«ΜΑΘΗΜΑΤΑ ΤΡΙΤΗΣ ΙΠΠΟΚΡΑΤΕΙΟΥ Γ.Ν.Α.» 2023-2024
Συντονιστής: **Κων/νος Π. Τσιούφης (8.00μ.μ – 9.30μ.μ. EEST)**
Καθηγητής-Διευθυντής Α΄ Καρδιολογικής Κλινικής Πανεπιστημίου Αθηνών Ι.Γ.Ν.Α.

Κριτική αποτίμηση των νέων πηγών ενέργειας στην κατάλυση της κολπικής μαρμαρυγής *Επανάσταση ή Κοινοτυπία;*

Γεώργιος Ανδρικόπουλος, MD, PhD, FESC
Διευθυντής Α Καρδιολογικού τμήματος,
Ηλεκτροφυσιολογίας/Βηματοδότησης,
Ερρίκος Ντυνάν Hospital Center

Τρίτη 17 Οκτωβρίου 2023

Presenter Disclosure Information

The presenter has received honoraria for participation in lectures and advisory boards from the following pharmaceutical and biotechnology companies:

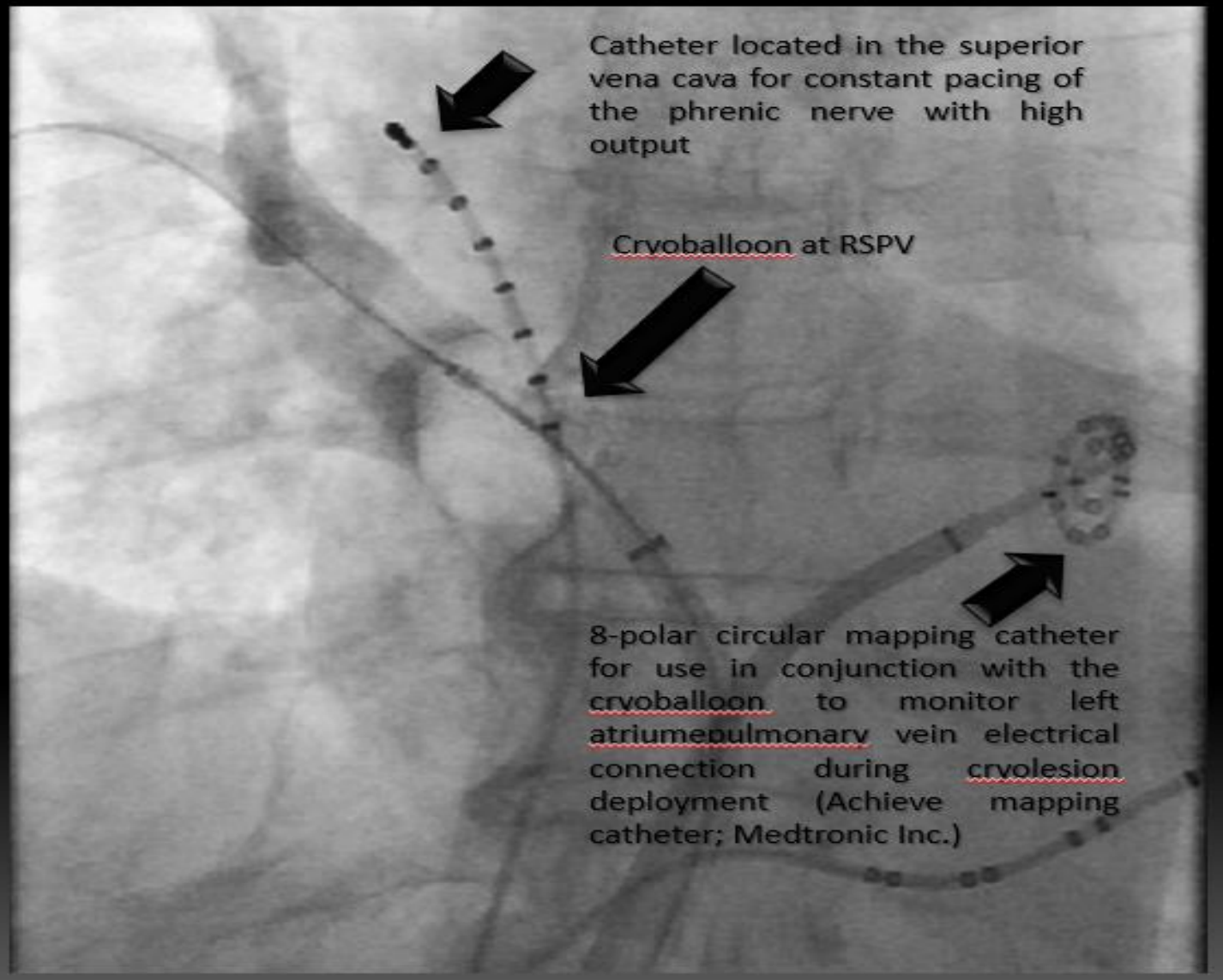
- *Abbot*
- *AstraZeneca,*
- *Bard,*
- *Bayer Healthcare,*
- *Boehringer Ingelheim,*
- *Boston Scientific,*
- *Bristol-Myers Squibb,*
- *ELPEN,*
- *Galenica,*
- *Lilly,*
- *Medtronic,*
- *Menarini,*
- *MSD,*
- *Pfizer,*
- *Sanofi,*
- *Servier,*
- *Unifarma,*
- *Vianex.*

HEART

Invasive therapy for atrial fibrillation: recent developments in ablation, navigation and mapping technology

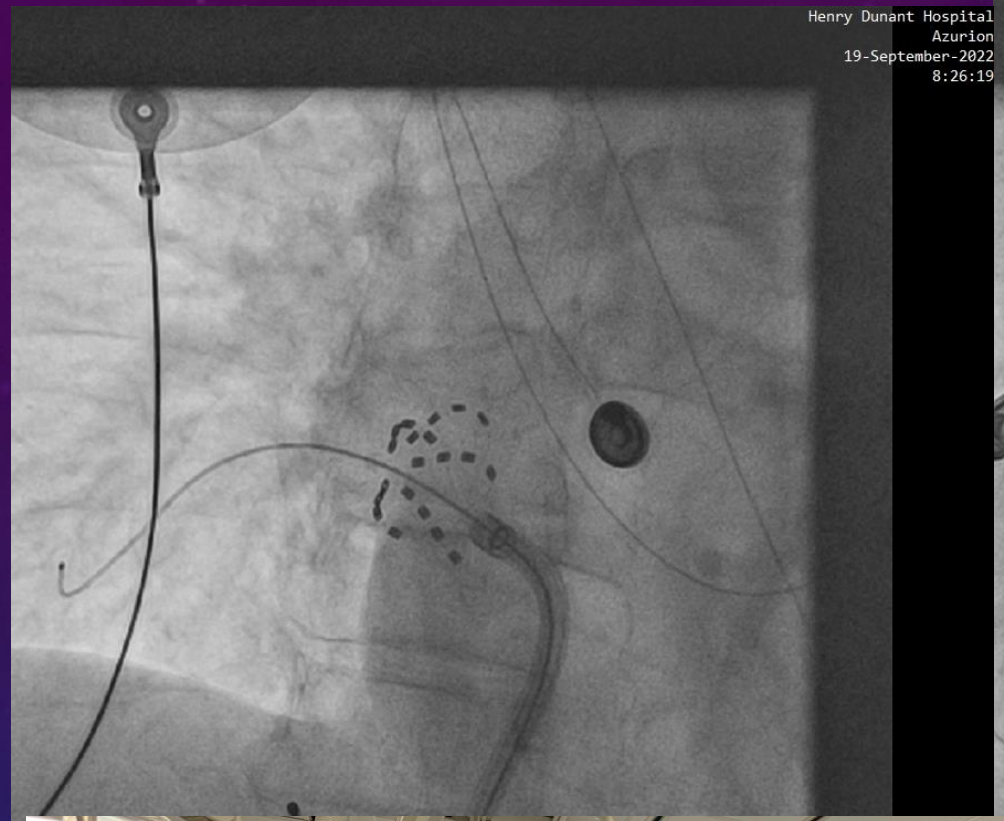
Ablation of the right superior pulmonary vein with the use of the **cryoablation balloon system**

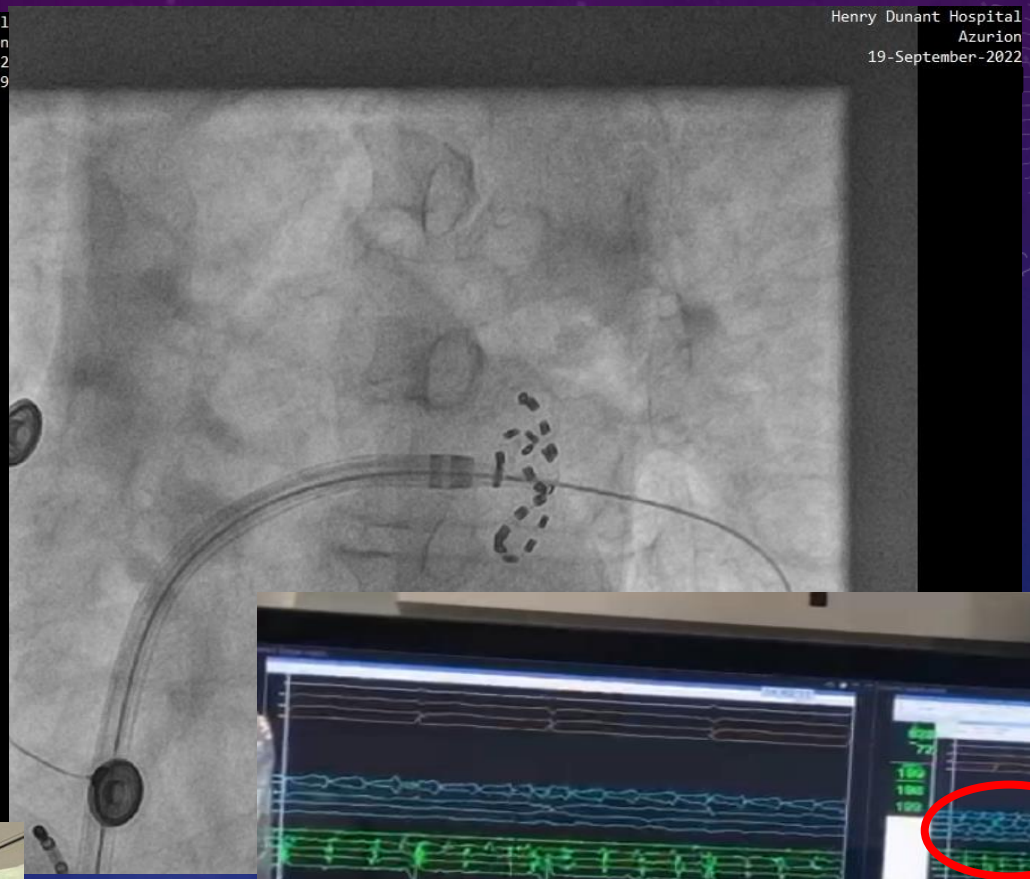
1. *Chun KR, Schmidt B, Metzner A, et al. The 'single big cryoballoon' technique for acute pulmonary vein isolation in patients with paroxysmal atrial fibrillation: a prospective observational single centre study. Eur Heart J 2009;30:699e709*
2. *Linhart M, Bellmann B, Mittmann-Braun E, et al. Comparison of cryoballoon and radiofrequency ablation of pulmonary veins in 40 patients with paroxysmal atrial fibrillation: a caseecontrol study. J Cardiovasc Electrophysiol 2009;20:1343e8.*
3. *20. Klein G, Oswald H, Gardiwal A, et al. Efficacy of pulmonary vein isolation by cryoballoon ablation in patients with paroxysmal atrial fibrillation. Heart Rhythm 2008;5:802e6.*

