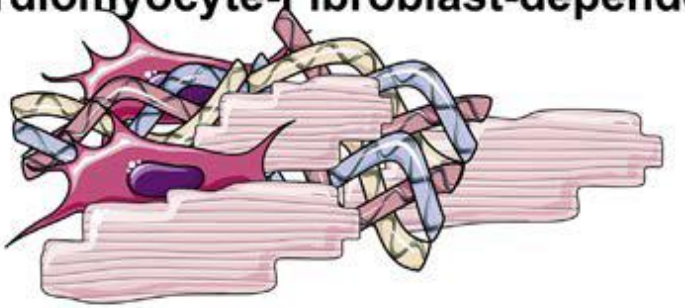
- lone AF
- genetic diseases
- diabetes mellitus

Primarily Fibroblast-dependent (Class II)



- aging
- cigarette smoking

Mixed Cardiomyocyte-Fibroblast-dependent (Class III)



- CHF
- valvular diseases

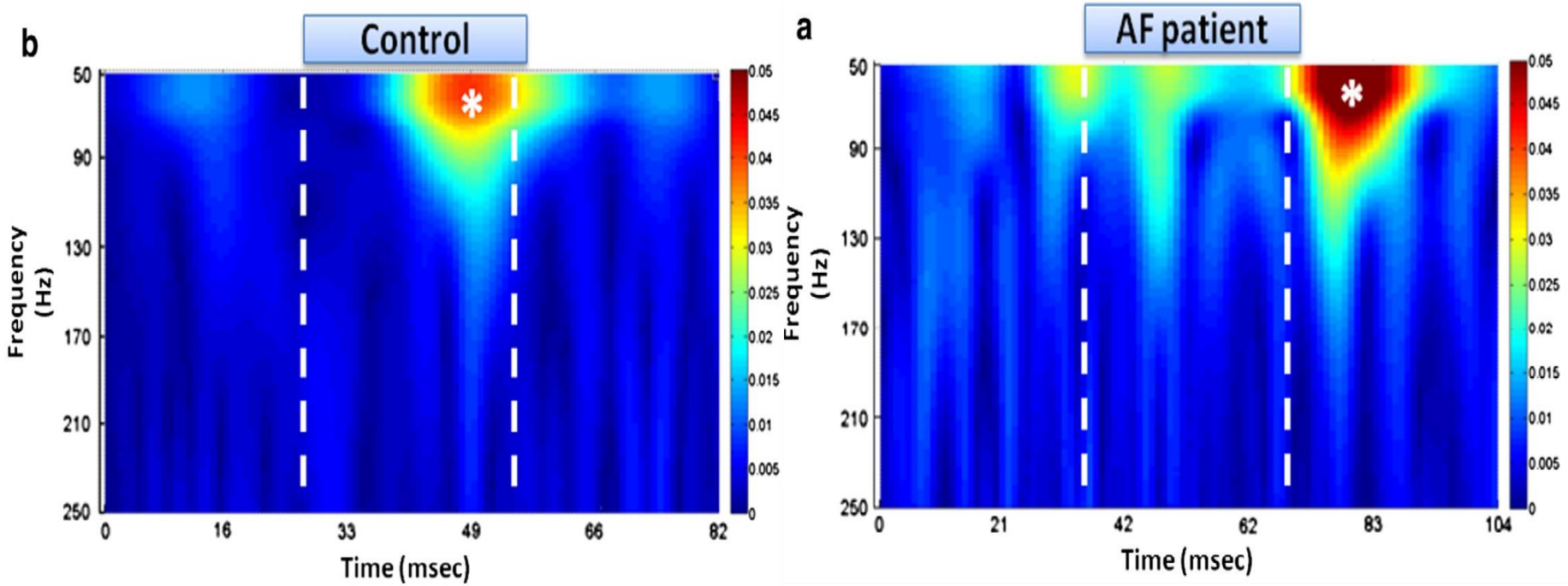
Primarily Non-Collagen Deposits (Class IV)

- isolated atrial amyloidosis
- granulomatosis
- inflammatory Infiltrates
- glycosphingolipids

Wavelet-based analysis of P waves identifies patients with lone atrial fibrillation: A cross-sectional pilot study

George Dakos [a,**,1], Yiannis S. Chatzizisis [a,b,*,1], Dimitrios Konstantinou [a], Ioanna Chouvarda [
Dimitrios Filos [c], Stylianos Paraskevaidis [a], Lilian Mantziari [a,d], Nicos Maglaveras [c],
Haralambos Karvounis [a], Ioannis Styliadis [a], Vassilios Vassilikos [a,e]

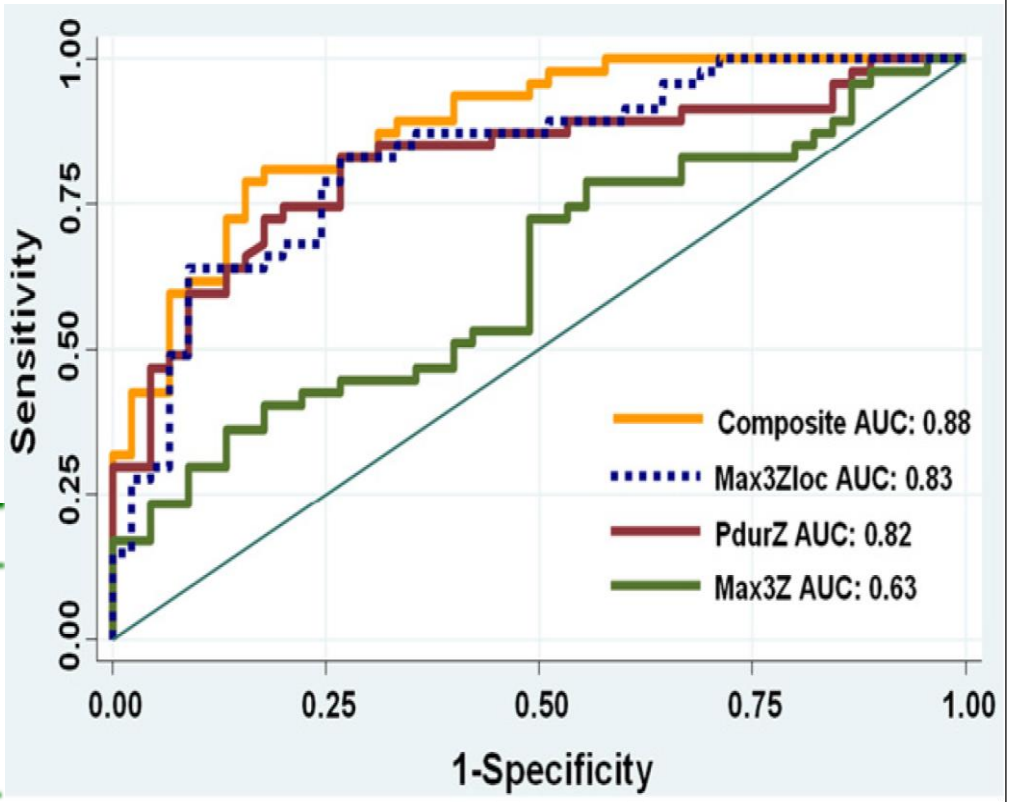
Time-frequency representations of the wavelet transform on Z axis



Int J Cardiol. 2014 Jun 15;174(2):389-92

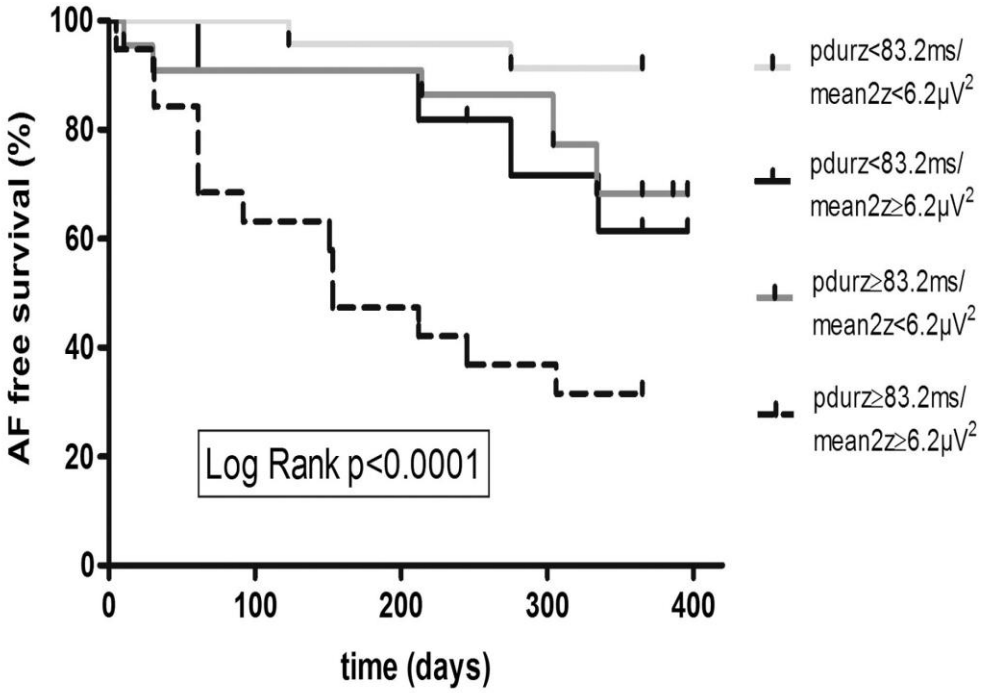
P wave wavelet analysis parameters as independent predictors of lone AF prevalence

Variables	B	SE	*p*
Max3Zloc	0.061	0.019	0.003
Max3Z	53.773	29.715	0.030
PdurZ	70.609	21.102	0.008
Constant	-10.457	2.278	<0.001



Dakos……Vassilikos. Int J Cardiol. 2014 Jun 15;174(2):389-92

P-wave analysis in patients with hypertension and AF



N° at risk					
Pdurz<83.2ms & mean2z<6.2μV²	23	23	22	21	21
Pdurz<83.2ms & mean2z>=6.2μV²	10	9	9	7	7
Pdurz>=83.2ms & mean2z<6.2μV²	22	20	20	19	16
Pdurz>=83.2ms & mean2z>=6.2μV²	19	12	9	7	6

Dakos ….. Vassilikos: J Electrocardiol 2015 (48) 845-852

Contents lists available at ScienceDirect

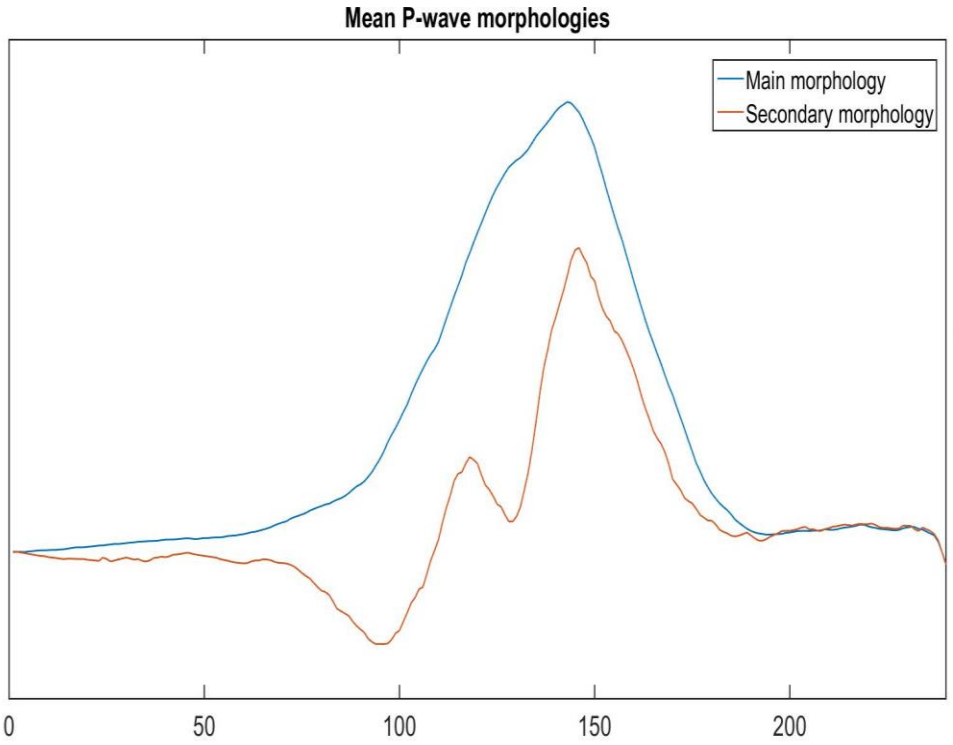
Computer Methods and Programs in Biomedicine