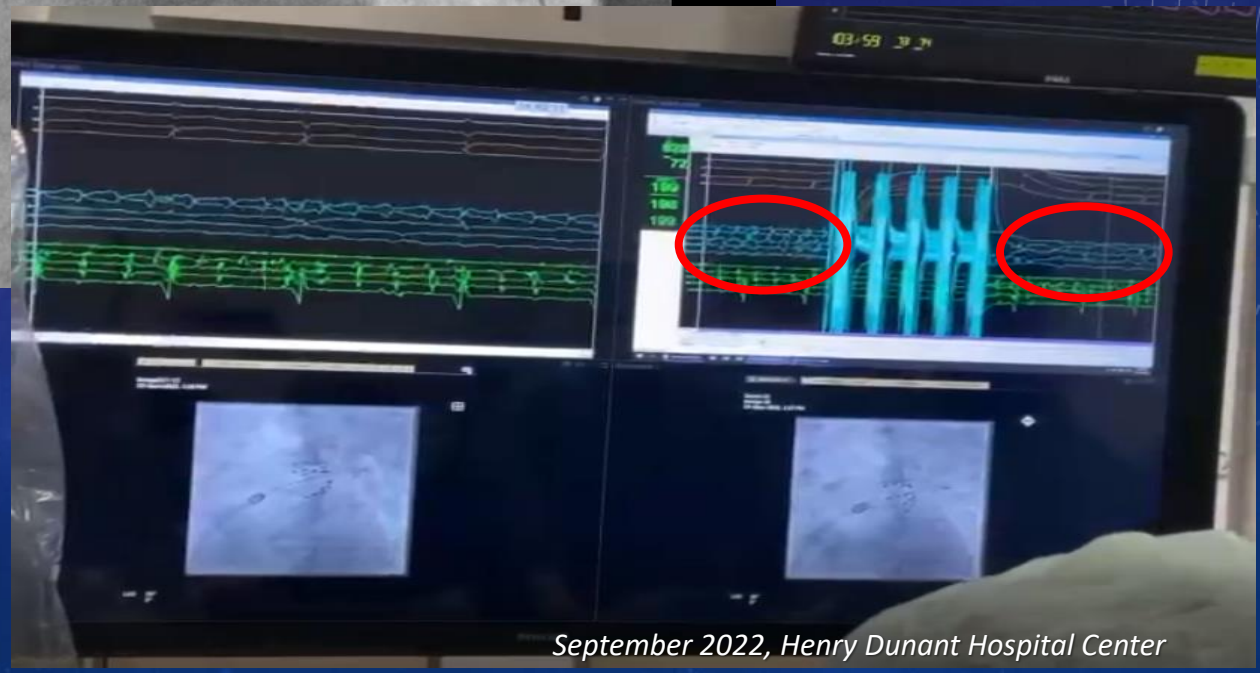


Andrikopoulos G., Tzeis S, Vardas P. Heart 2011;97:237-243

PFA for AF ablation







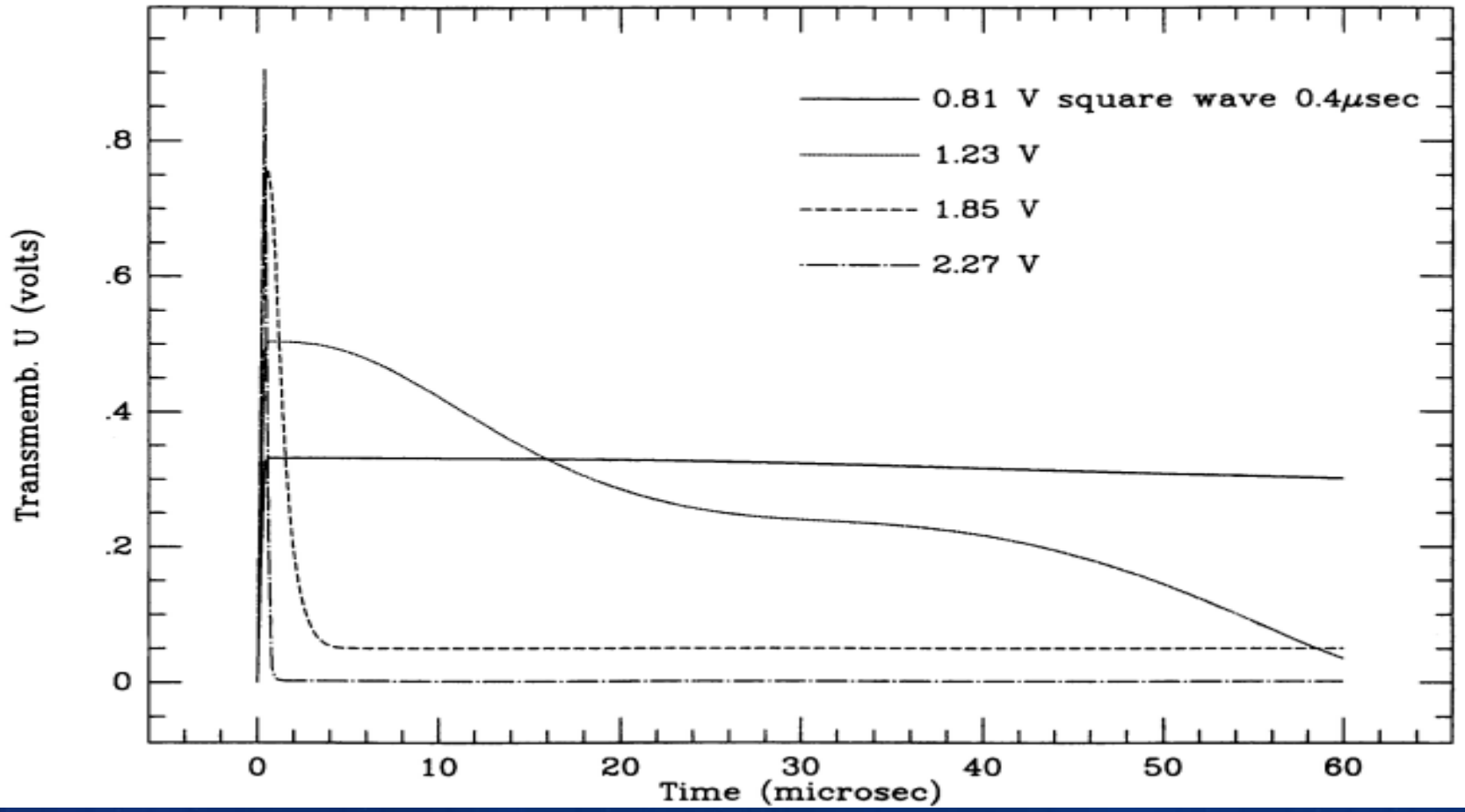
September 2022, Henry Dunant Hospital Center

42 Biophysical Journal Volume 67 July 1994 42–56

Theory of Electroporation of Planar Bilayer Membranes: Predictions of the Aqueous Area, Change in Capacitance, and Pore-Pore Separation

Scott A. Freeman,* Michele A. Wang,* and James C. Weaver‡
*Department of Physics and ‡Harvard-M.I.T. Division of Health Sciences and Technology, Massachusetts Institute of Technology, Cambridge, Massachussetts 02139 USA

FIGURE 2 Predicted square pulse behavior of the transmembrane voltage, $U(t)$, due to a single 0.4-μs pulse of the indicated amplitudes. As found previously, four distinguishable outcomes are possible: (1) simple charging of the membrane capacitance (smallest pulse; here 0.81 V), (2) rupture of the membrane (larger pulse; here 1.23 V), (3) incomplete reversible electrical breakdown (still larger pulse; here 1.85 V), (4) reversible electrical breakdown (REB) (largest pulse; here 2.27 V). The electrical behavior predicted by a recent transient aqueous pore model (Barnett and Weaver, 1991) agrees reasonably, but not exactly, with experimental observations of these outcomes (Benz et al., 1979).



ESC European Society of Cardiology

Europace (2022) **24**, 1213–1222
https://doi.org/10.1093/europace/euac033

REVIEW

Cardiac ablation with pulsed electric fields: principles and biophysics

Alan Sugrue [1,2]*, Elad Maor[1,3], Freddy Del-Carpio Munoz[1], Ammar M. Killu[1], and Samuel J. Asirvatham[1]

[1]Division of Heart Rhythm Services, Department of Cardiovascular Medicine, Mayo Clinic, Rochester, MN, USA; [2]Division of Cardiovascular Medicine, Department of Medicine, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania; and [3]Chaim Sheba Medical Center and Sackler School of Medicine, Tel Aviv University, Israel

Table I Comparison of different effects observed with different pulse durations

	Pulse duration		
	Millisecond (ms)	**Microsecond (μs)**	**Nanosecond (ns)**
Site of dominant electric field effect	Outer cell membrane	Outer cell membrane	Internal cell organelles
Energy required to induce TMV	Lower	–	Highest
Thermal effect	Highest		Lowest
Treatment delivery time	Highest	–	Lowest
Anode–cathode differential effects (assuming not bipolar waveform delivery)	Yes	Yes	No
Muscle contractions	Highest		Lowest
Cell death	Necrosis, pyroptosis, or necroptosis	Necrosis, pyroptosis, or necroptosis	Apoptosis

Cardiac ablation with pulsed electric fields: principles and biophysics

Η ΠΟΛΥΠΛΟΚΗ ΚΑΙ ΠΟΛΥΠΑΡΑΓΟΝΤΙΚΗ ΦΥΣΗ ΤΟΥ ELECTROPORATION

1. Ένταση ηλεκτρικού πεδίου

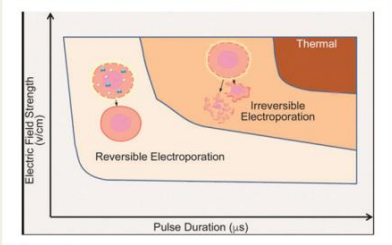


Figure 3 Potential observed impact of electrical pulse and electric field strength. The longer the pulse and the greater the voltage the more likelihood there will be irreversible injury and the possibility of thermal damage. With permission Maor et *al.*[3]

2. Αριθμός και συχνότητα ηλεκτρικών παλμών

3. Διάρκεια ηλεκτρικών παλμών

4. Κυματομορφή ηλεκτρικών παλμών

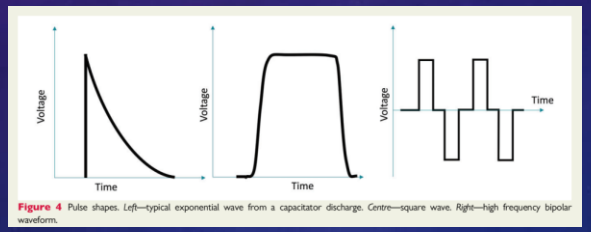


Figure 4 Pulse shapes. *Left*—typical exponential wave from a capacitator discharge. *Centre*—square wave. *Right*—high frequency bipolar waveform.

5. Μέγεθος και απόσταση ηλεκτροδίων

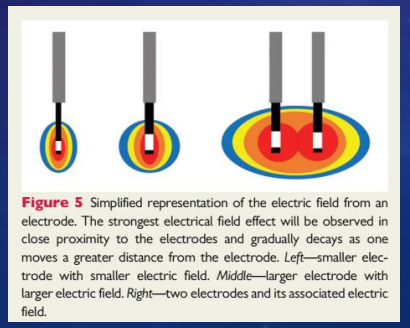


Figure 5 Simplified representation of the electric field from an electrode. The strongest electrical field effect will be observed in close proximity to the electrodes and gradually decays as one moves a greater distance from the electrode. *Left*—smaller electrode with smaller electric field. *Middle*—larger electrode with larger electric field. *Right*—two electrodes and its associated electric field.

6. Μήκος κύματος ηλεκτρικών παλμών

7. Σχετική θέση ηλεκτροδίων

8. Μονοπολικό ή διπολικό πεδίο

9. Αντίσταση

10. Αύξηση θερμοκρασίας ιστών

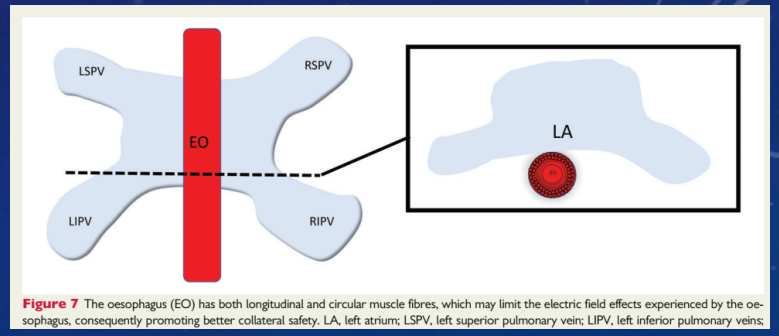


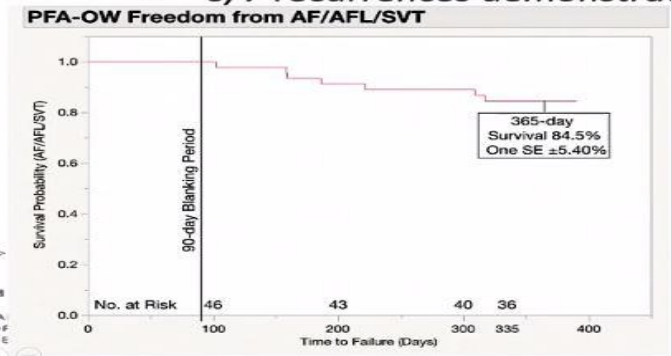
Figure 7 The oesophagus (EO) has both longitudinal and circular muscle fibres, which may limit the electric field effects experienced by the oesophagus, consequently promoting better collateral safety. LA, left atrium; LSPV, left superior pulmonary vein; LIPV, left inferior pulmonary veins;

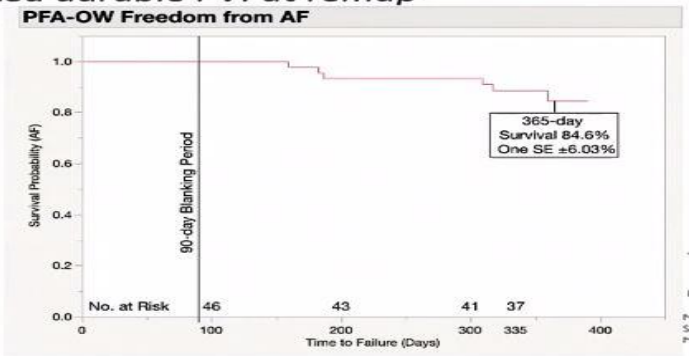
Surgue A et al. Europace 2022

PVI in PAF pts

1-Year Clinical Recurrence

- **97 pts reached 1 year of follow-up**
- Optiwave cohort
  - *86% per-week (TTM) and 98% per-monitor (Holter) compliance*
  - *85±5% freedom from atrial arrhythmia*
  - *6/7 recurrences demonstrated durable PVI at remap*





EHRA 2021
As presented by Vivek Reddy

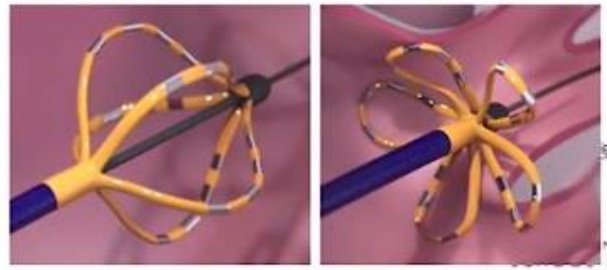
PVI in PAF pts

Remap Results

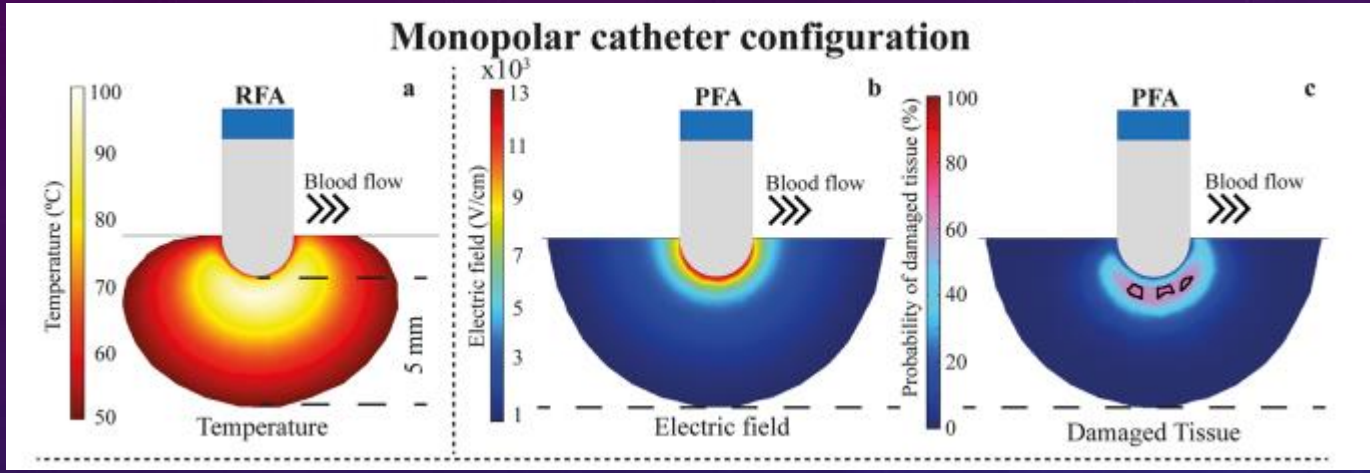
110 pts returned for prospective remaps at 93±30 days

Cohort	n	Durable PVI (% PVs)	Durable PVI (% pts)
Monophasic	11	45%	18%
Biphasic (Early/Other)	55	84%	58%
Optiwave (Optimized Biphasic)	**44**	**96%**	**84%**

- 4 paired applications / PV @ 1.8-2.0kV
  - 2 pairs in “Flower”
  - 2 pairs in ”Basket”



A computational comparison of radiofrequency and pulsed field ablation in terms of lesion morphology in the cardiac chamber



Lesion parameter	Description	Monopolar catheter configuration		Bipolar catheter configuration	
		RFA	PFA	RFA	PFA
V	Total volume (mm^3)	320.58	459.54	291.56	435.96
D	Depth (mm)	5	5	1.6	1.6
W	Width (mm)	9.9	12.1	5.1	6.6
SR	Symmetry ratio (%, %)	47.9, 52.1	49.9, 50.1	37.4, 62.6	50.0, 50.0

with respect to the cardiac surface impacted both ablation techniques but in opposite sense. The orientation of the catheter with respect to blood flow direction only affected RFA lesions. In this study, substantial morphological differences between RFA and PFA lesions were predicted numerically. Negligible dependence of PFA on blood flow velocity and direction is a potential important advantage of this technique over RFA.

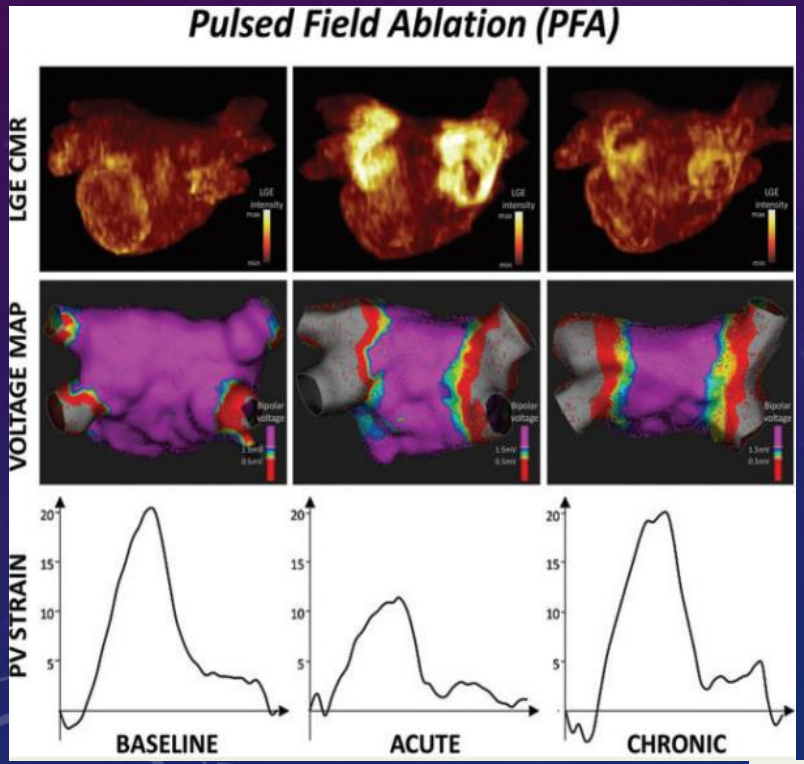
Gomez-Barea M. et al. 2022 Sep 27;12(1):16144 – Barcelona, Spain

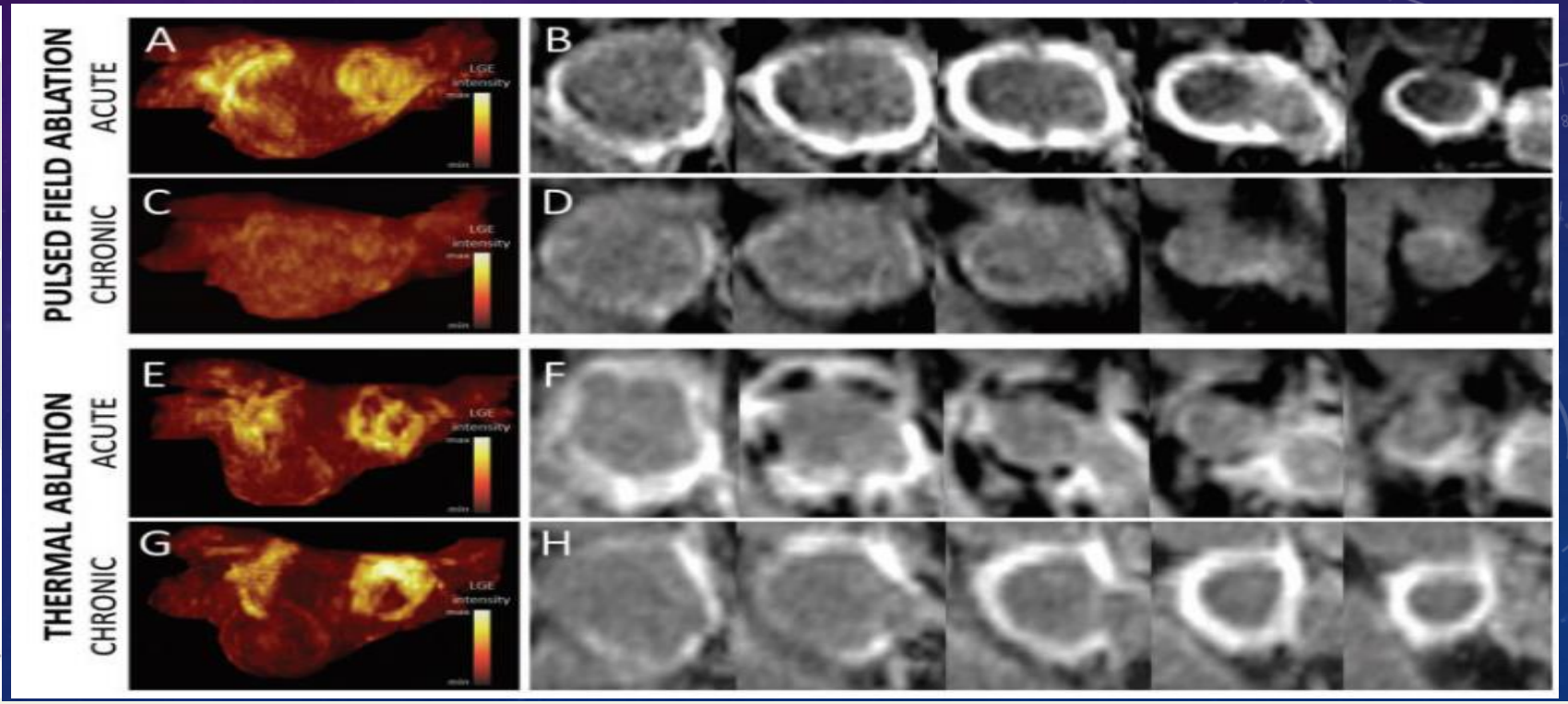
ESC
European Society of Cardiology

Pulsed field ablation prevents chronic atrial fibrotic changes and restrictive mechanics after catheter ablation for atrial fibrillation

Methods and results

Cardiac magnetic resonance was performed pre-ablation, acutely (<3 h), and 3 months post-ablation in 41 patients with paroxysmal atrial fibrillation (AF) undergoing pulmonary vein (PV) isolation with PFA ($n = 18$) or thermal ablation ($n = 23$, 16 radiofrequency ablations, 7 cryoablations). Late gadolinium enhancement (LGE), T2-weighted, and cine images were analysed. In the acute stage, LGE volume was 60% larger after PFA vs. thermal ablation





Conclusion

Pulsed field ablation induces large acute LGE without microvascular damage or intramural haemorrhage. Most LGE lesions disappear in the chronic stage, suggesting a specific reparative process involving less chronic fibrosis. This process may contribute to a preserved tissue compliance and LA reservoir and booster pump functions.