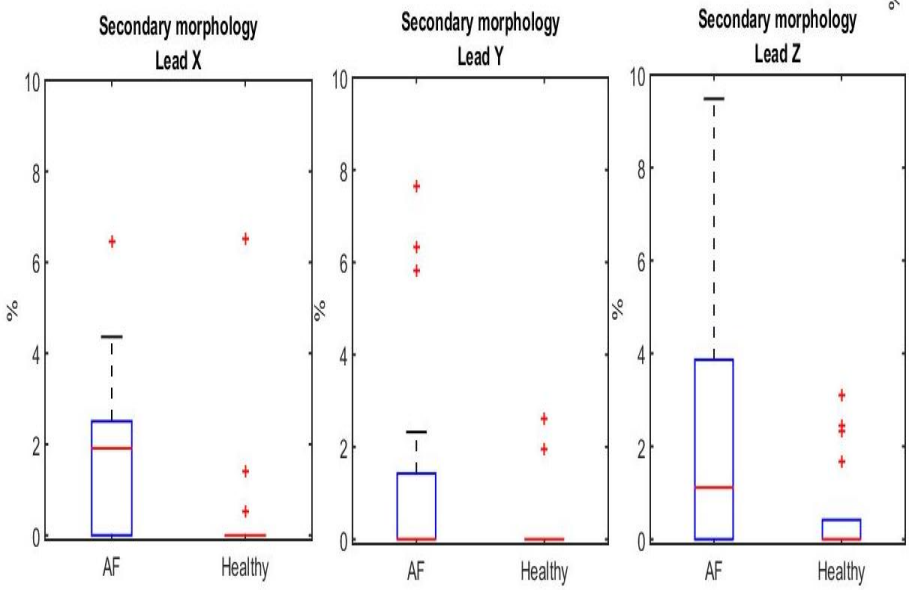
journal homepage: www.elsevier.com/locate/cmpb

Beat-to-beat P-wave morphology as a predictor of paroxysmal atrial fibrillation

Dimitrios Filos [a,*], Ioanna Chouvarda [a], Dimitris Tachmatzidis [b], Vassilios Vassilikos [b], Nicos Maglaveras [a]

[a] Laboratory of Computing and Medical Informatics, Aristotle University of Thessaloniki, Box 323, 54124, Thessaloniki, Greece
[b] 3rd Cardiology Department, Aristotle University of Thessaloniki, Greece





European Heart Journal (2015) **36**, 1660–1668
doi:10.1093/eurheartj/ehv115

CLINICAL RESEARCH
Atrial fibrillation

Randomized trial of atrial arrhythmia monitoring to guide anticoagulation in patients with implanted defibrillator and cardiac resynchronization devices

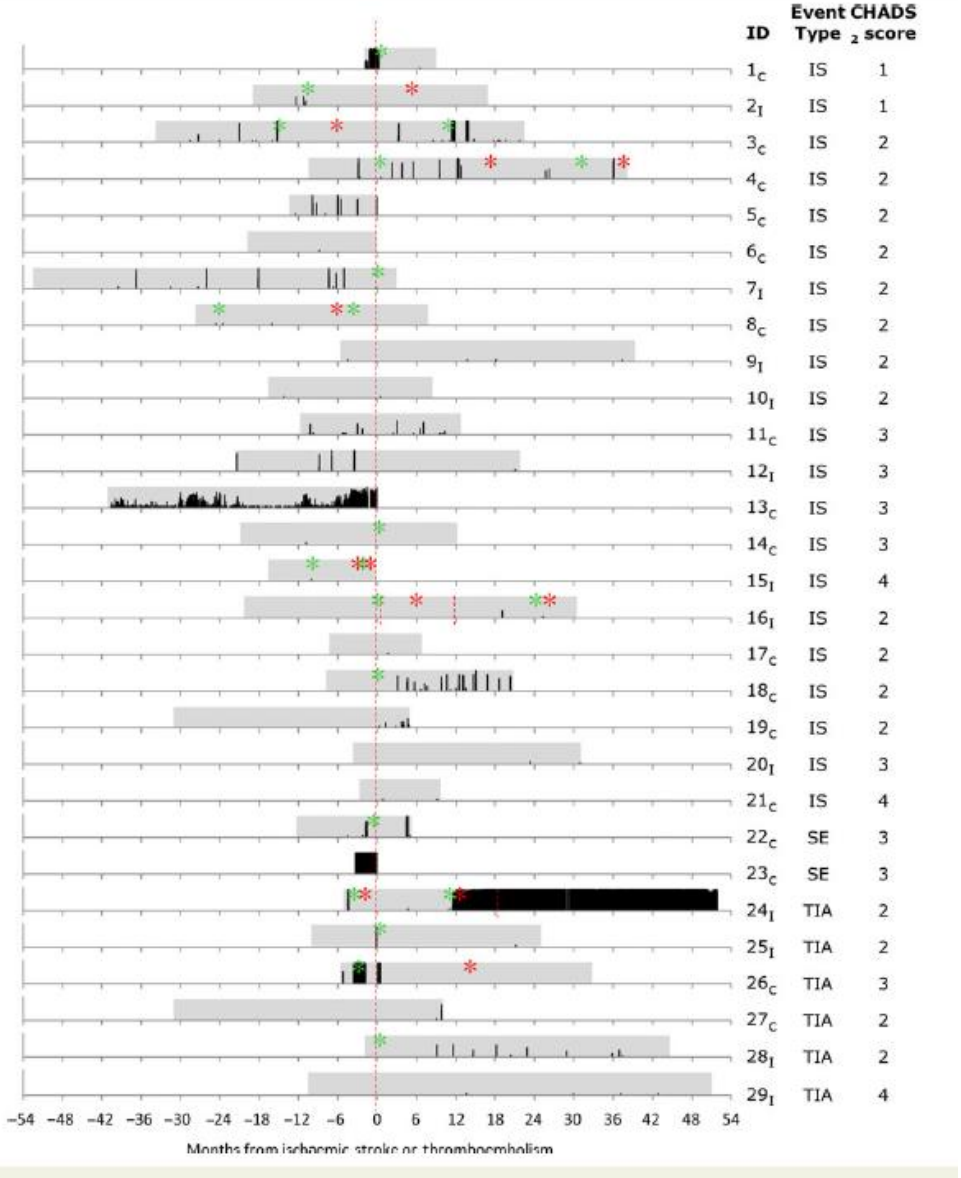
David T. Martin[1], Malcolm M. Bersohn[2], Albert L. Waldo[3], Mark S. Wathen[4], Wassim K. Choucair[5], Gregory Y.H. Lip[6], John Ip[7], Richard Holcomb[8], Joseph G. Akar[9], and Jonathan L. Halperin[10]*, on behalf of the IMPACT Investigators

2718 patients with dual-chamber and biventricular defibrillators to start and stop anticoagulation based on remote rhythm monitoring vs. usual office-based follow-up with anticoagulation determined by standard clinical criteria.

20 (29.0%) followed AT by 1 to 489 days, and 9 (13.0%) preceded AT

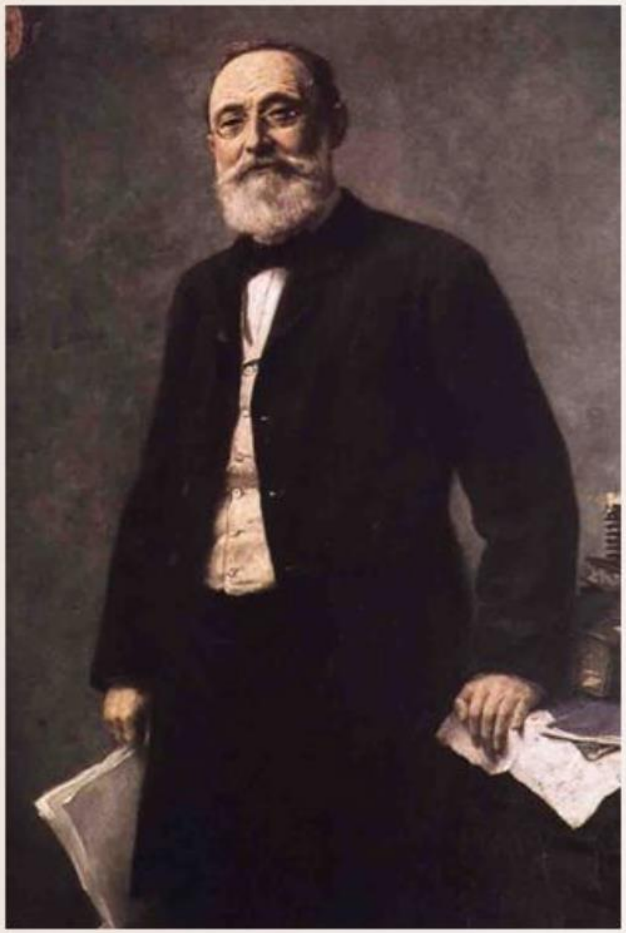
40 (58.0%) occurred without AT detected during the monitoring period

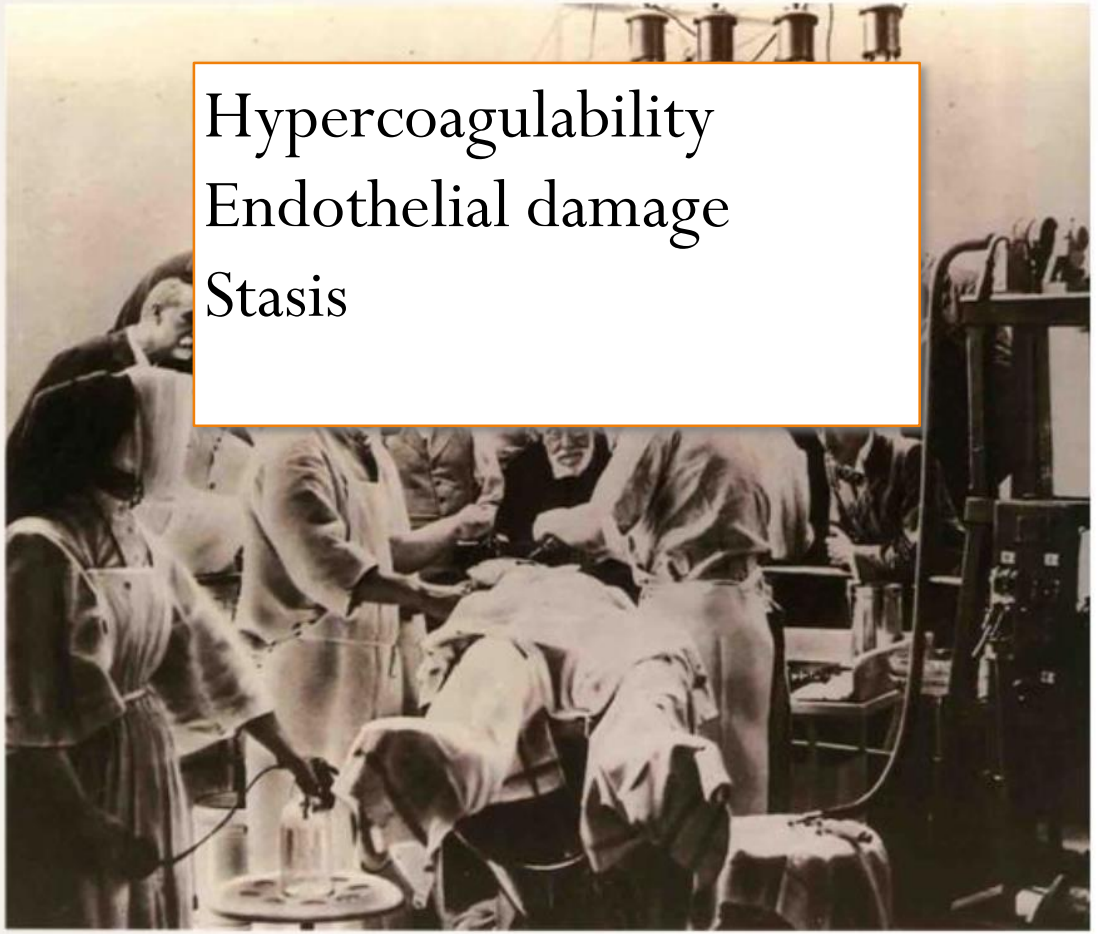
69 thromboembolic events



IMPACT Study *European Heart Journal 2015; 36: 1660–1668*

Rudolf Virchow

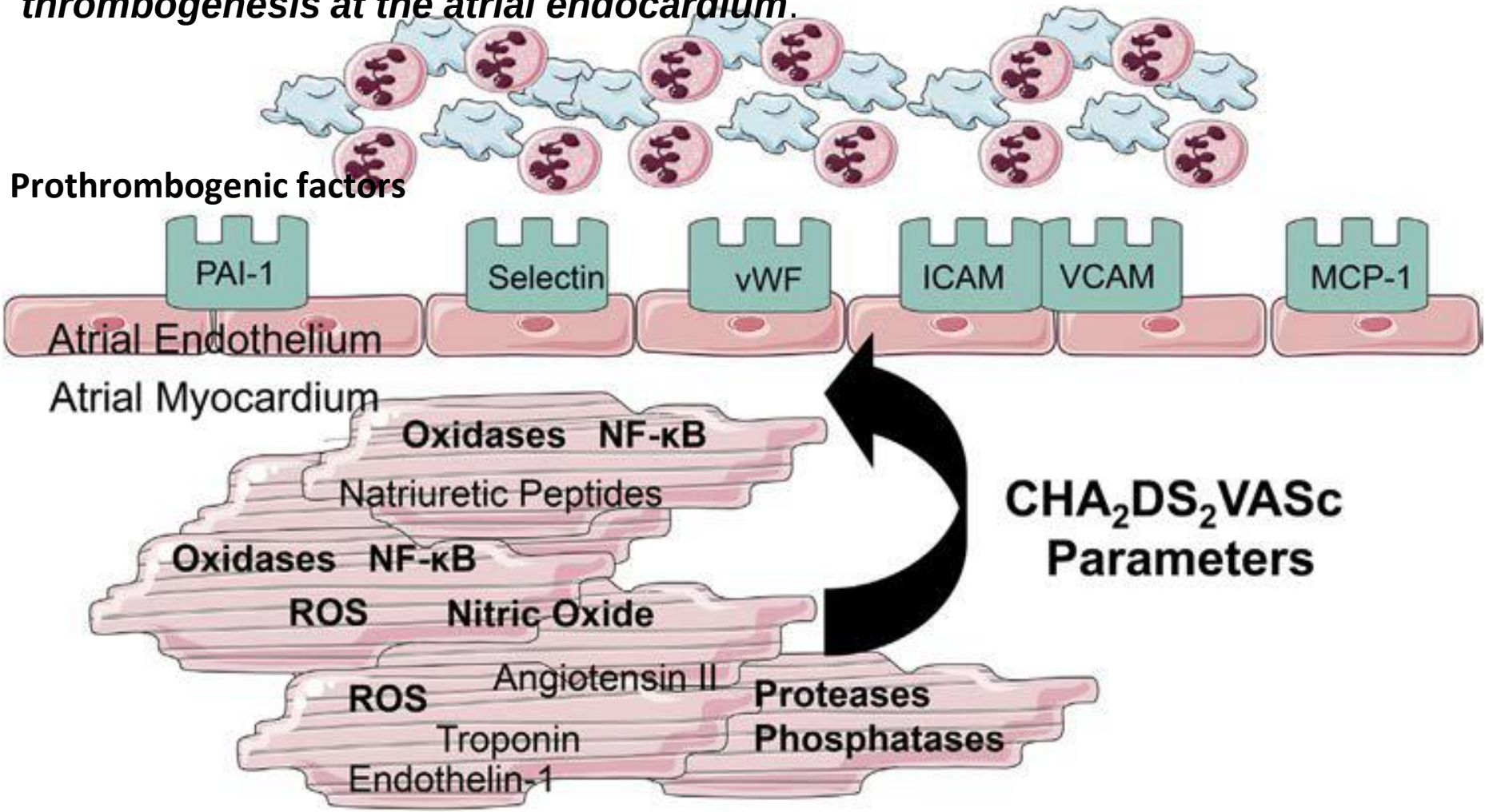




Hypercoagulability
Endothelial damage
Stasis

Are not directly related to the presence of absensce of atrial fibrillation in the surface ECG

Flow abnormalities, and endothelial changes must co-exist to induce thrombogenesis at the atrial endocardium.

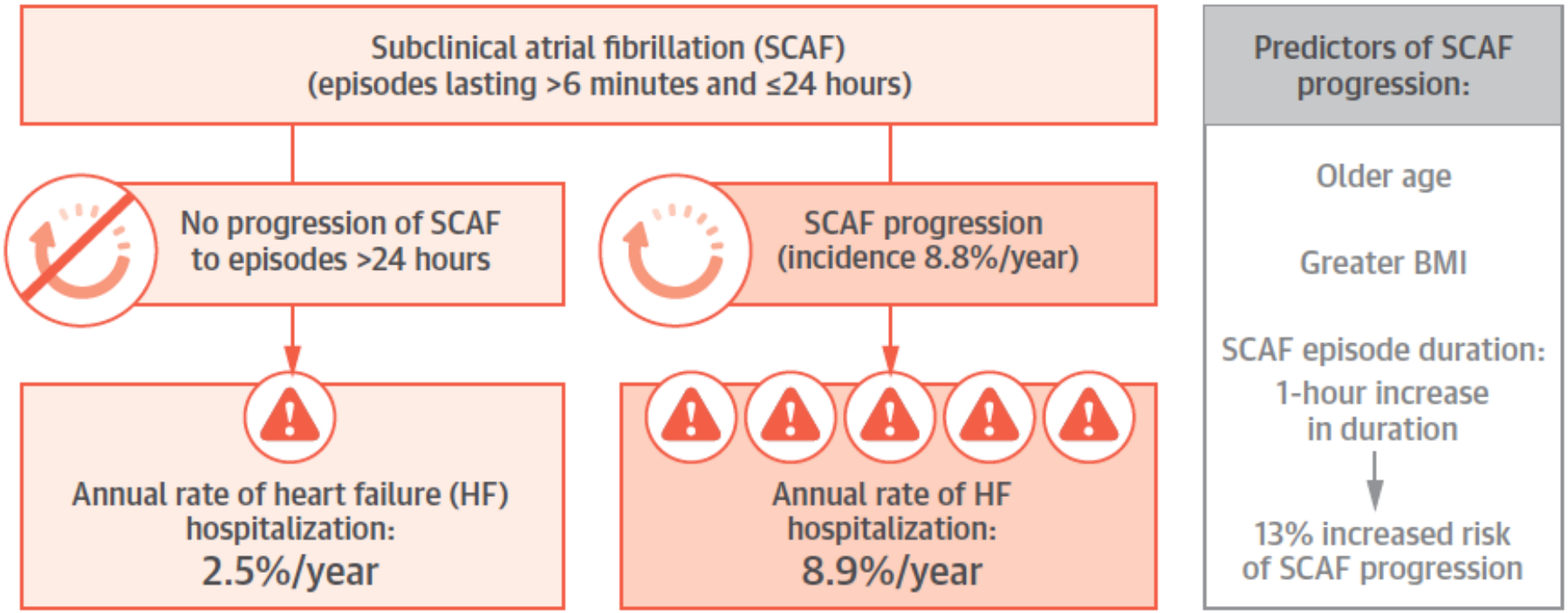


Molecular alterations (oxidative stress pathways etc.) within myocytes and endothelial cells, and thereby, increase the expression of prothrombogenic factors.

Goette et al, Europace (2016) 18, 1455–1490

Progression of Device-Detected Subclinical Atrial Fibrillation and the Risk of Heart Failure

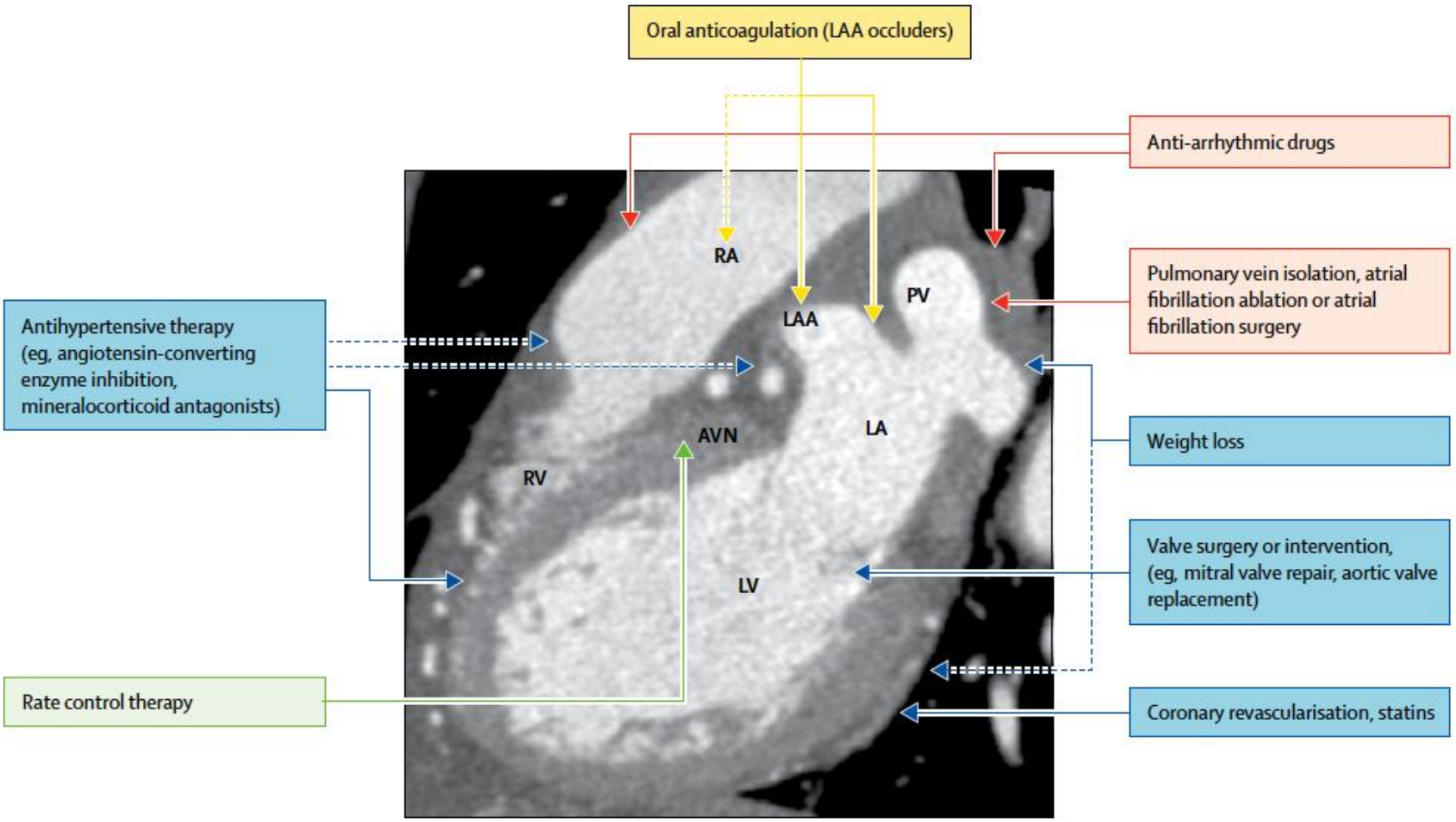
Jorge A. Wong, MD, MPH,[a] David Conen, MD, MPH,[a] Isabelle C. Van Gelder, MD,[b] William F. McIntyre, MD,[a] Harry J. Crijns, MD,[c,d] Jia Wang, MSc,[a] Michael R. Gold, MD,[e] Stefan H. Hohnloser, MD,[f] C.P. Lau, MD,[g] Alessandro Capucci, MD,[h] Gianluca Botto, MD,[i] Gerian Grönefeld, MD,[j] Carsten W. Israel, MD,[e] Stuart J. Connolly, MD,[a] Jeff S. Healey, MD, MSc[a]



SCAF progression associated with increased risk of HF hospitalization
[HR: 4.58; 95% CI: 1.64 - 12.8; p = 0.004]

Wong, J.A. et al. J Am Coll Cardiol. 2018;71(23):2603-11.

Main cardiac targets of the different domains of atrial fibrillation management



Kirchhof www.thelancet.com Vol 390 October 21, 2017

REVIEW

Ranolazine as a Promising Treatment Option for Atrial Fibrillation: Electrophysiologic Mechanisms, Experimental Evidence, and Clinical Implications

NIKOLAOS FRAGAKIS, M.D., PH.D., KONSTANTINOS C. KOSKINAS, M.D., M.SC., and VASSILIOS VASSILIKOS, M.D., PH.D.