Nakatani Y et al. Europace 2021(23):1767-1776

1. Εκλεκτικότητα

ESC European Society of Cardiology

European Heart Journal - Case Reports (2023) 7, 1–5
https://doi.org/10.1093/ehjcr/ytad370

CASE REPORT
Electrophysiology

Transient conduction disturbances acutely after pulsed-field cavotricuspid isthmus ablation: a case report

George Andrikopoulos, Konstantinos Tampakis *, Alexandros Sykiotis, and Sokratis Pastromas

First Department of Cardiology/Electrophysiology and Pacing, Henry Dunant Hospital Center, 107 Mesogeion ave, 11526 Athens, Greece

Received 26 March 2023; revised 24 July 2023; accepted 31 July 2023; online publish-ahead-of-print 2 August 2023

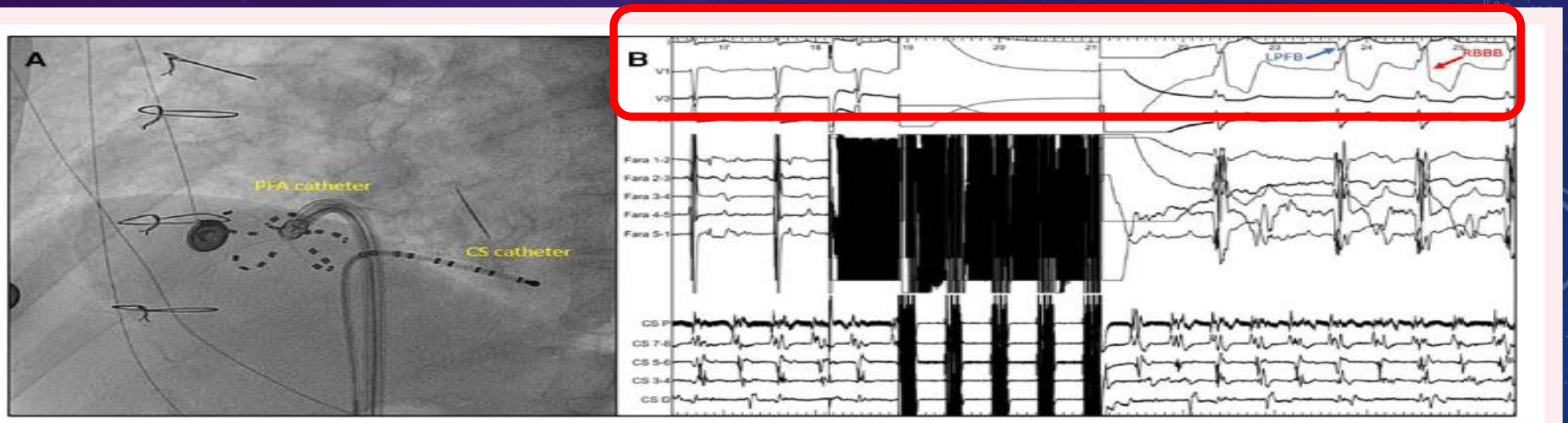
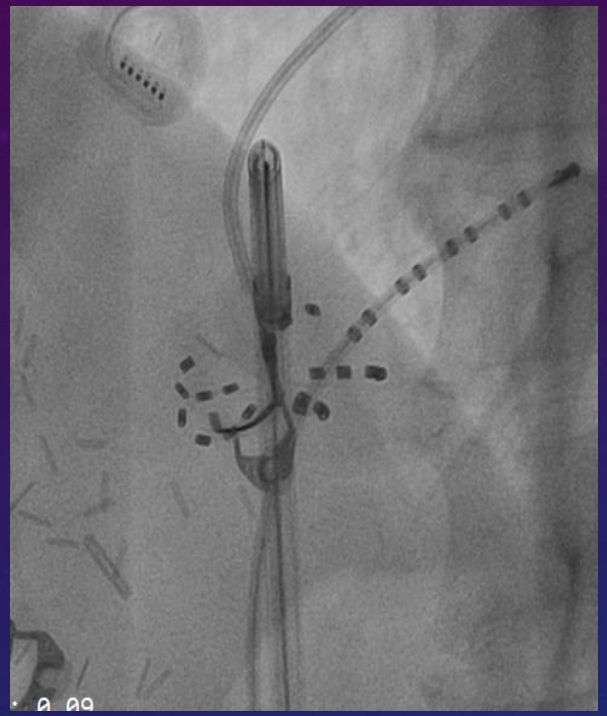
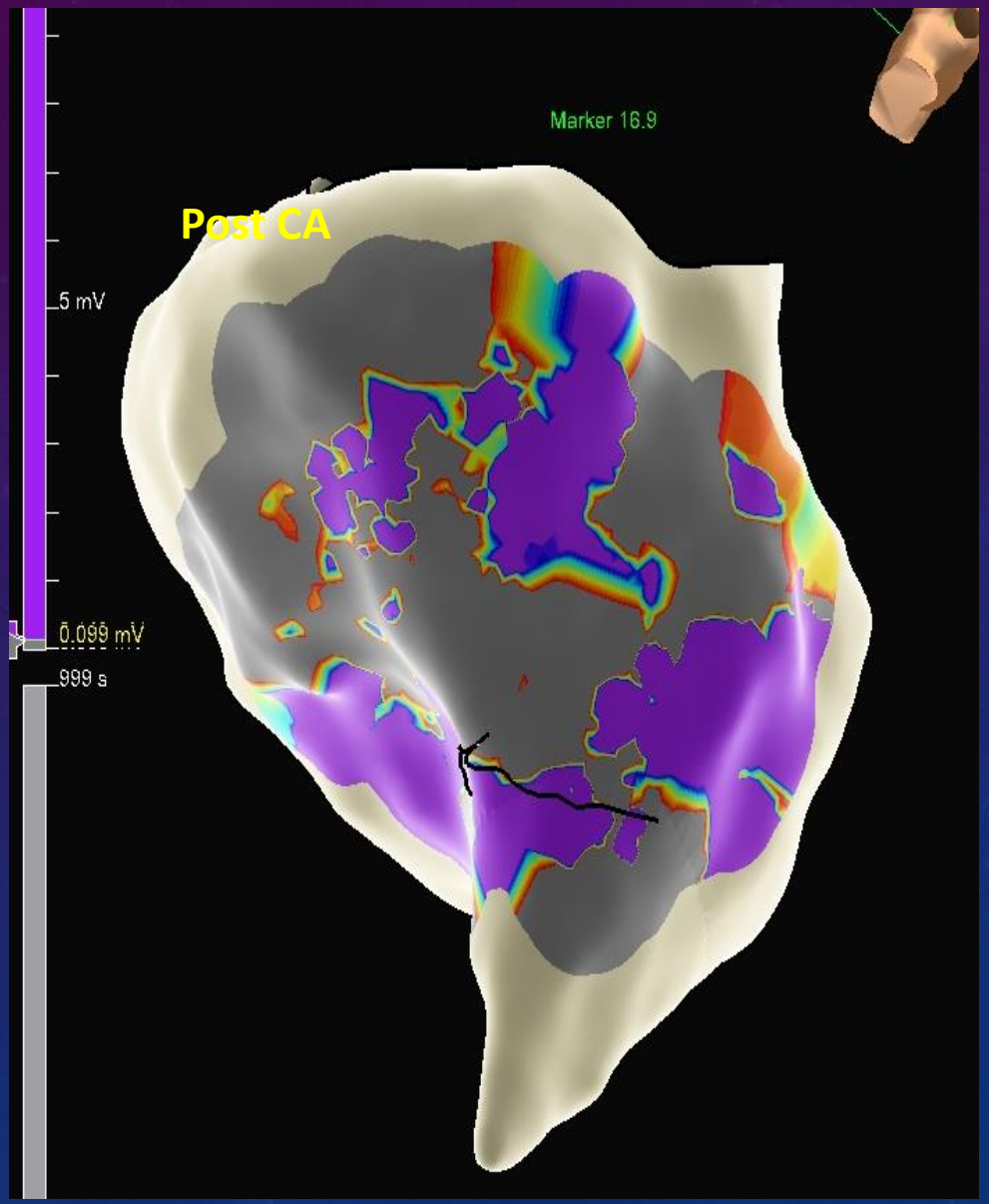


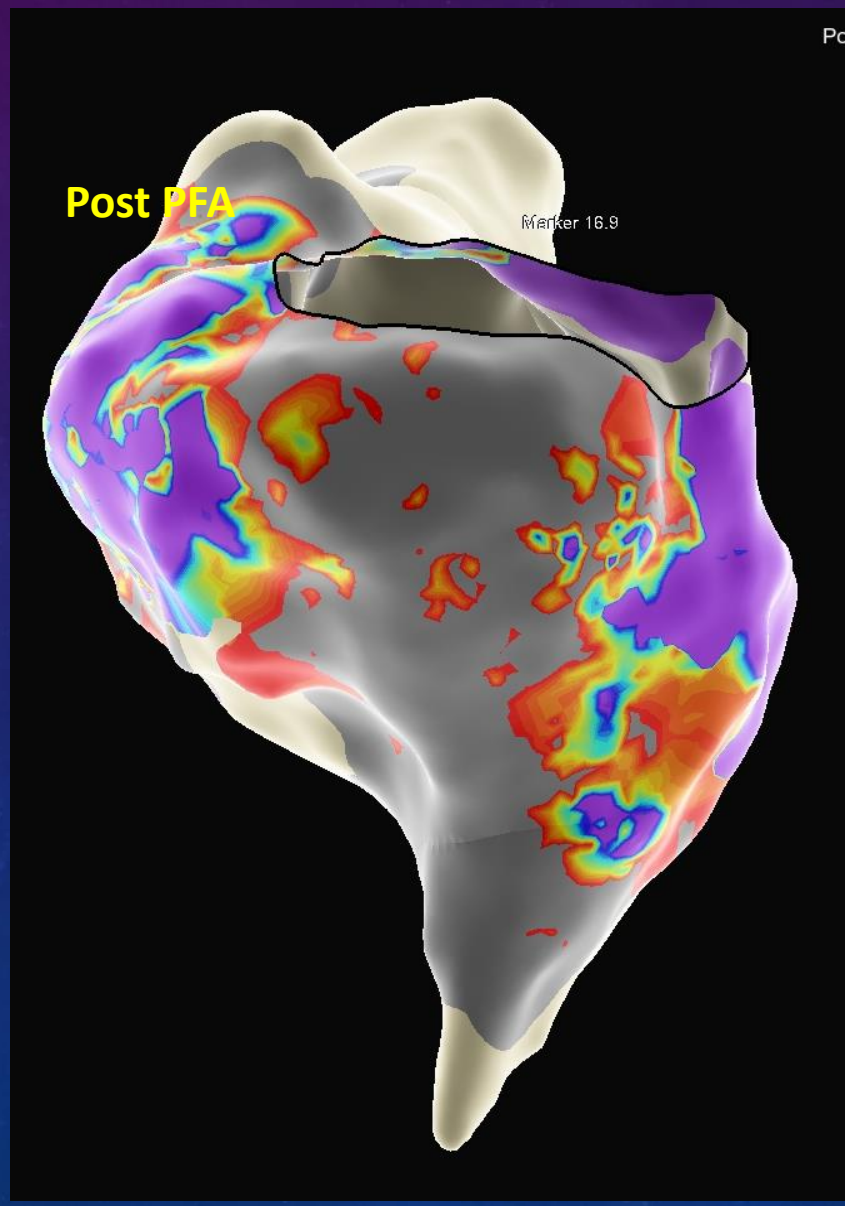
Figure 2 (*A*) After administration of 2 mg of intravenous nitroglycerine, a single pulsed-field application (with a peak voltage of 2.0 kV), in flower configuration, was delivered at the lateral annular portion of the cavotricuspid isthmus. (*B*) Acute occurrence of RBBB and LPFB without flutter termination. CS, coronary sinus; PFA, pulsed-field ablation; RBBB, right bundle branch block; LPFB, left posterior fascicular block.

Fluoroscopy guided PF CTI ablation in a patient with peculiar anatomy

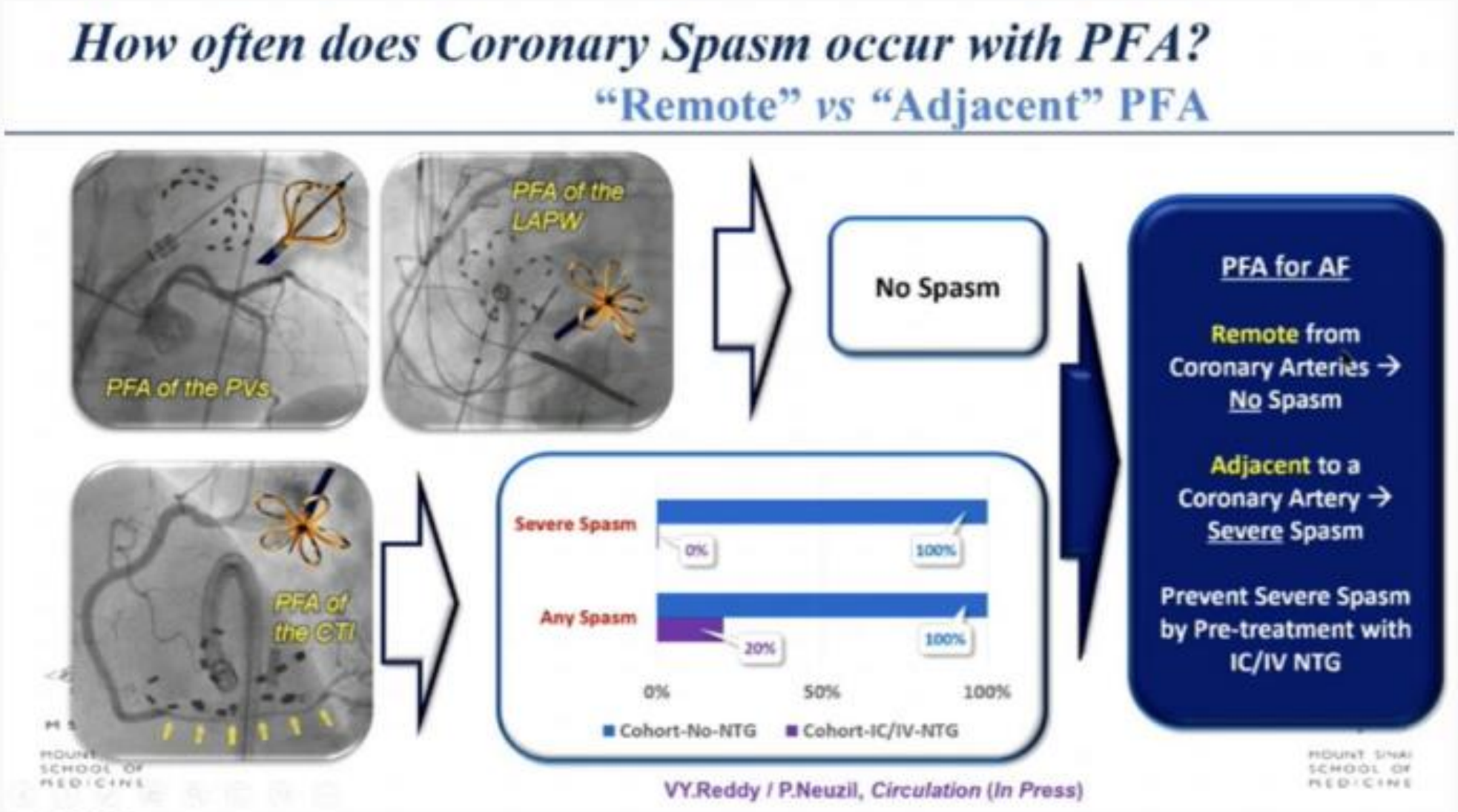
(CTI bidirectional block NOT feasible with irrigated catheter and electroanatomic mapping)







CORONARY SPASM DATA



As presented by Dr Potter, ESC 2023

Volume 44, Issue
Supplement_1
February 2023

JOURNAL ARTICLE

The efficacy and safety of pulsed-field ablation in para-Hisian paroxysmal supraventricular tachycardia: first-in-human pilot trial

FREE

F H Li, R Zeng, Q Zhang, C S Ma

European Heart Journal, Volume 44, Issue Supplement_1, February 2023, ehac779.026, https://doi.org/10.1093/eurheartj/ehac779.026
Published: 25 January 2023

Background

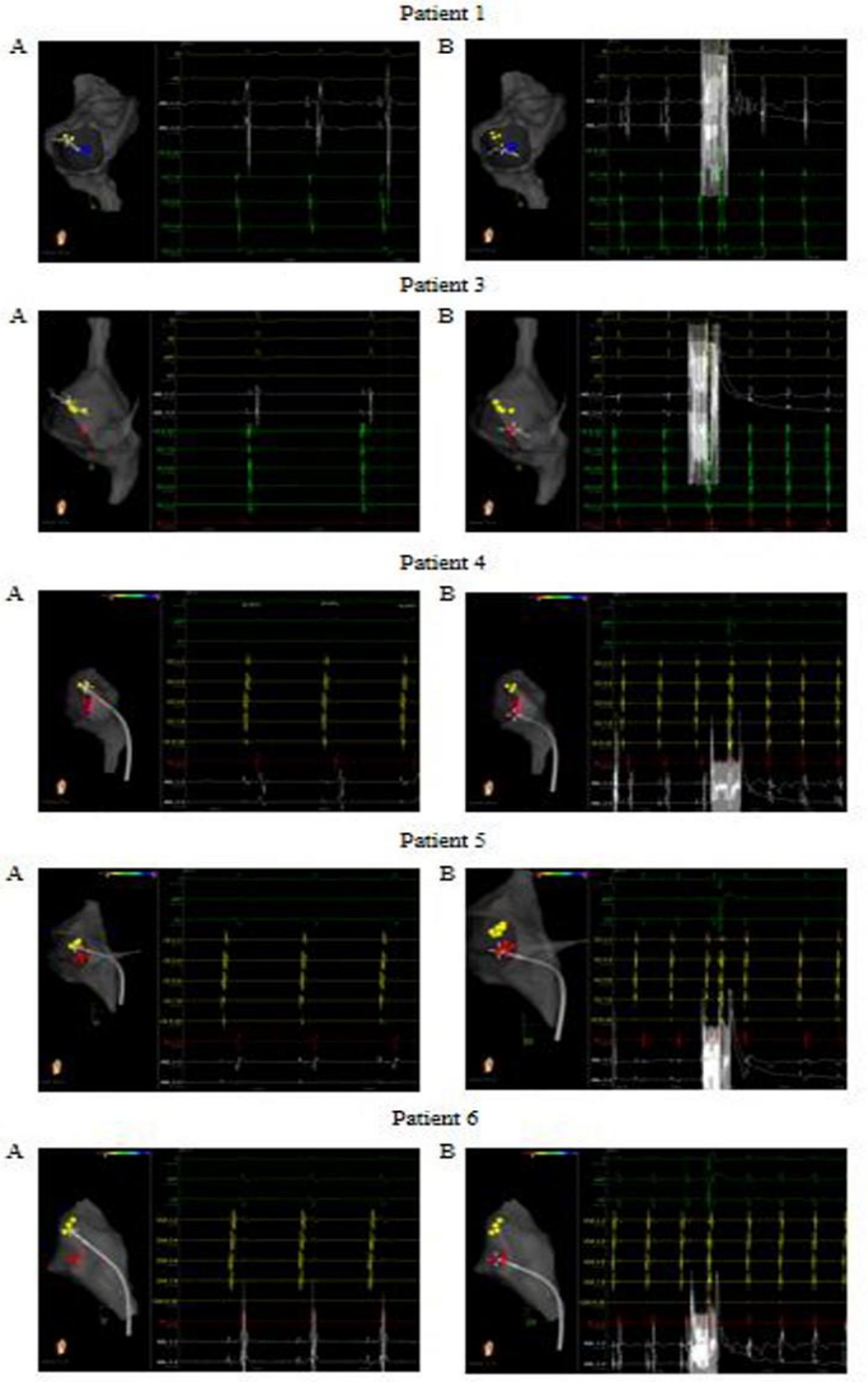
Para-Hisian paroxysmal supraventricular tachycardia (PSVT) is associated with a higher risk of atrioventricular block due to proximity of the His bundle during catheter ablation. Pulsed-field ablation (PFA) with high tissue selectivity may be a promising technique for catheter ablation in patients with para-Hisian PSVT.

Purpose

This study aimed to evaluate the efficacy and safety of PFA for para-Hisian PSVT.

Conclusion

PFA had favorable efficacy and safety in para-Hisian PSVT patients and can help minimize the risk of inadvertent atrioventricular block during ablation. PFA may be a favorable treatment choice for patients with para-Hisian PSVT.



2. Ασφάλεια

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Pulsed Field or Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation

The **ADVENT** trial was a multicenter, randomized, noninferiority, single-blind, pivotal trial with blinded end-point adjudication. A total of 305 patients were assigned to undergo pulsed field ablation, and 302 were assigned to undergo thermal ablation. At 1 year, the primary efficacy end point was met (i.e., no events occurred) in 204 patients (estimated probability, 73.3%) who underwent pulsed field ablation and 194 patients (estimated probability, 71.3%) who underwent thermal ablation.

Table 3. Serious and Nonserious Adverse Events.*

Event	Serious Adverse Events†		Serious or Nonserious Adverse Events‡	
	Pulsed Field Ablation (N=305)	Thermal Ablation (N=302)	Pulsed Field Ablation (N=305)	Thermal Ablation (N=302)
	number of patients (percent)			
Any event	6 (2.0)§	4 (1.3)	7 (2.3)§	6 (2.0)
Death	1 (0.3)	0	1 (0.3)	0
Myocardial infarction	0	0	0	0
Persistent phrenic-nerve palsy	0	0	0	2 (0.7)
Stroke	0	1 (0.3)	0	1 (0.3)
TIA	1 (0.3)	0	1 (0.3)	0
Systemic thromboembolism	0	0	0	0
Cardiac tamponade or perforation	2 (0.7)	0	2 (0.7)	0
Pericarditis	1 (0.3)	0	2 (0.7)	0
Pulmonary edema	1 (0.3)	1 (0.3)	1 (0.3)	1 (0.3)
Vascular-access complication	1 (0.3)	2 (0.7)	1 (0.3)	2 (0.7)
Heart block	0	0	0	0
Gastric motility or pyloric spasm	0	0	0	0
Pulmonary vein stenosis	0	0	0	0
Atrioesophageal fistula	0	0	0	0

Reddy VY, et al. Pulsed Field or Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation. N Engl J Med. 2023

ESC European Society of Cardiology
Europace (2021) 23, 1767–1776
doi:10.1093/europace/euab155

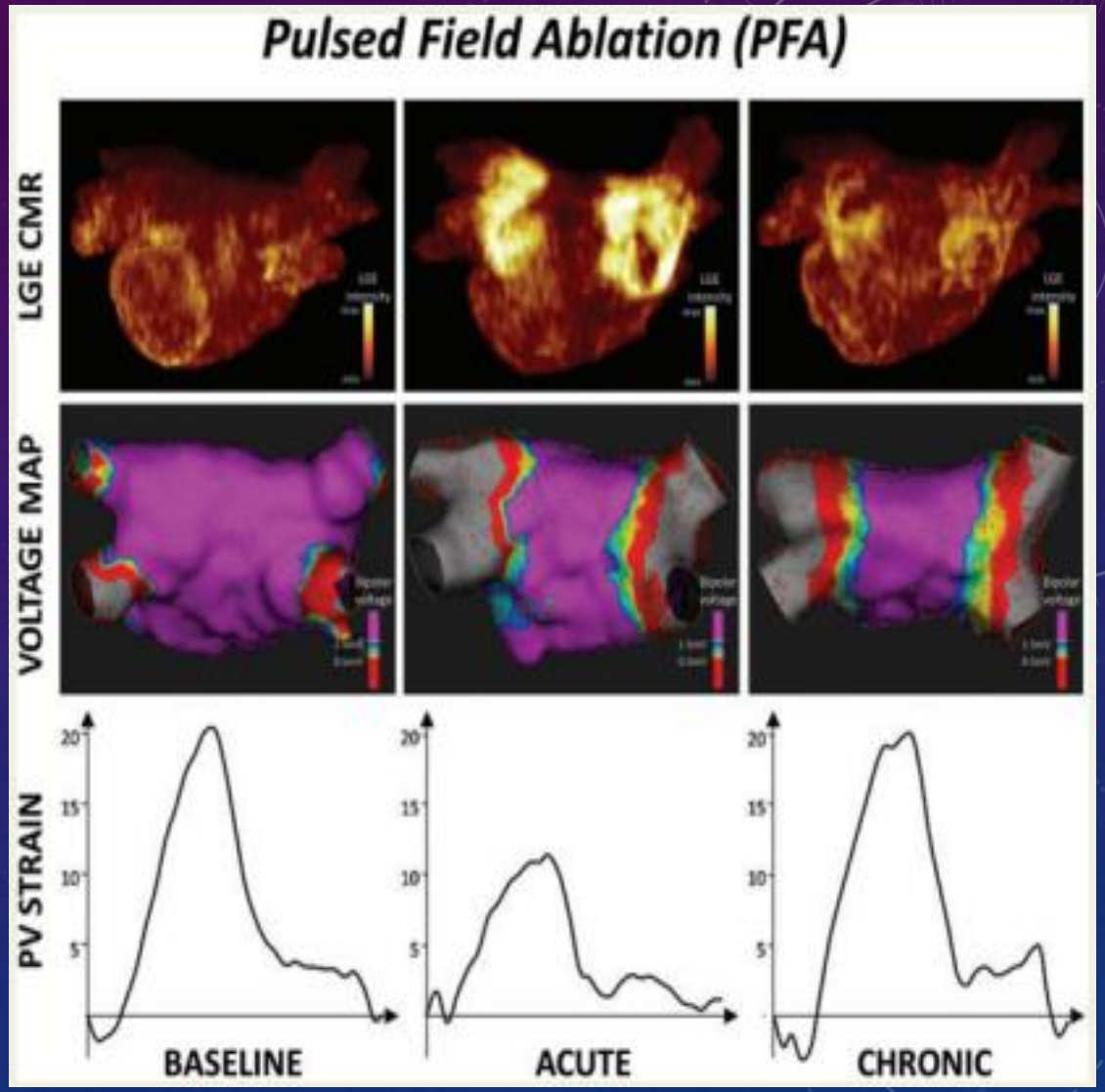
CLINICAL RESEARCH
Ablation for atrial fibrillation

Pulsed field ablation prevents chronic atrial fibrotic changes and restrictive mechanics after catheter ablation for atrial fibrillation

Yosuke Nakatani [1]*, Soumaya Sridi-Cheniti[2], Ghassen Cheniti[1], F. Daniel Ramirez [1], Cyril Goujeau[1], Clementine André[1], Takashi Nakashima[1], Charles Eggert[3], Christopher Schneider[3], Raju Viswanathan[3], Philipp Krisai[1], Takamitsu Takagi[1], Tsukasa Kamakura[1], Konstantinos Vlachos [1], Nicolas Derval[1,4], Josselin Duchateau[1,4], Thomas Pambrun[1,4], Remi Chauvel[1,4], Vivek Y. Reddy[5], Michel Montaudon[2,4], François Laurent[2,4], Frederic Sacher[1,4], Mélèze Hocini[1,4], Michel Haïssaguerre[1,4], Pierre Jaïs[1,4], and Hubert Cochet [2,4]