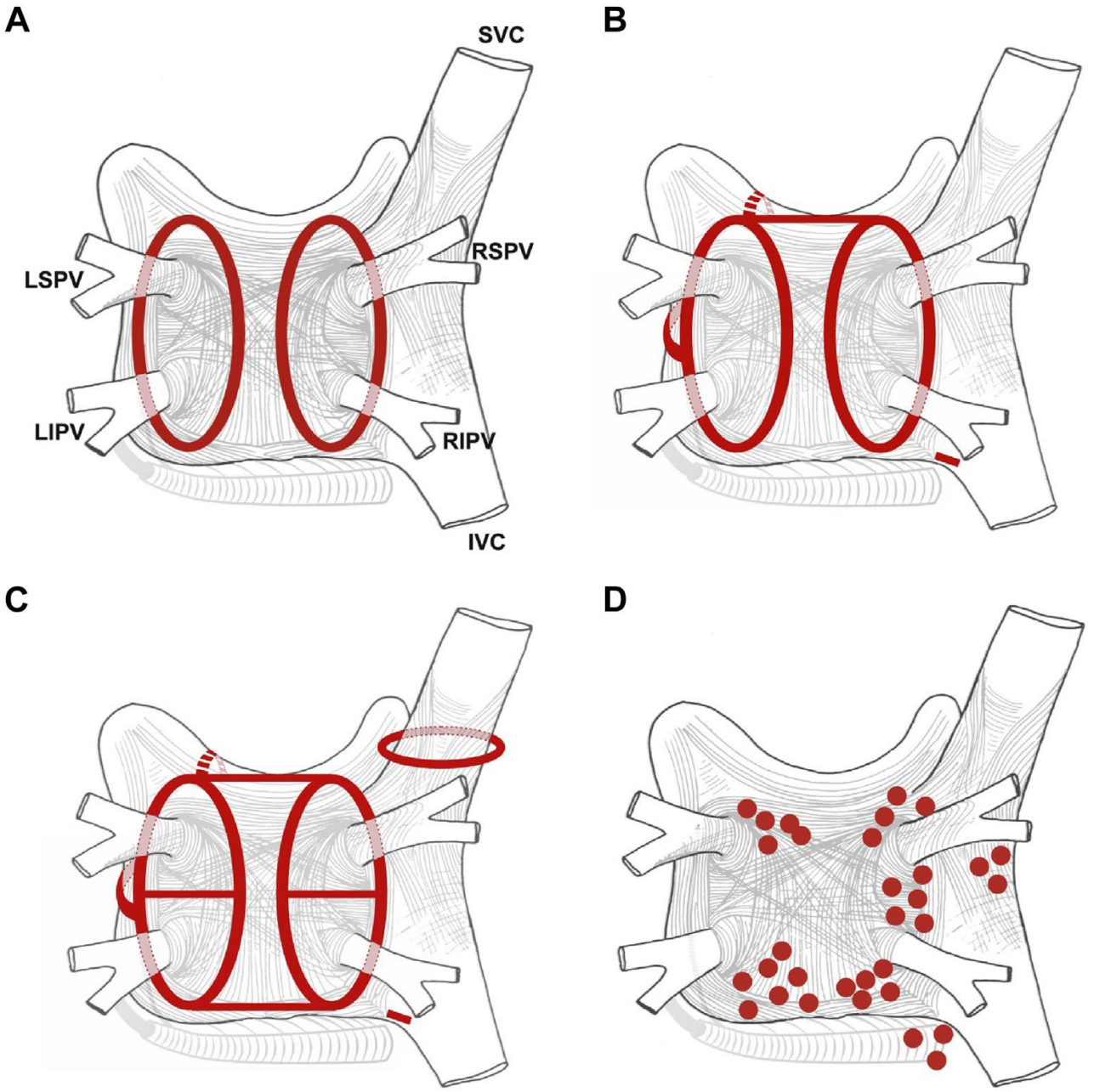
From the Third Department of Cardiology, Hippokrateion Hospital, Aristotle University Medical School, Thessaloniki, Greece

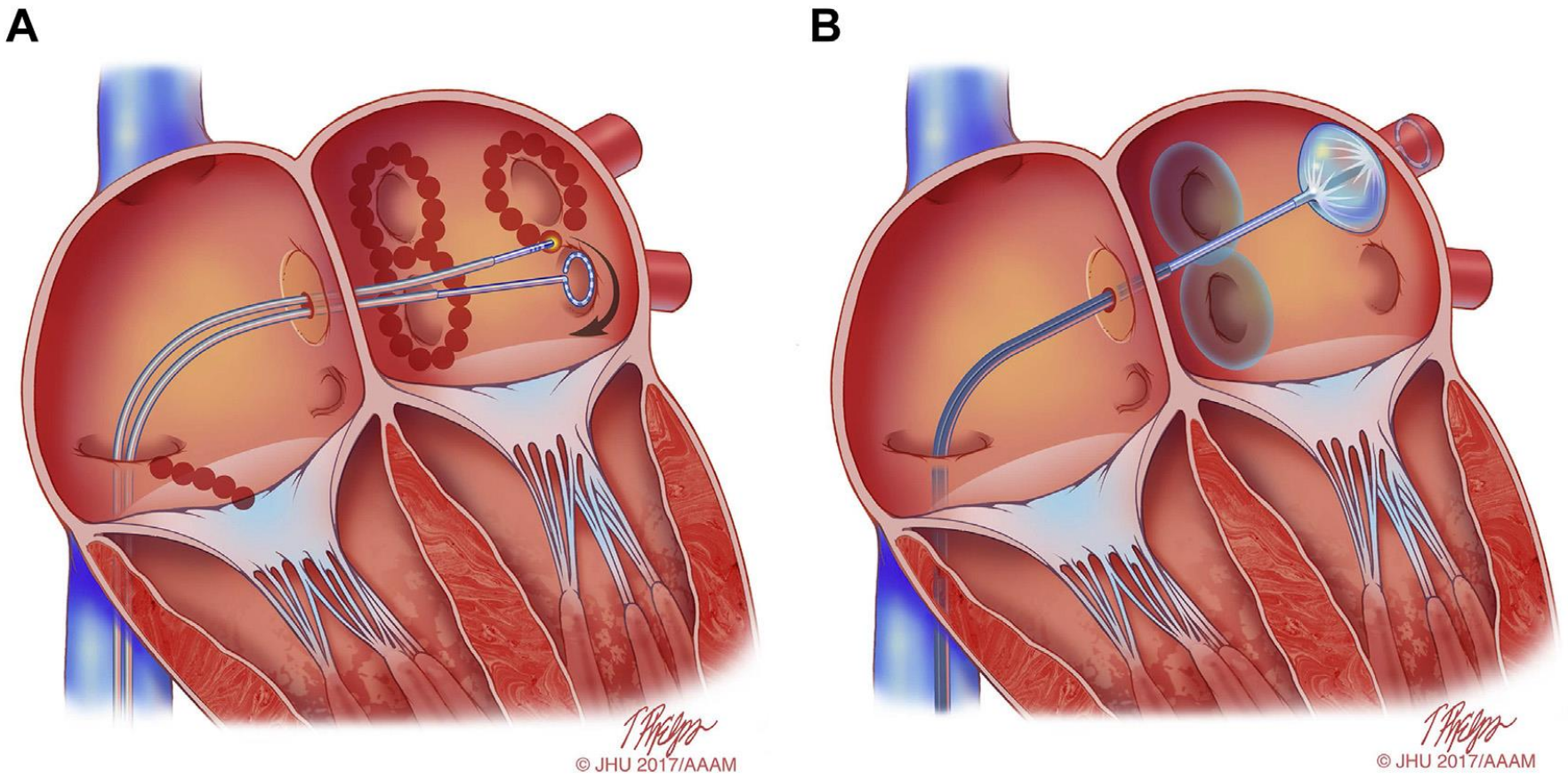
Currently available agents for pharmacologic management of atrial fibrillation (AF) are limited by their suboptimal efficacy and nonnegligible proarrhythmic risk. Ranolazine (RN) is a novel antianginal agent with increasingly appreciated antiarrhythmic properties that can suppress ventricular and supraventricular arrhythmias including AF. In this review, we describe the electrophysiological properties of RN, focusing on atrial-selective inhibition of a number of ion channels implicated in the development of AF, particularly the sodium current. We further summarize evidence from experimental studies that demonstrate a potent AF-suppressing effect of RN, alone or in combination with other antiarrhythmic drugs. Of clinical relevance, we present growing evidence from preliminary clinical investigations indicating the safety and efficacy of RN for prevention and treatment of AF in various clinical settings including prevention of AF in patients with acute coronary syndromes, prevention and conversion of postoperative AF after surgical coronary revascularization, sinus rhythm maintenance in drug-resistant recurrent AF, and facilitating of electrical or pharmacological cardioversion in cardioversion-resistant patients. While current experimental and clinical evidence points to RN as a potentially promising agent for suppression of AF, well-designed, large-scale trials will be required before RN can be considered for pharmacological treatment of AF in clinical practice. (PACE 2014; 37:1412–1420)

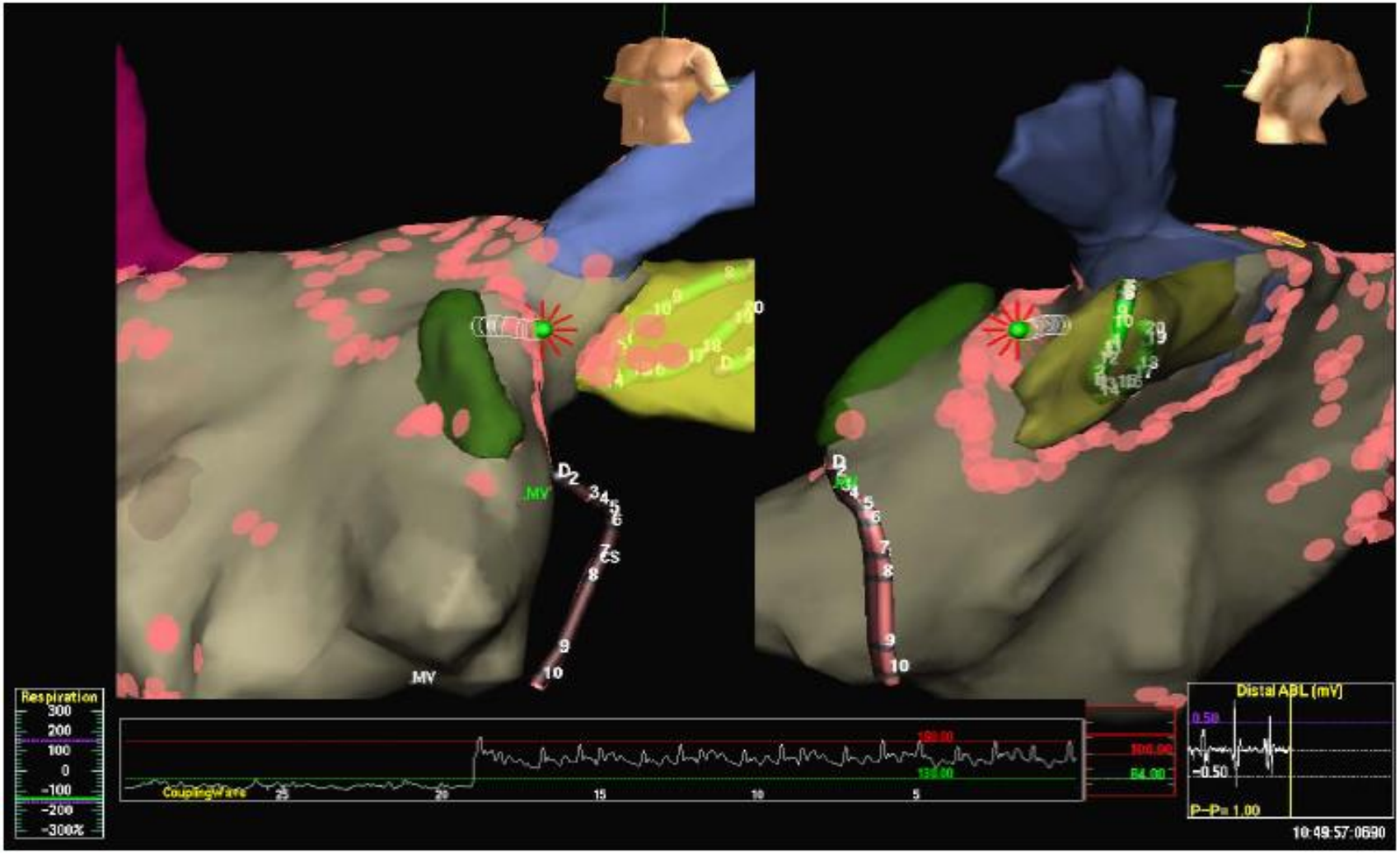
atrial fibrillation, ranolazine, clinical trials, pharmacology