Methods and results

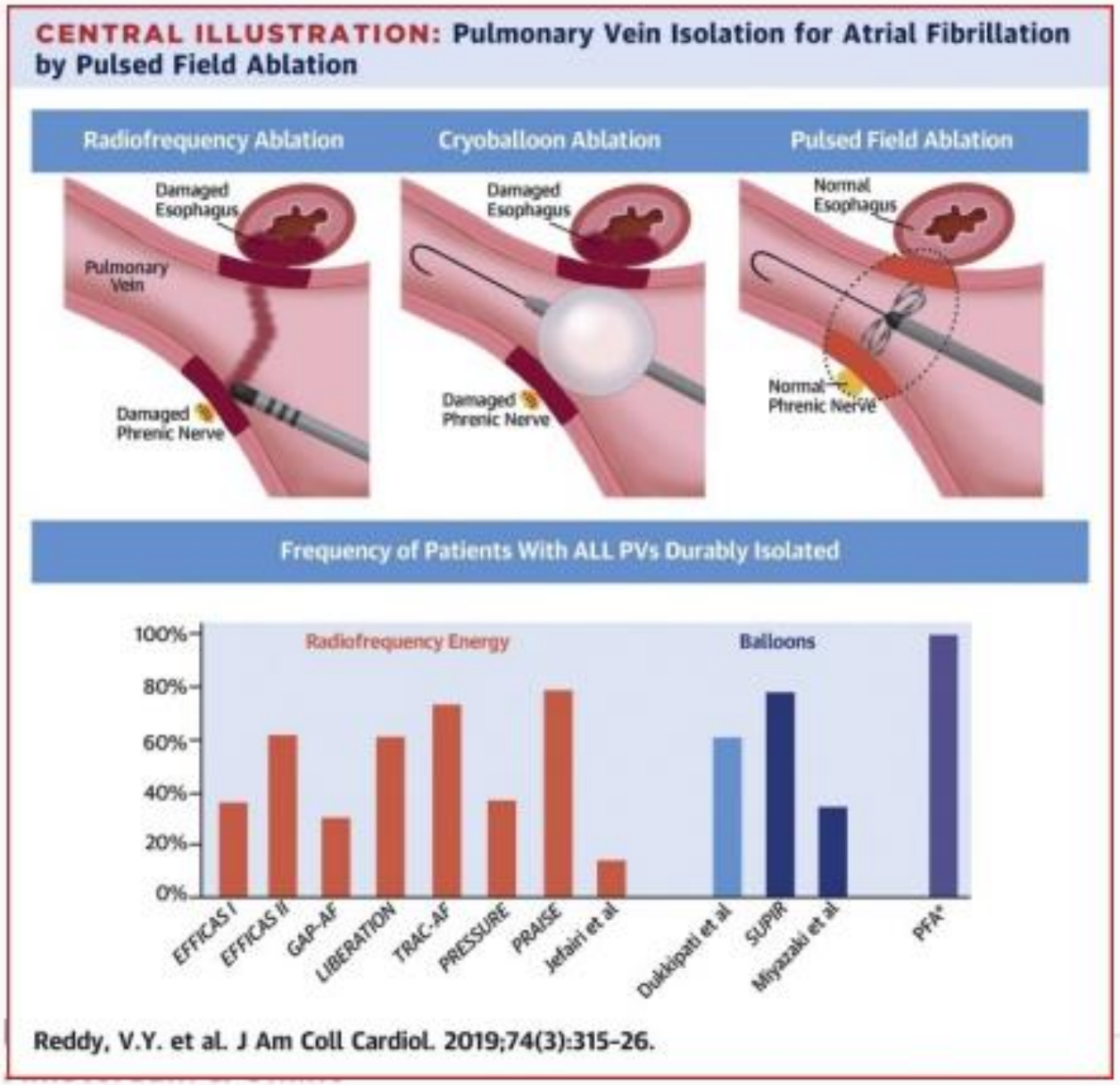
Cardiac magnetic resonance was performed pre-ablation, acutely (<3 h), and 3 months post-ablation in 41 patients with paroxysmal atrial fibrillation (AF) undergoing pulmonary vein (PV) isolation with PFA ($n = 18$) or thermal ablation ($n = 23$, 16 radiofrequency ablations, 7 cryoablations). Late gadolinium enhancement (LGE), T2-weighted, and cine images were analysed. In the acute stage, LGE volume was 60% larger after PFA vs. thermal ablation ($P < 0.001$), and oedema on T2 imaging was 20% smaller ($P = 0.002$). Tissue changes were more homogeneous after PFA than after thermal ablation, with no sign of microvascular damage or intramural haemorrhage. In the chronic stage, the majority of acute LGE had disappeared after PFA, whereas most LGE persisted after thermal ablation. The maximum strain on PV antra, the LA expansion index, and LA active emptying fraction declined acutely after both PFA and thermal ablation but recovered at the chronic stage only with PFA.



Conclusion

Pulsed field ablation induces large acute LGE without microvascular damage or intramural haemorrhage. Most LGE lesions disappear in the chronic stage, suggesting a specific reparative process involving less chronic fibrosis. This process may contribute to a preserved tissue compliance and LA reservoir and booster pump functions.

PULSED FIELD ABLATION



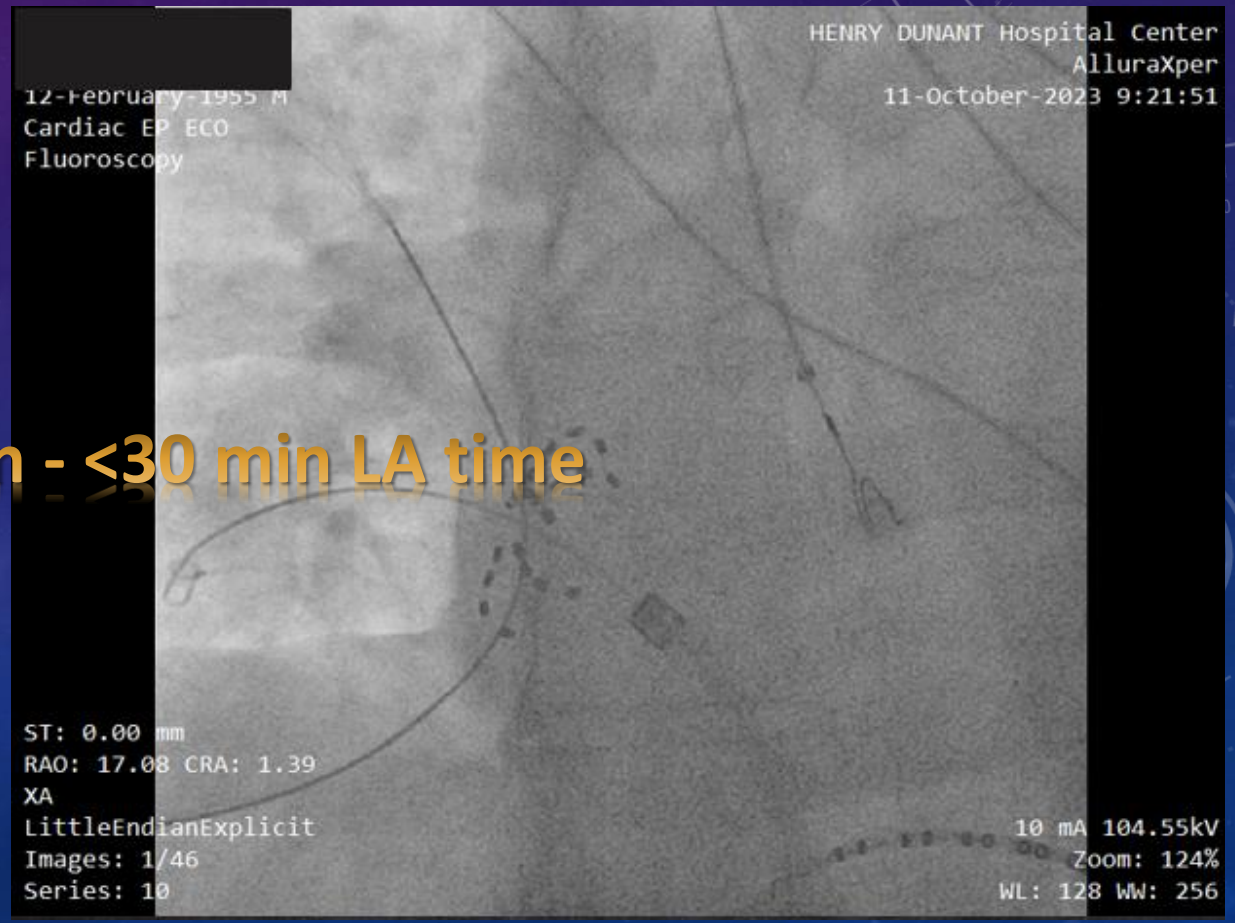
- Cell membrane damage through DC current ("irreversible electroporation")
  - Non-thermal ablation
  - Voltage-mediated tissue selectivity observed
- Early data indicates sparing of esophagus and phrenic nerve

Reddy VY, et al. JACC 2019: 74(3):315-26

3. Ταχύτητα

Ασθενής 60 ετών, ναυτικός, χωρίς οργανική καρδιοπάθεια με ΑΚ=42, προσήλθε με ΚΜ πιθανώς από έτους

Ασθενής 68 ετών, παχύσαρκος (130 Kg), χωρίς οργανική καρδιοπάθεια με ΑΚ=48, προσήλθε με ΚΜ από έτους. Εμμένουσα κολπική μαρμαρυγή το 2018.



55 min total duration - <30 min LA time

Αρχείο Γ.Ανδρικόπουλου, 11 Οκτωβρίου 2023

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Pulsed Field or Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation

The **ADVENT** trial was a multicenter, randomized, noninferiority, single-blind, pivotal trial with blinded end-point adjudication. A total of 305 patients were assigned to undergo pulsed field ablation, and 302 were assigned to undergo thermal ablation. At 1 year, the primary efficacy end point was met (i.e., no events occurred) in 204 patients (estimated probability, 73.3%) who underwent pulsed field ablation and 194 patients (estimated probability, 71.3%) who underwent thermal ablation.

TREATMENT CHARACTERISTICS

The mean (±SD) total procedure time was 105.8±29.4 minutes for patients who underwent pulsed field ablation and 123.1±42.1 minutes for patients who underwent thermal ablation. The mean fluoroscopy time was 21.1±11.0 minutes for patients who underwent pulsed field ablation and 13.9±12.8 for patients who underwent thermal ablation (Fig. S4 and Table S10). The overall

Reddy VY, et al. Pulsed Field or Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation. N Engl J Med. 2023

10.4.5 - Rhythm Control, Catheter Ablation

Pulsed-field ablation versus single catheter high-power short-duration radiofrequency ablation for atrial fibrillation: procedural characteristics, myocardial injury and midterm outcomes

Mr Weidlich S; Mr Serban T; Doctor Krisai P; Mr Spiess F; Mr Voellmin G; Professor Osswald S; Doctor Knecht S; Professor Sticherling C; Professor Kuehne M; Doctor Badertscher P.

University Hospital Basel, Basel, Switzerland

Funding Acknowledgements: Type of funding sources: None.

Background: Pulsed-field ablation (PFA) has emerged as a novel treatment strategy for patients with atrial fibrillation (AF). A direct comparison to high-power short-duration (HPSD) radiofrequency (RF) ablation using a single catheter is lacking.

Aim: To compare pulmonary vein isolation (PVI) using PFA versus single catheter HPSD-RF ablation regarding efficiency, safety, myocardial injury, and outcomes.

Methods: 119 patients underwent PVI and were included (age 65.6 ± 10 years, ejection fraction 0.55 ± 0.11, left atrial size 41 ± 6.6 mm, paroxysmal AF 55%). 56 patients (47%) underwent PFA using a multi-electrode pentaspline PFA catheter with a biphasic waveform and 63 patients (53%) underwent single catheter HPSD-RF ablation without a multipolar mapping catheter.

Results: Using PFA the median procedure time was significantly shorter compared to the single catheter HPSD-RF group with 58 (IQR 51-70) min versus 83 (IQR 71-99) min (p<0.001), while fluoroscopic time was significantly longer with 12 (IQR 10-16) min versus 2.2 (IQR 1.3-3.6) min (p<0.001). First-pass isolation was achieved in 91% of the PFA group and 88% in the HPSD-RF group. 3.3 catheters vs. 1.0 catheters were used in the PFA group versus the HPSD-RF group, p<0.01. One procedural complications was observed in the PFA group and one complication in the HPSD-RF group (Tamponades). High sensitivity cardiac troponin levels were on average significantly higher in patients using the PFA system, 1520 (IQR 1010-1980) ng/l compared to 897 (IQR 725-1240) ng/l in the HPSD-RF group. During a median follow-up of 177 days (IQR 92-300), AF recurrence was observed in five patients (9%) from the PFA group and in 15 patients (24%) from the HPSD-RF group. (Figure 1)

Conclusion: PFA showed shorter procedure times but longer fluoroscopy times, higher levels of hs cTnT, and a possible improved AF-free survival.