2017 HRS/EHRA/ECAS/APHRS/SOLAECE expert consensus statement on catheter and surgical ablation of atrial fibrillation

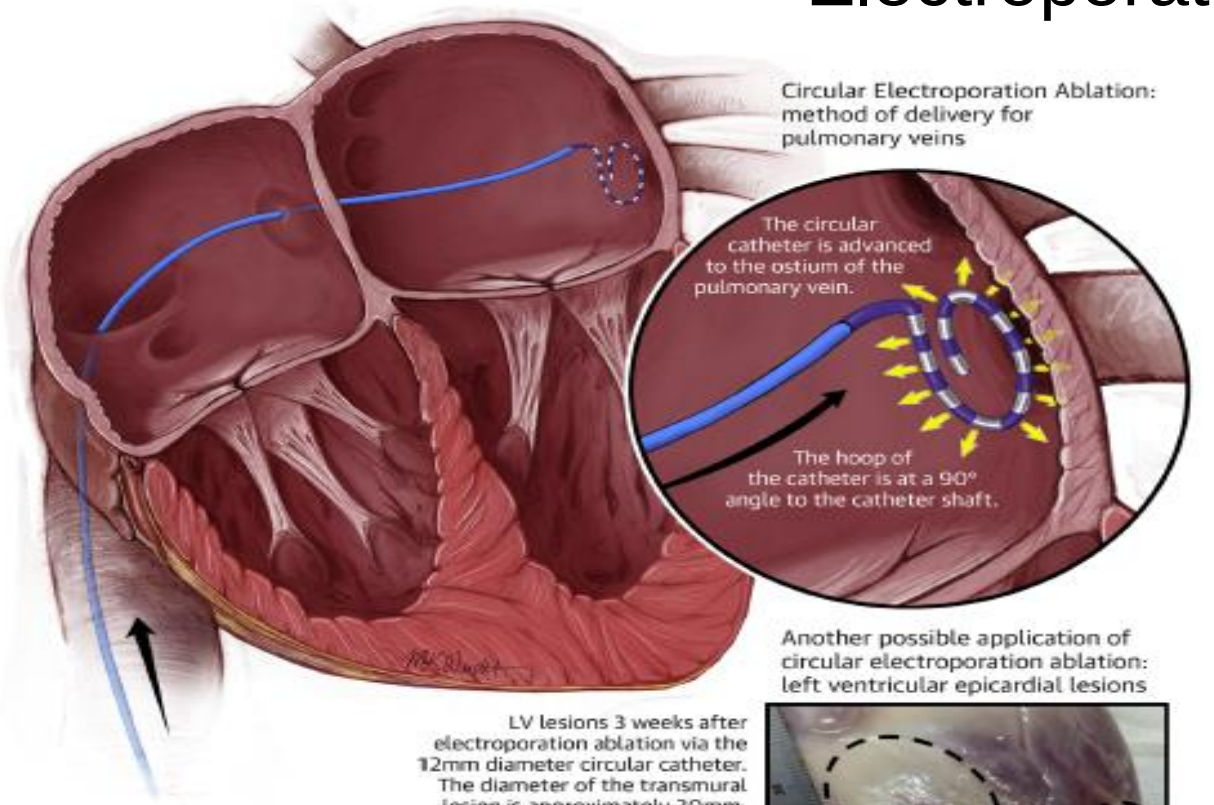
Hugh Calkins, MD (Chair),[1] Gerhard Hindricks, MD (Vice-Chair),[2,*] Riccardo Cappato, MD (Vice-Chair),[3,¶] Young-Hoon Kim, MD, PhD (Vice-Chair),[4,§] Eduardo B. Saad, MD, PhD (Vice-Chair),[5,‡] Luis Aguinaga, MD, PhD,[6,‡] Joseph G. Akar, MD, PhD,[7] Vinay Badhwar, MD,[8,#] Josep Brugada, MD, PhD,[9,*] John Camm, MD,[10,*] Peng-Sheng Chen, MD,[11] Shih-Ann Chen, MD,[12,§] Mina K. Chung, MD,[13] Jens Cosedis Nielsen, DMSc, PhD,[14,*] Anne B. Curtis, MD,[15,‖] D. Wyn Davies, MD,[16,¶] John D. Day, MD,[17] André d'Avila, MD, PhD,[18,‡‡] N.M.S. (Natasja) de Groot, MD, PhD,[19,*] Luigi Di Biase, MD, PhD,[20,*] Mattias Duytschaever, MD, PhD,[21,*] James R. Edgerton, MD,[22,#] Kenneth A. Ellenbogen, MD,[23] Patrick T. Ellinor, MD, PhD,[24] Sabine Ernst, MD, PhD,[25,*] Guilherme Fenelon, MD, PhD,[26,‡] Edward P. Gerstenfeld, MS, MD,[27] David E. Haines, MD,[28] Michel Haissaguerre, MD,[29,*] Robert H. Helm, MD,[30] Elaine Hylek, MD, MPH,[31] Warren M. Jackman, MD,[32] Jose Jalife, MD,[33] Jonathan M. Kalman, MBBS, PhD,[34,§] Josef Kautzner, MD, PhD,[35,*] Hans Kottkamp, MD,[36,*] Karl Heinz Kuck, MD, PhD,[37,*] Koichiro Kumagai, MD, PhD,[38,§] Richard Lee, MD, MBA,[39,#] Thorsten Lewalter, MD, PhD,[40,¶] Bruce D. Lindsay, MD,[41] Laurent Macle, MD,[42,**] Moussa Mansour, MD,[43] Francis E. Marchlinski, MD,[44] Gregory F. Michaud, MD,[45,†] Hiroshi Nakagawa, MD, PhD,[46] Andrea Natale, MD,[47] Stanley Nattel, MD,[48] Ken Okumura, MD, PhD,[49,††] Douglas Packer, MD,[50] Evgeny Pokushalov, MD, PhD,[51,*] Matthew R. Reynolds, MD, MSc,[52] Prashanthan Sanders, MBBS, PhD,[53] Mauricio Scanavacca, MD, PhD,[54,‡] Richard Schilling, MD,[55,*] Claudio Tondo, MD, PhD,[56,*] Hsuan-Ming Tsao, MD,[57,§] Atul Verma, MD,[58] David J. Wilber, MD,[59] Teiichi Yamane, MD, PhD[60,††]


A
SVC
RSPV
LSPV
LIPV
RIPV
IVC
B
C
D


A
B
© JHU 2017/AAAM
© JHU 2017/AAAM

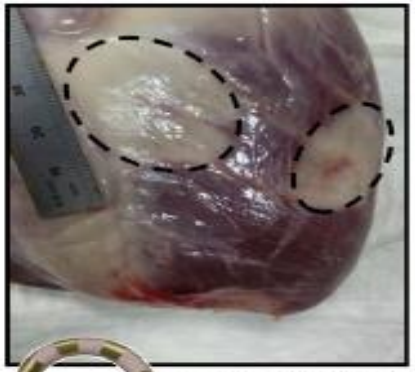

Respiration
300
200
100
0
-100
-200
-300%
CouplingWave
25
20
15
10
5
Distal ABL [mV]
0.50
-0.50
P-P= 1.00
10:49:57:0690
MV
D2
10

Electroporation Ablation



LV lesions 3 weeks after electroporation ablation via the 12mm diameter circular catheter. The diameter of the transmural lesion is approximately 30mm.

Another possible application of circular electroporation ablation: left ventricular epicardial lesions



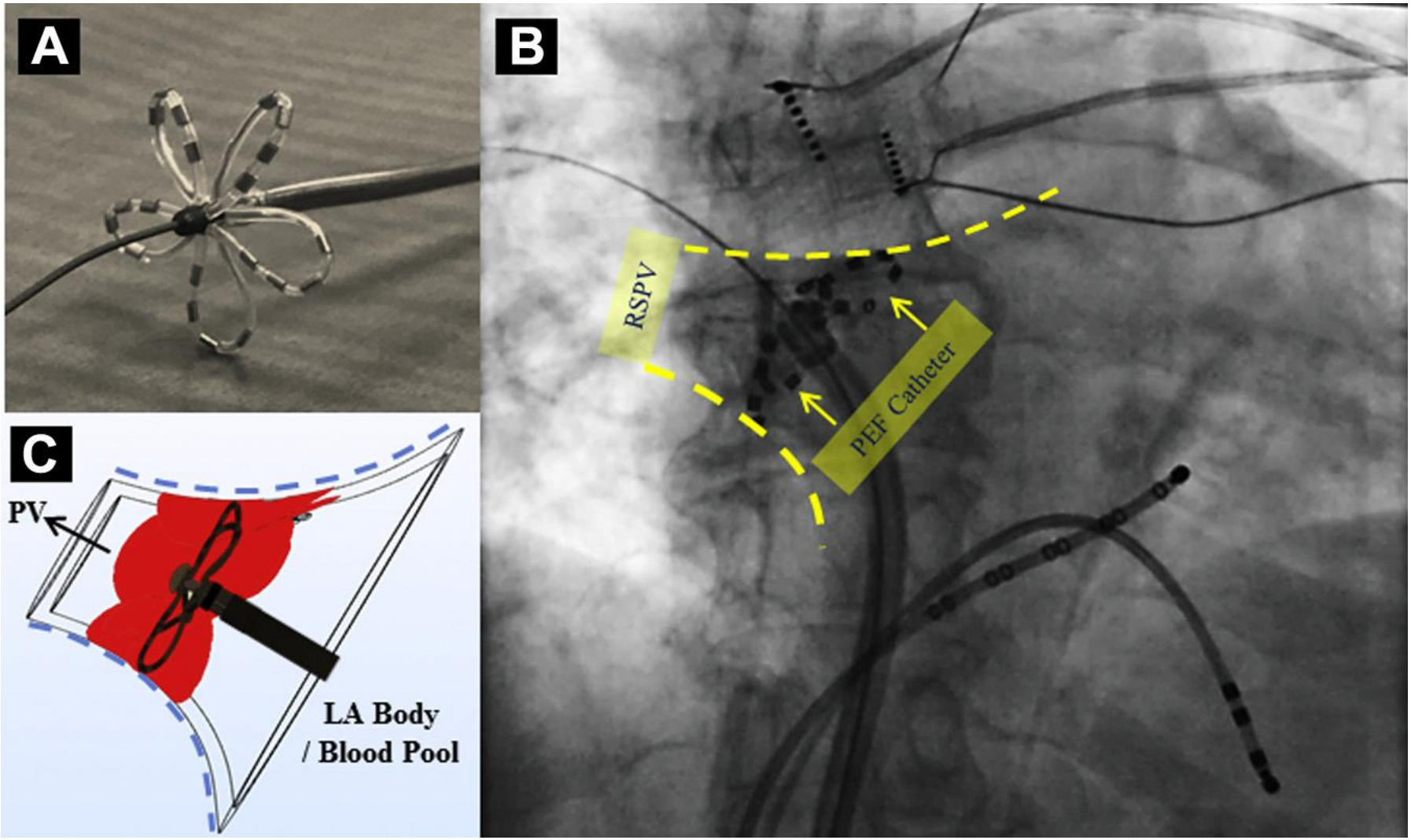
The hoop of the custom catheter used in this application is in the same plane as the catheter shaft, as it is intended for use in the pericardial space.