	PFA, n=56	HPSD-RF, n=63
Procedure duration (min)	58 (IQR 51-70)	83 (IQR 71-99)
Fluoroscopy time (min)	12 (IQR 10-16)	2.2 (IQR 1.3-3.6)
First pass isolation, n(%)	91%	88%
Postoperative Troponin ng/l	1520 (IQR 1010-1980)	897 (IQR 725-1240)
AF recurrence, n(%)	5 (9%)	15 (24%)

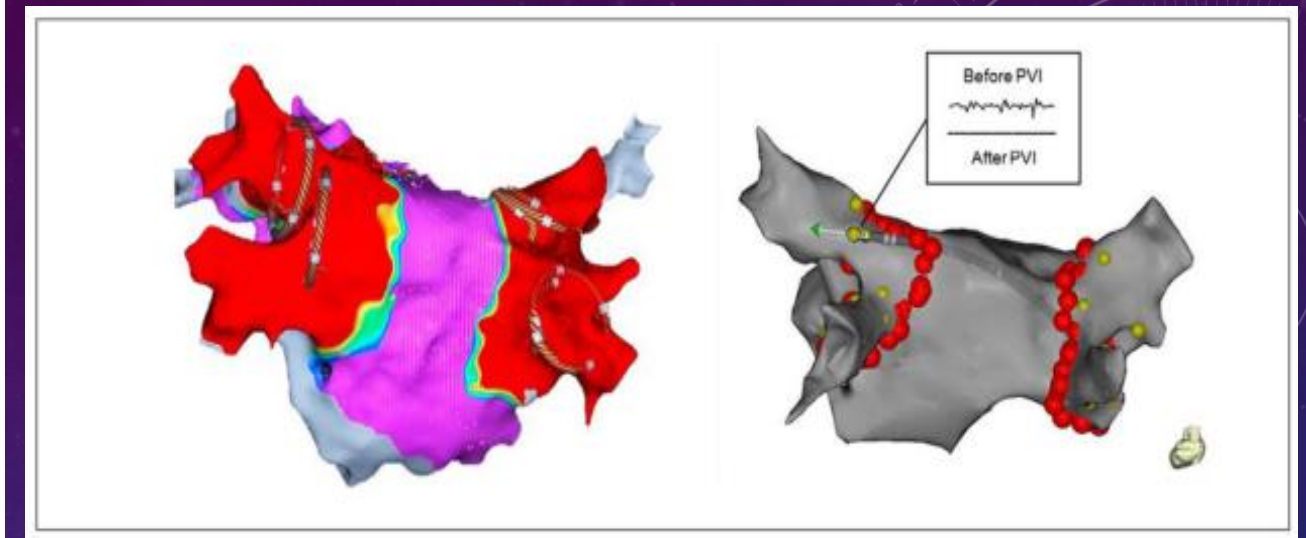


Figure 1: left: 3D-electroanatomic map after pulsed field ablation. The position of the ablation catheter is depicted. Right: 3D-electroanatomic map after high-power short-duration radiofrequency ablation. The ablation catheter is positioned in the upper pulmonary vein.

UNIKLINIK KÖLN | Heart Center University of Cologne

Comparison of Pulsed Field Ablation vs. High Power Short Duration-Ablation for Pulmonary Vein Isolation

J. Wörmann, J. Schipper, J. Lüker, J. van den Bruck, K. Filipovic, S. Erthöfer, F. Pavel, C. Schaufen, S. Dittrich, D. Steven, A. Sultan

University of Cologne - Heart Center, Department of Electrophysiology

Background

PVI using non-thermal Pulsed Field Ablation (PFA) is a promising technology to achieve fast PVI with high success rates. High Power Short Duration (HPSD) RF-ablation using a protocol of 70W and 7s; posterior wall 5s has shown promising results compared to standard RF-ablation. Data comparing PFA to HPSD is missing.

Objectives

We investigated success-rates and feasibility of PFA in comparison to HPSD in the clinical setting in patients suffering from PAF and persAF.

Methods

- PAF and persAF patients undergoing de-novo PVI receiving PFA were matched to patients undergoing HPSD-PVI
- 12-month follow-up: 48h Holter-ECG, 12-lead ECG, app-based telemonitoring and device interrogation

Results

- 114 pts (57 PFA; 57 HPSD); no significant differences in baseline parameters (67±13 years, 63% women)
- Follow-up: Median 125 days [92-295 days]
- 30% PAF, 70% persAF in both groups
- Shorter procedure duration in PFA, less fluoroscopy in HPSD (Figure 1)
- Similar arrhythmia-free survival after FU (Figures 2 and 3)

	PFA (n=57)	HPSD (n=57)	p-value
Complications overall [%]	2 [3.5%]	3 [5.2%]	1
Bleedings [%]	0 [0%]	2 [2.4%]	0.496
PV stenosis [%]	0 [0%]	1 [1.8%]	1
Tamponade [%]	2 [3.5%]	0 [0%]	0.496
Death [%]	0 [0%]	0 [0%]	1

Table 1: Procedural data of PFA and HPSD-patients. Tamponades were not device related. PV stenosis was clinically not significant.

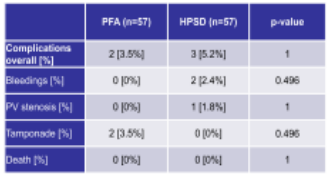


Figure 2: Outcome data of PFA and HPSD-patients. Median Follow-Up was 125 days.

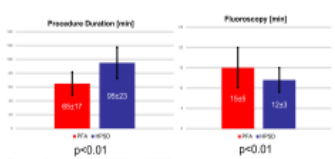


Figure 1: Procedural data of PFA and HPSD-patients.

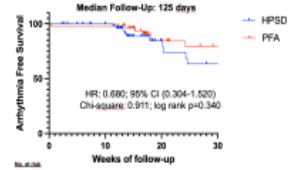
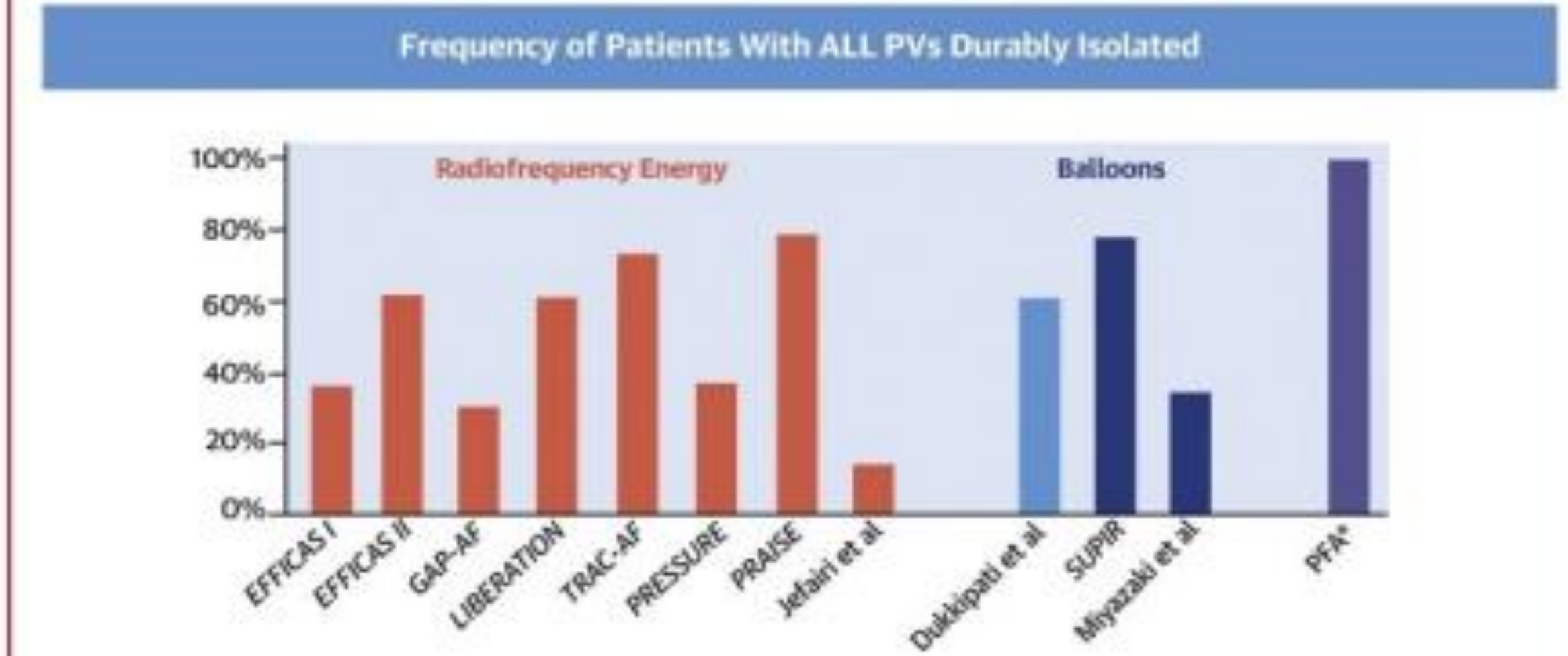


Figure 3: Kaplan-Meier-analysis showing arrhythmia-free survival during follow-up in PFA and HPSD pts.

Conclusions

PFA and HPSD seem to be highly effective and safe to achieve PVI in the setting of PAF and persAF with comparable arrhythmia free survival. However, procedure duration for PFA-PVI is significantly shorter and therefore may be of potential benefit.

4. Αποτελεσματικότητα Απομόνωσης ΠΦ



Reddy, V.Y. et al. J Am Coll Cardiol. 2019;74(3):315–26.

Repeat catheter ablation for recurrent atrial fibrillation: Electrophysiologic findings and clinical outcomes

[1]Division of Cardiology, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA

[2]Department of Biostatistics, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland, USA

- 300 patients who underwent their first repeat AF ablations for symptomatic, recurrent AF
- All repeat ablations were performed using RF energy, 78% RF for 1st ablation
- 67% at SR before repeat ablation

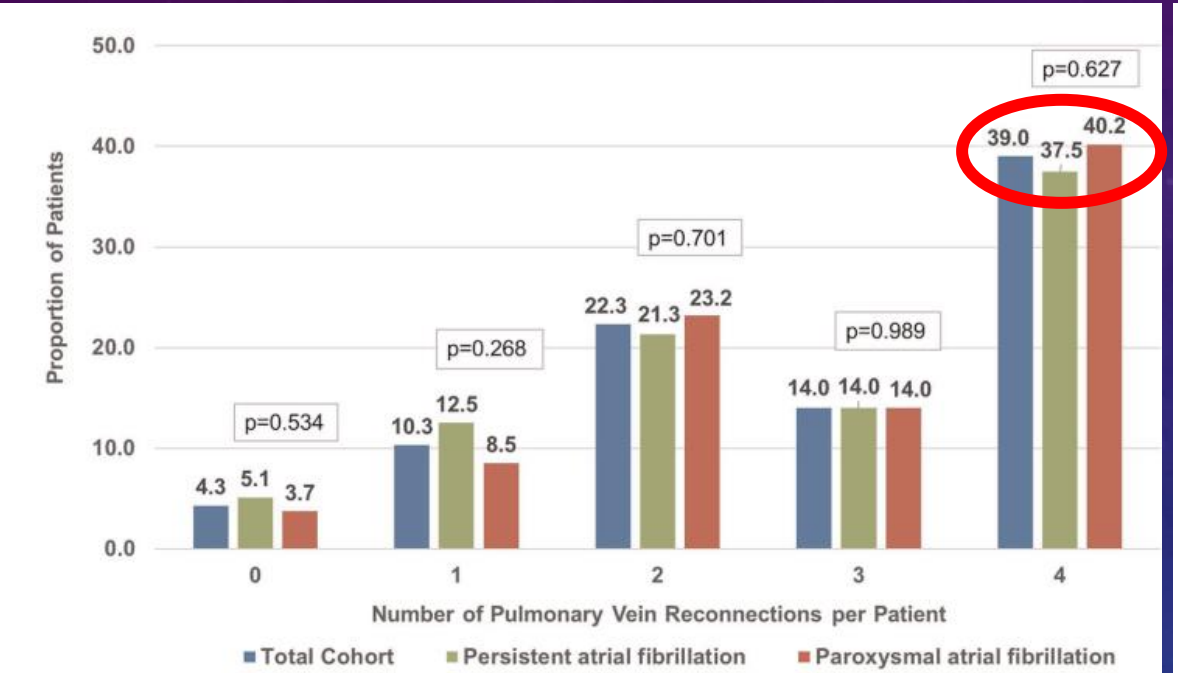


FIGURE 1 Number of pulmonary vein reconnections per patient discovered during repeat ablation for all patients and stratified by persistent versus paroxysmal atrial fibrillation at presentation for repeat ablation