Circular Electroporation Ablation

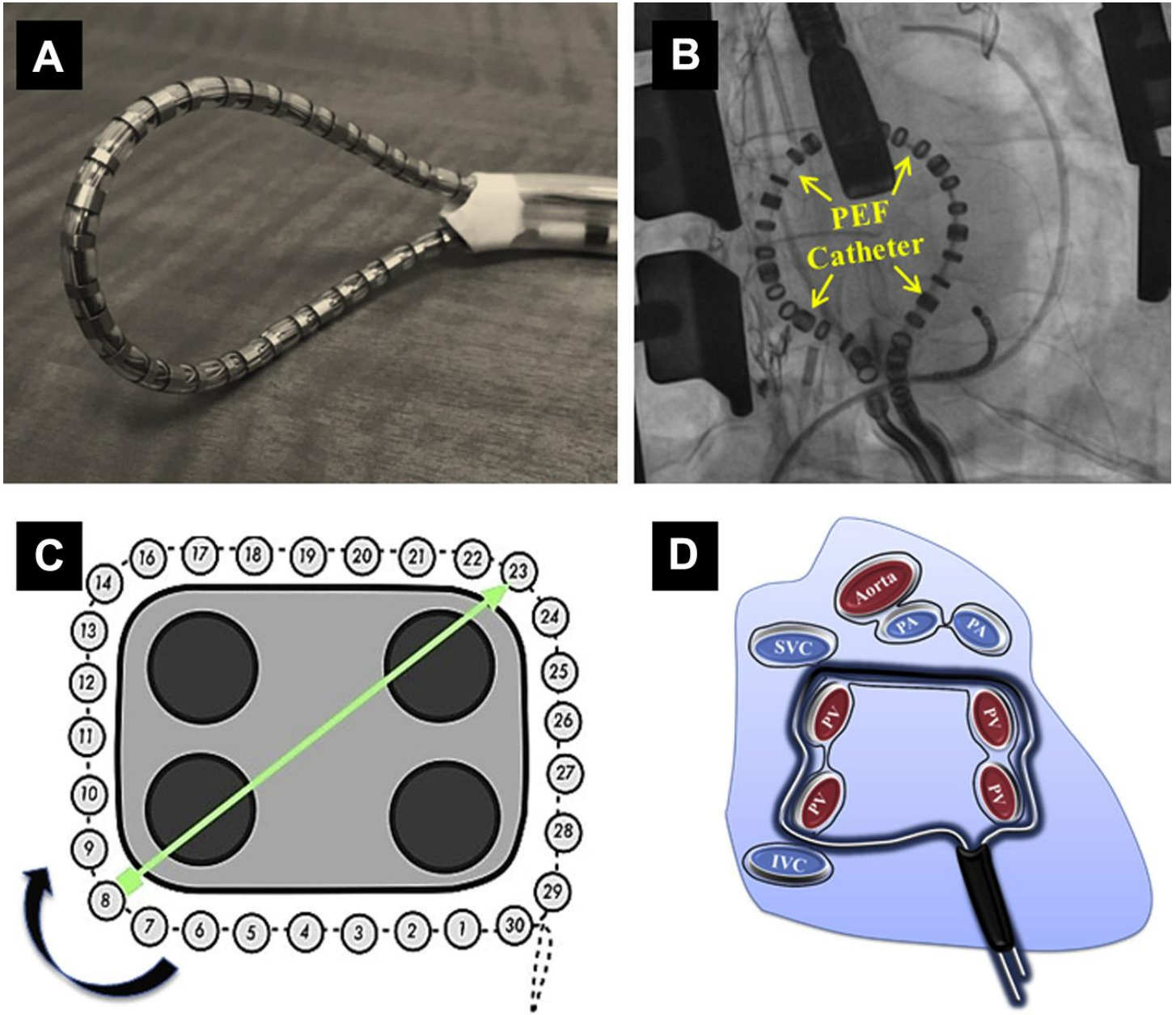
Advantages	Disadvantages
Ultra fast	No power titration:
Great lesion depth	• Not suitable for AVNRT
Non-thermal	Large lesions:
Myocardial specificity:	• Not 1st choice for focal arrhythmias
• No nerve damage	Myocardial stunning:
• No coronary damage	• Endpoint misleading
• No PV stenosis	High voltage:
• Esophageal fistulas unlikely	• Technical catheter challenge
LV transmurality with pericardial ablation	Tiny gas bubbles

Wittkampf, F.H.M. et al. J Am Coll Cardiol EP. 2018;4(8):977–86.

Pulsed electric fields



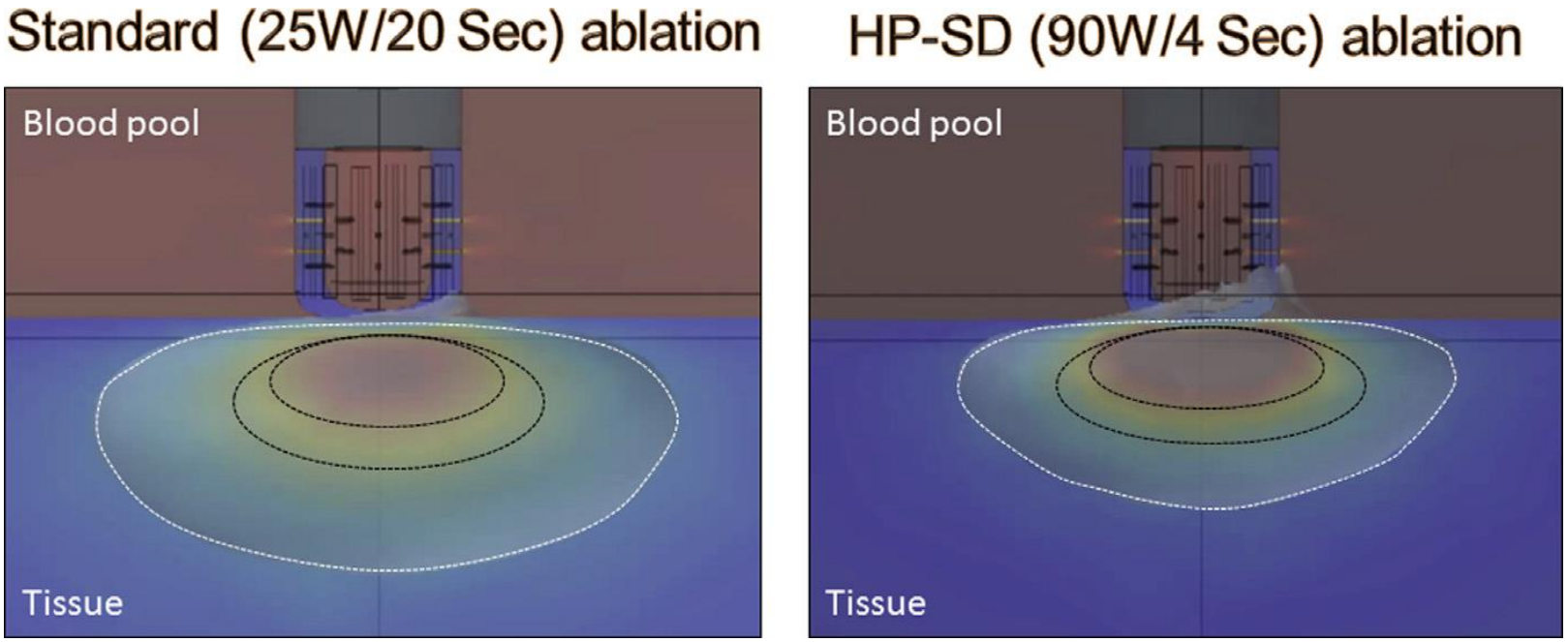
Reddy et al JACC 2018


A
B
PEF
Catheter
C
16
17
18
19
20
21
22
23
14
24
13
25
12
26
11
27
10
28
9
29
8
7
6
5
4
3
2
1
30
D
Aorta
PA
PA
SVC
PV
PV
PV
PV
IVC

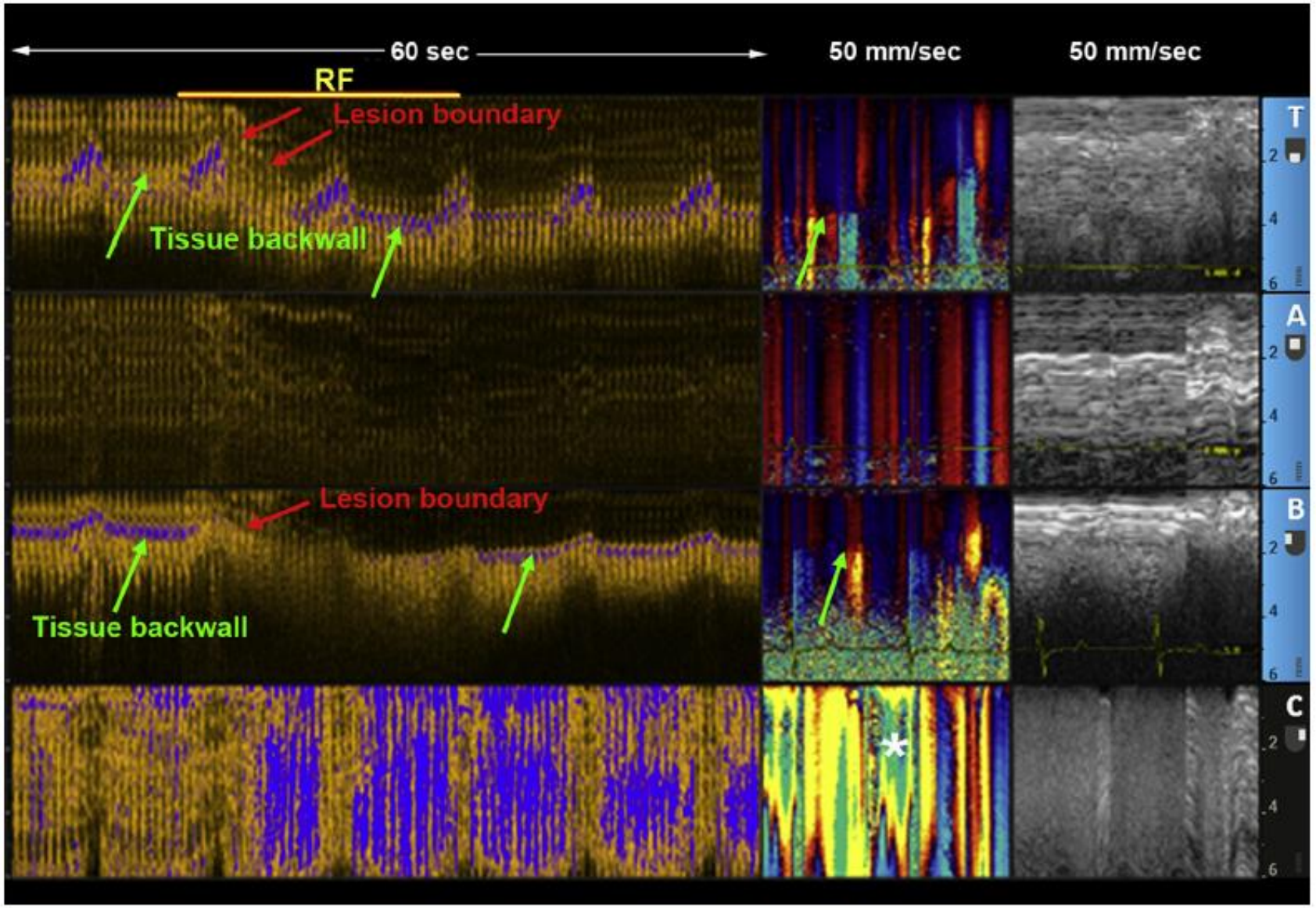
High-Power and Short-Duration Ablation for Pulmonary Vein Isolation

Biophysical Characterization

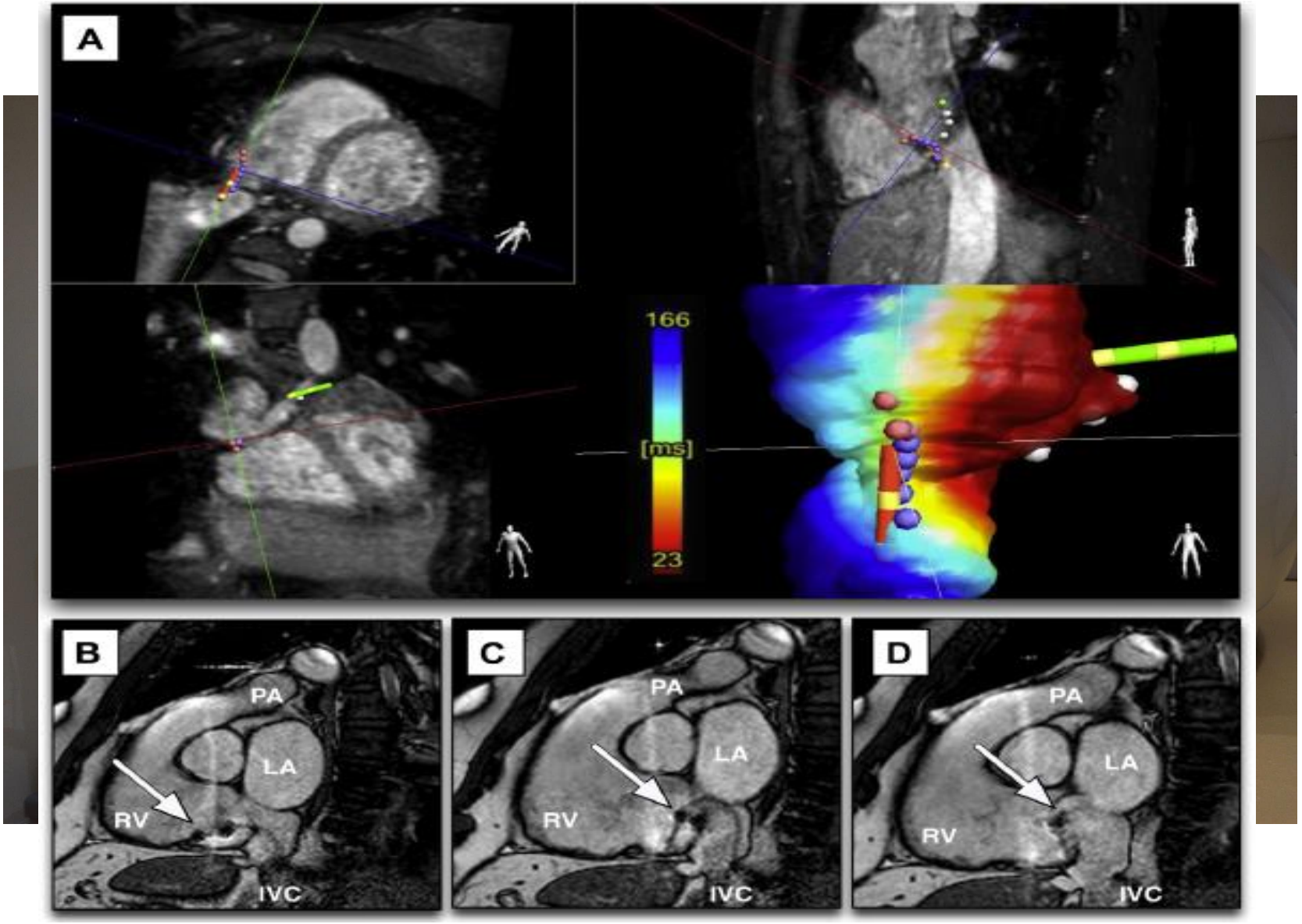
Eran Leshem, MD, MHA,[a] Israel Zilberman, DVM,[b] Cory M. Tschabrunn, PhD,[a] Michael Barkagan, MD,[a] Fernando M. Contreras-Valdes, MD,[a] Assaf Govari, PhD,[b] Elad Anter, MD[a]



J Am Coll Cardiol EP 2018;4:467–79

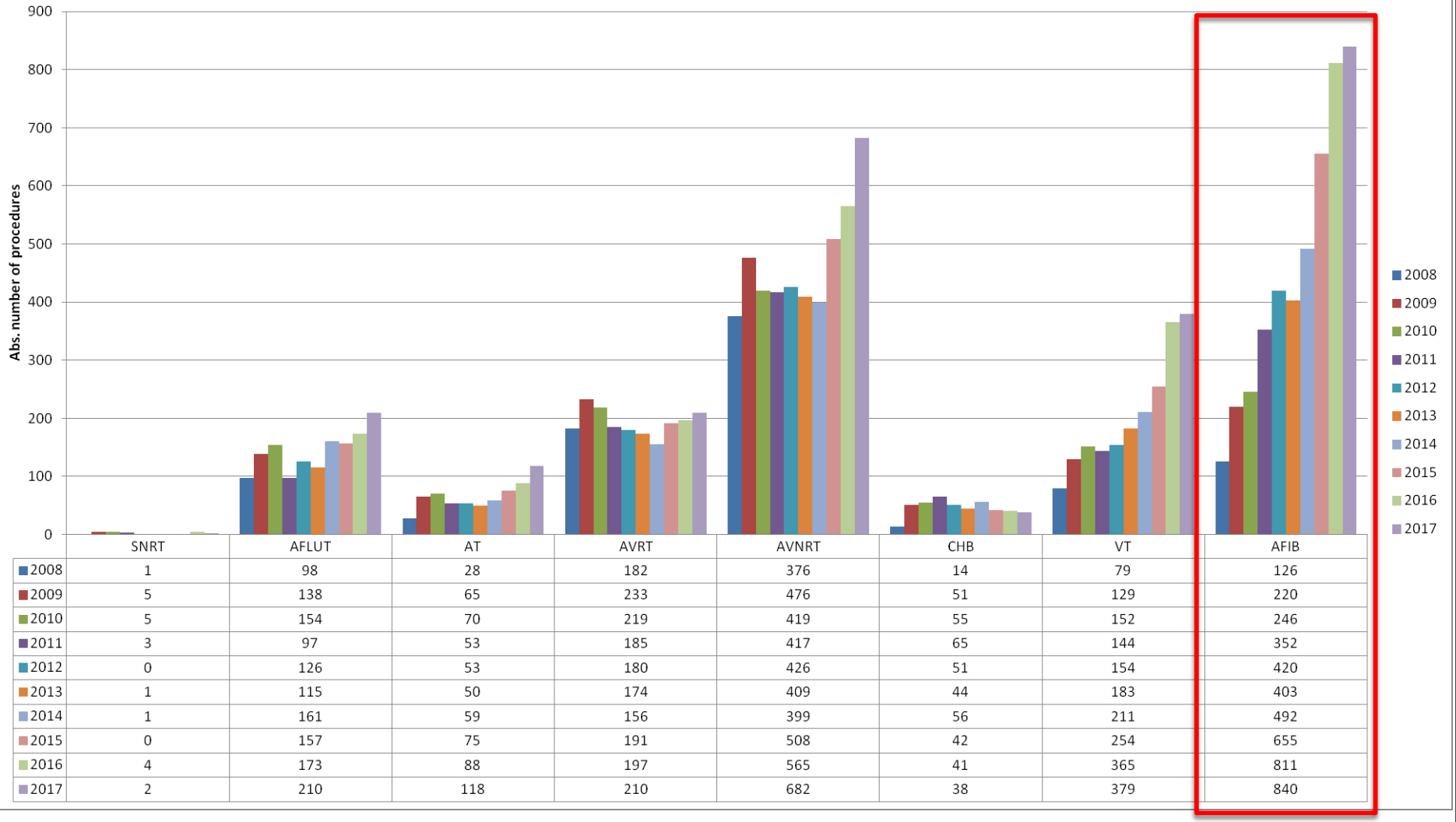


Wright et al JACC 2018



Chubb et al, JACC 2017;(3):2

Ablation Procedures (abs. values) in Greece during 2008-2017



	SNRT	AFLUT	AT	AVRT	AVNRT	CHB	VT	AFIB
2008	1	98	28	182	376	14	79	126
2009	5	138	65	233	476	51	129	220
2010	5	154	70	219	419	55	152	246
2011	3	97	53	185	417	65	144	352
2012	0	126	53	180	426	51	154	420
2013	1	115	50	174	409	44	183	403
2014	1	161	59	156	399	56	211	492
2015	0	157	75	191	508	42	254	655
2016	4	173	88	197	565	41	365	811
2017	2	210	118	210	682	38	379	840

Vassilikos et al, HJC 2018


microlife

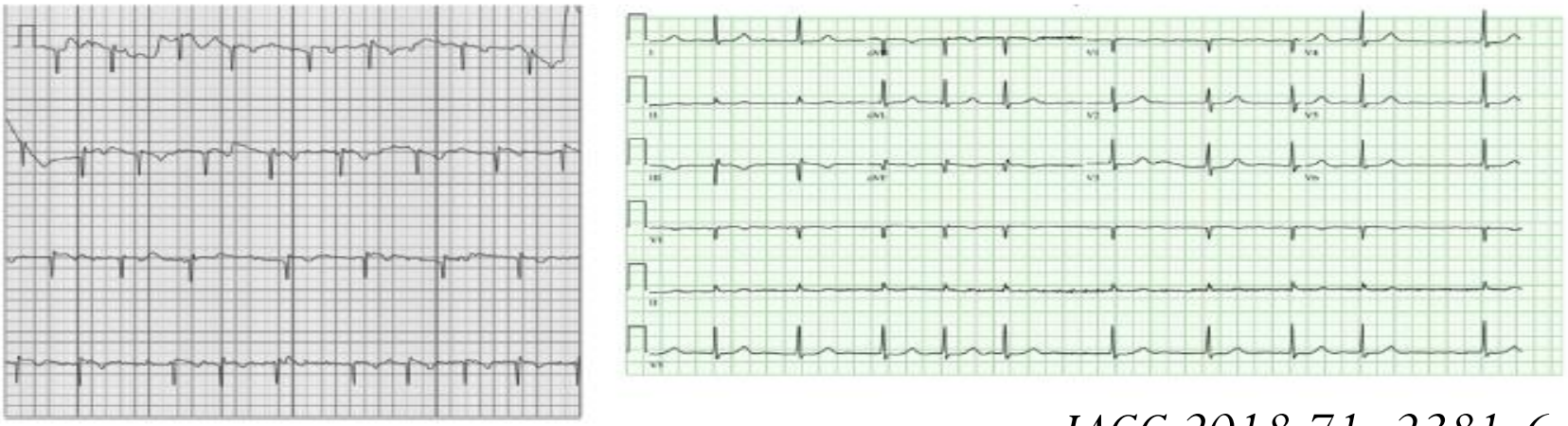

Kardia
10:09
63
BPM
27
I'm feeling...

Smartwatch Algorithm for Automated Detection of Atrial Fibrillation

Joseph M. Bumgarner, MD,[a] Cameron T. Lambert, MD,[a] Ayman A. Hussein, MD,[a] Daniel J. Cantillon, MD,[a] Bryan Baranowski, MD,[a] Kathy Wolski, MPH,[b] Bruce D. Lindsay, MD,[a] Oussama M. Wazni, MD, MBA,[a] Khaldoun G. Tarakji, MD, MPH[a]

A

B

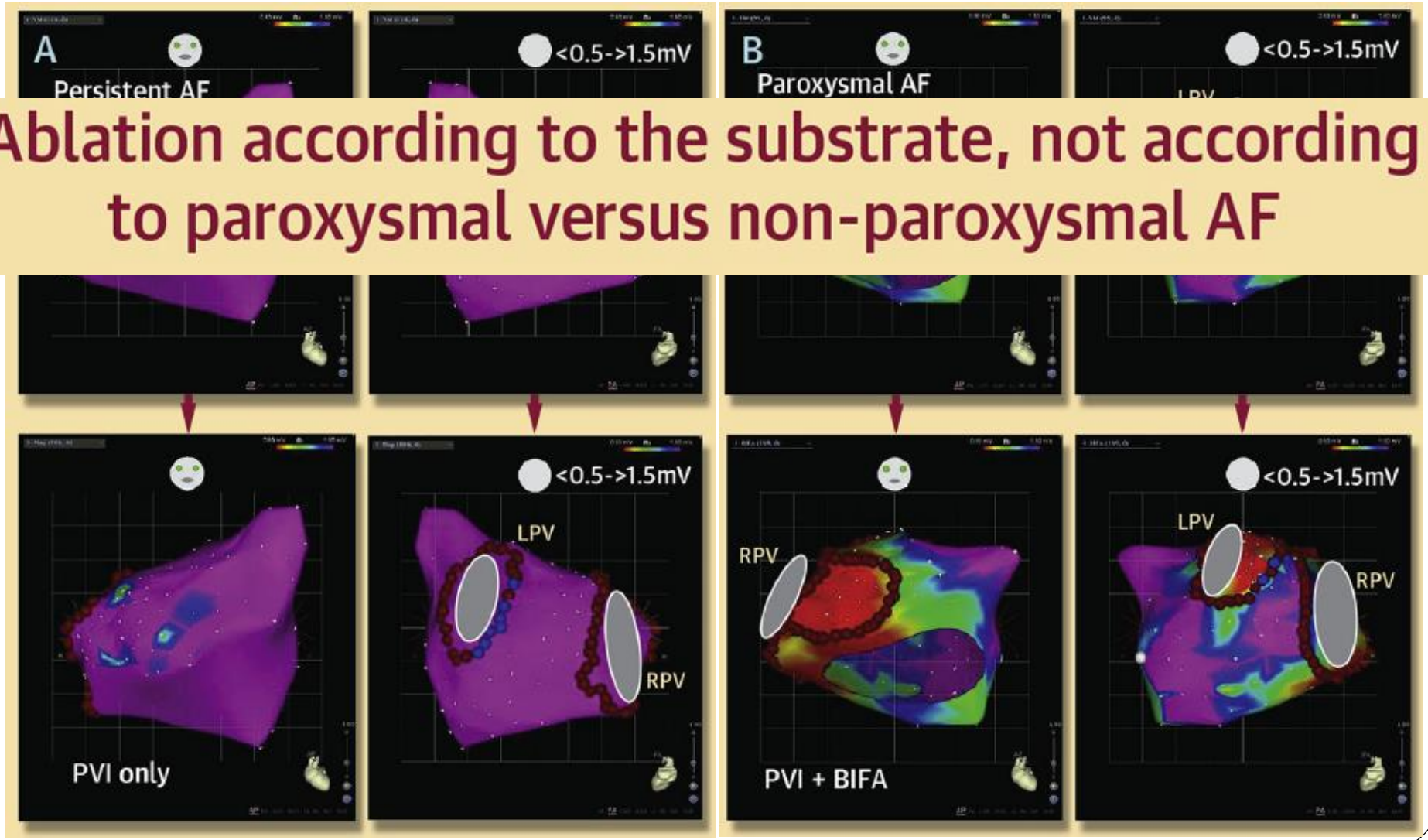


JACC 2018;71: 2381-6

Therapeutic Approaches to Atrial Fibrillation Ablation Targeting Atrial Fibrosis

Hans Kottkamp, MD, Doreen Schreiber, MD, Fabian Moser, MD, Andreas Rieger, MD

JACC 2017;3 (7):643-53

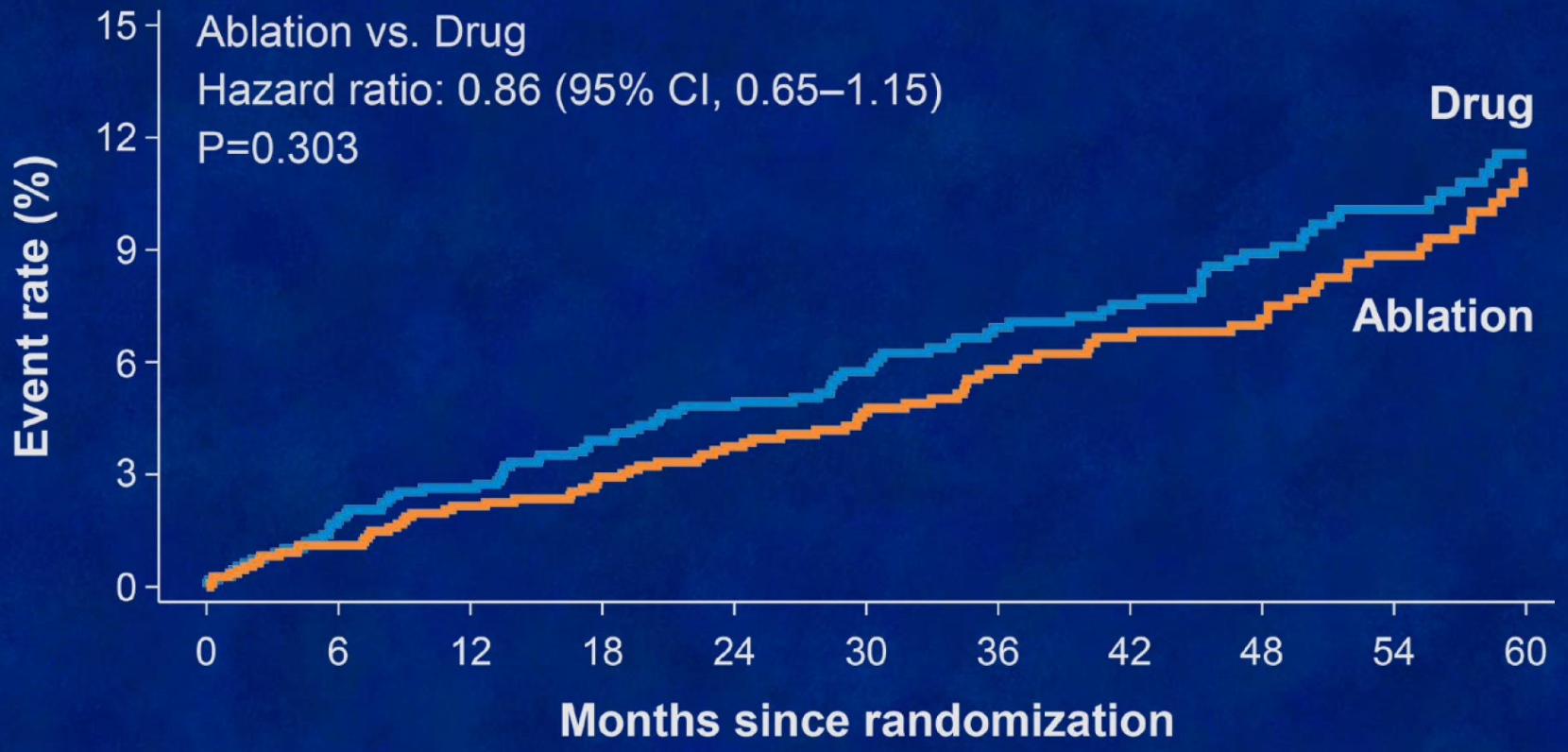


Ablation according to the substrate, not according to paroxysmal versus non-paroxysmal AF

Take Home Messages

- The arrhythmia in certain cases is part of an atrial myopathy
- Imaging techniques are developing and seem to add valuable information for the future management and prognosis
- Anticoagulation
- Ablation techniques, ?Personalized approach

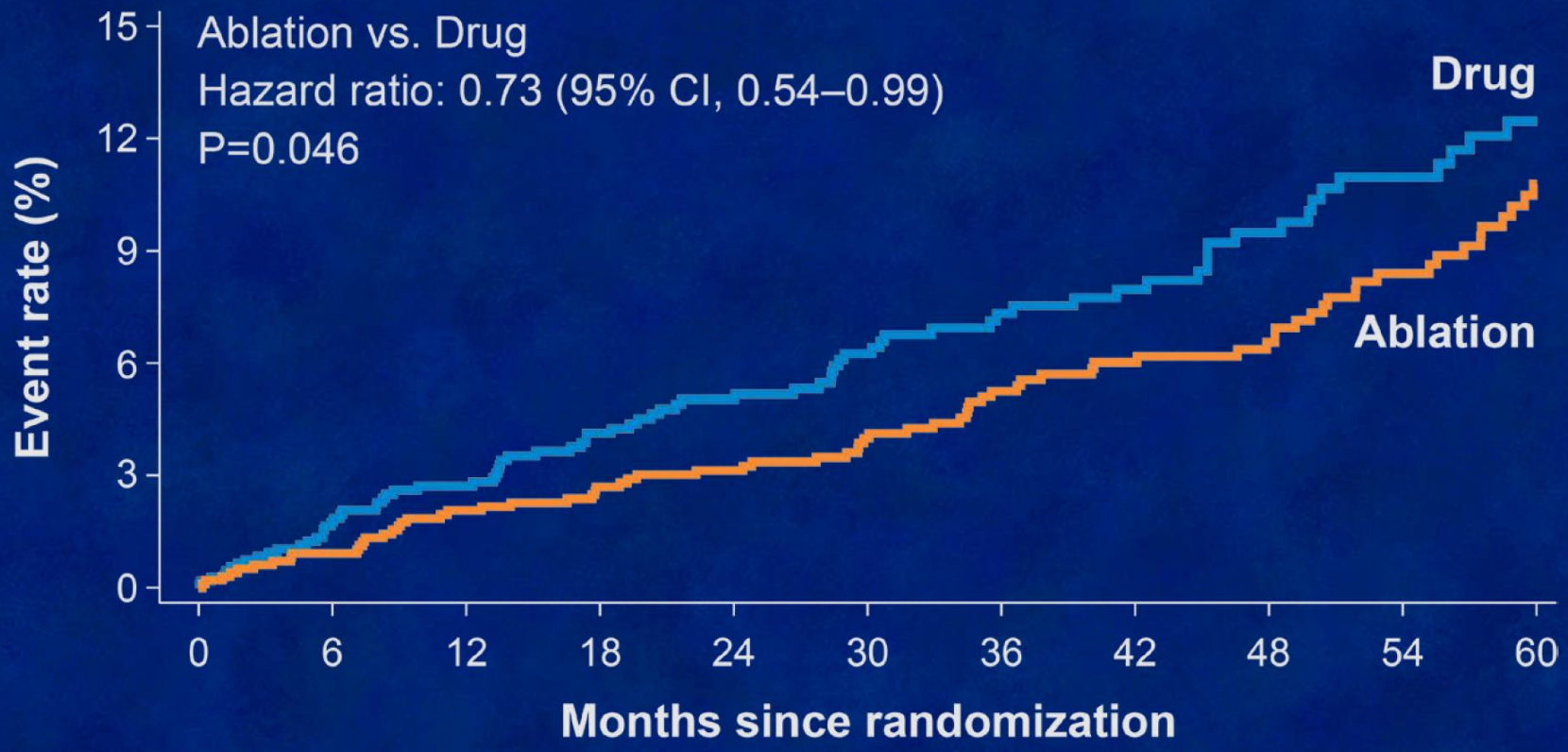
Primary Endpoint (Death, Disabling Stroke, Serious Bleeding, or Cardiac Arrest) (ITT)



Number at risk											
Drug	1096	1036	1006	970	880	763	652	578	499	418	312
Ablation	1108	1045	1021	996	915	793	700	614	535	432	309

MAYO CLINIC Duke Clinical Research Institute NIH National Heart, Lung, and Blood Institute

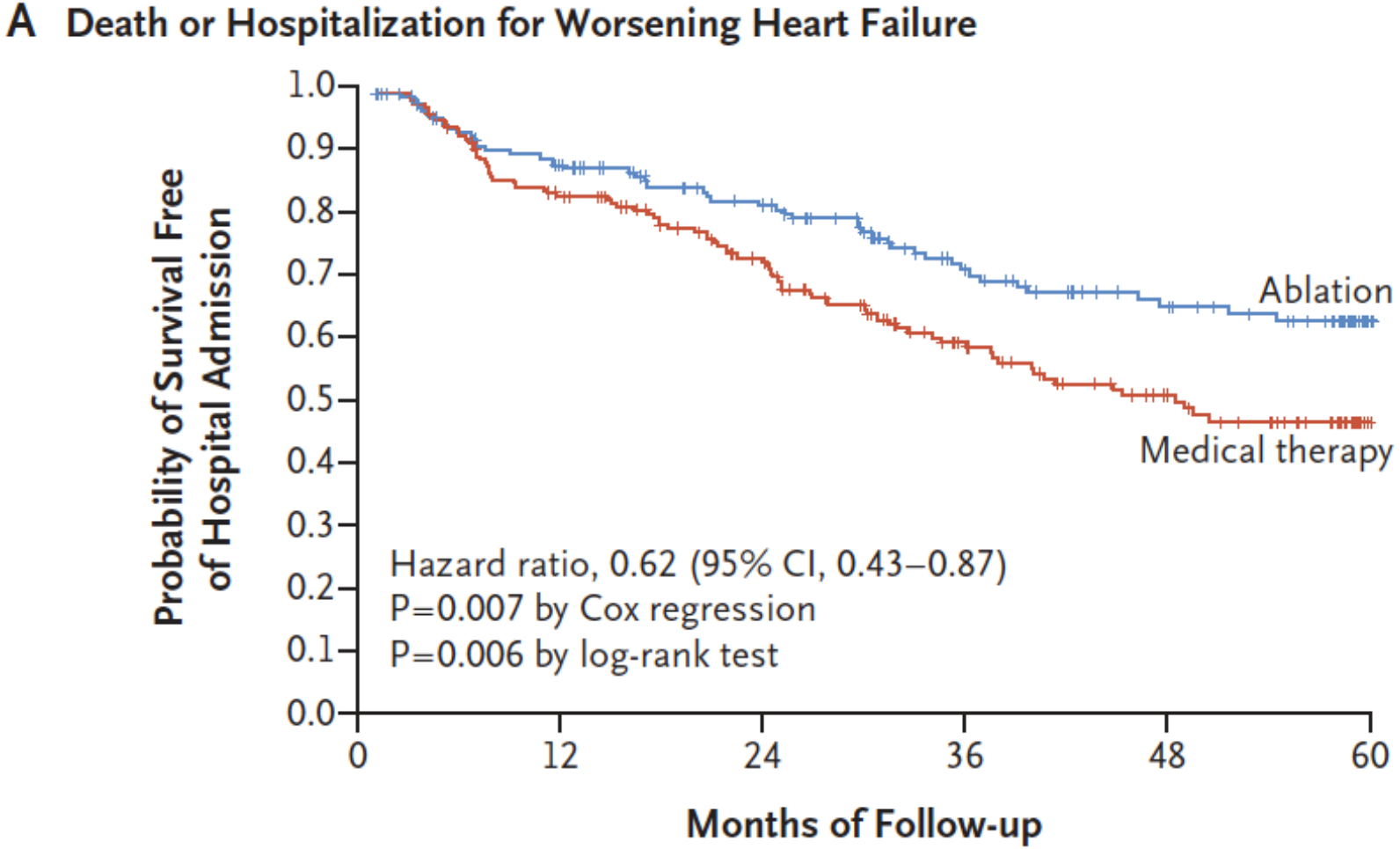
Primary Endpoint (Death, Disabling Stroke, Serious Bleeding, or Cardiac Arrest (Per Protocol)



Number at risk											
Drug	1096	954	860	778	680	566	464	396	330	275	204
Ablation	987	958	937	918	849	735	648	566	494	404	291

MAYO CLINIC Duke Clinical Research Institute NIH National Heart, Lung, and Blood Institute

CASTLE-AF Study



No. at Risk

Ablation	179	141	114	76	58	22
Medical therapy	184	145	111	70	48	12

Marouche et al, N Engl J Med 2018;378:417-27.