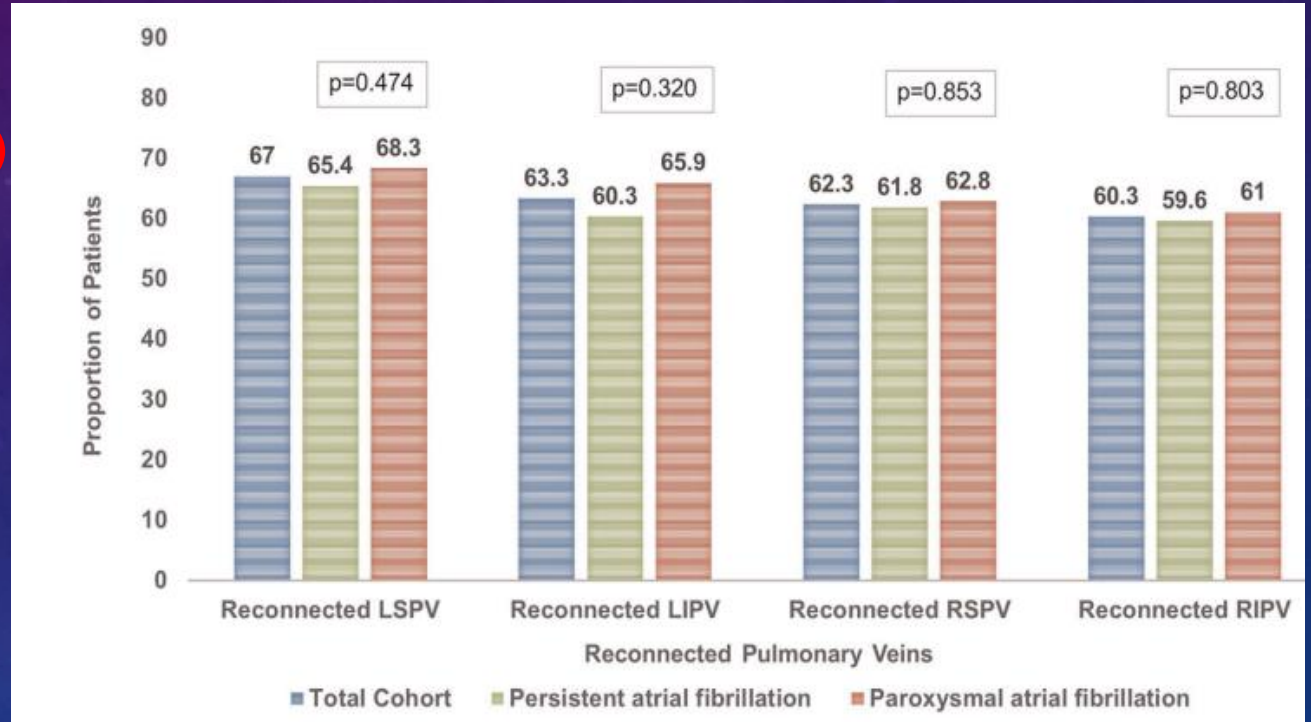


FIGURE 2 Anatomic distribution of pulmonary vein reconnections discovered during repeat ablation

"During repeat ablation, at least one PV reconnection was found in 257 (85.6%) patients, while 159 (53%) had three to four reconnections"

Daimee UA, et al. Akhtar T, Boyle TA, Jager L, Arbab-Zadeh A, Marine JE, Berger RD, Calkins H, Spragg DD. Repeat catheter ablation for recurrent atrial fibrillation: Electrophysiologic findings and clinical outcomes. J Cardiovasc Electrophysiol. 2021 Mar;32(3):628-638.

4. Αποτελεσματικότητα κατάλυσης οπισθίου τοιχώματος ΑΚ

Journal of Clinical Medicine
MDPI

Review

Persistent Atrial Fibrillation: The Role of Left Atrial Posterior Wall Isolation and Ablation Strategies

Riyaz A. Kaba [1,2,*], Aziz Momin [1,2] and John Camm [1]

"Myocytes within the left atrial posterior wall have unique electrophysiological proper- ties that may be intrinsically suited to initiate or sustain AF. These cells are characterised by having larger late sodium currents and smaller potassium currents [23]. The intracellular calcium transient and content within the sarcoplasmic reticulum are high. In effect, the cells of the posterior wall have
(I) a low resting membrane potential;
(ii) short action potential duration;
(iii) the shortest refractory period of any cell in the heart."

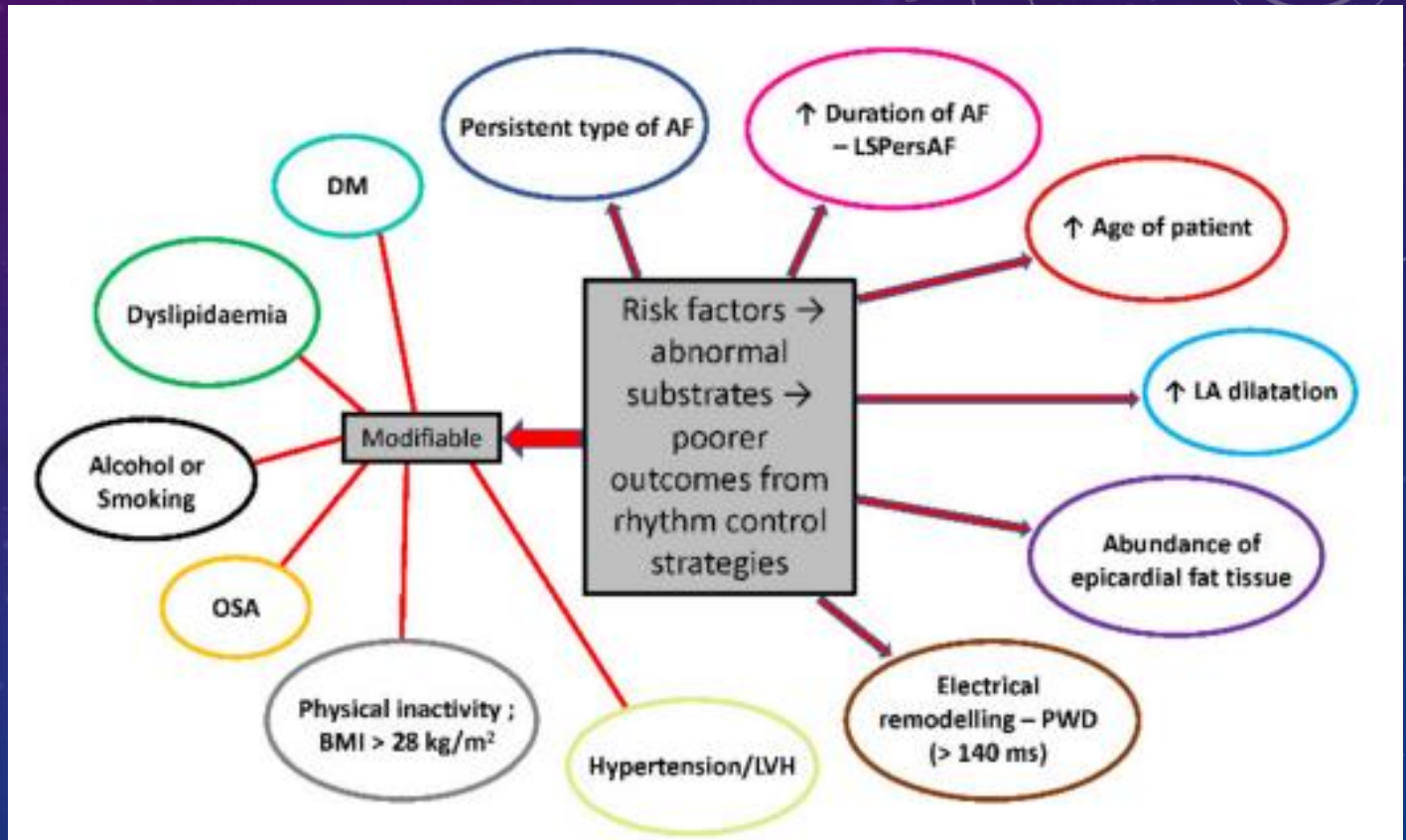


Figure 1. Risk factors for perpetuation of AF. Modifiable risk factors are highlighted separately. LSPersAF, long-standing persistent AF; LA, left atrium; PWD, p-wave duration; LVH, left ventricular hypertrophy; BMI, body mass index; OSA, obstructive sleep apnoea; DM, diabetes mellitus.

J. Clin. Med. 2021, 10, 3129. https://doi.org/10.3390/jcm10143129

Journal of *Clinical Medicine*

MDPI

Review

Persistent Atrial Fibrillation: The Role of Left Atrial Posterior Wall Isolation and Ablation Strategies

Riyaz A. Kaba [1,2,*], Aziz Momin [1,2] and John Camm [1]

Table 2. Posterior wall (PW) connection rates in studies comparing pulmonary vein isolation (PVI) to PVI + PW isolation.

Study	Posterior Wall Strategy	Follow-Up Time	Population Evaluated for Reconnection	Reconnection Rates in PW Ablation Group
Bai et al. 2016	Debulking with RF	3-months	All patients	37.5% [1]
Lee et al. 2015	Linear ablation with RF	16.2 ± 8.8 months	Recurrent patients	50%
Tamborero et al. 2009	Linear ablation with RF	9.8 ± 4.3 months	Recurrent patients	67%
Tokioka et al. 2020	Linear ablation with RF	1–6 months	Recurrent patients	65.2%

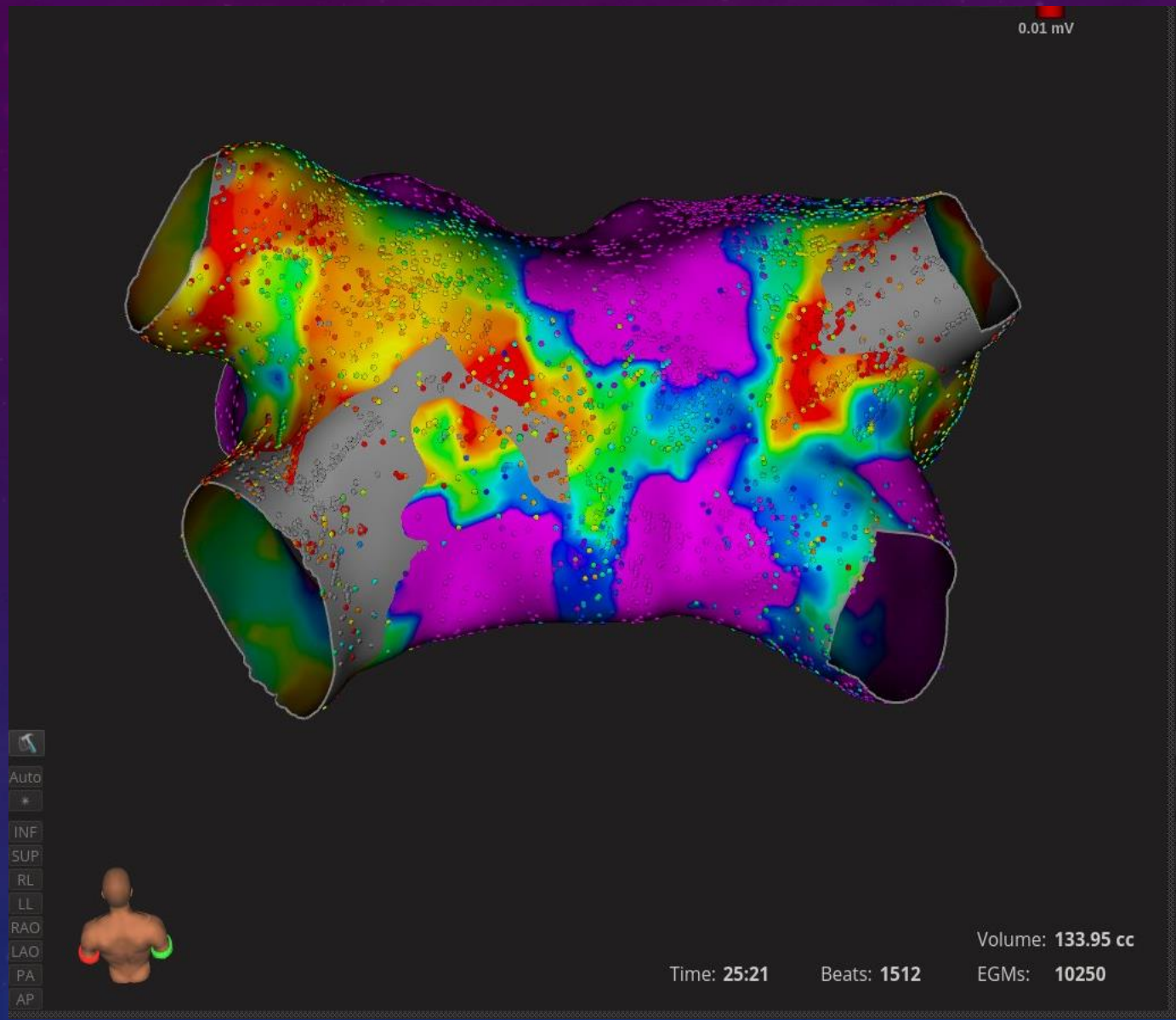
[1] Includes pulmonary vein and PW reconnections; PVI: pulmonary vein isolation; PW: posterior wall; RF: radiofrequency.

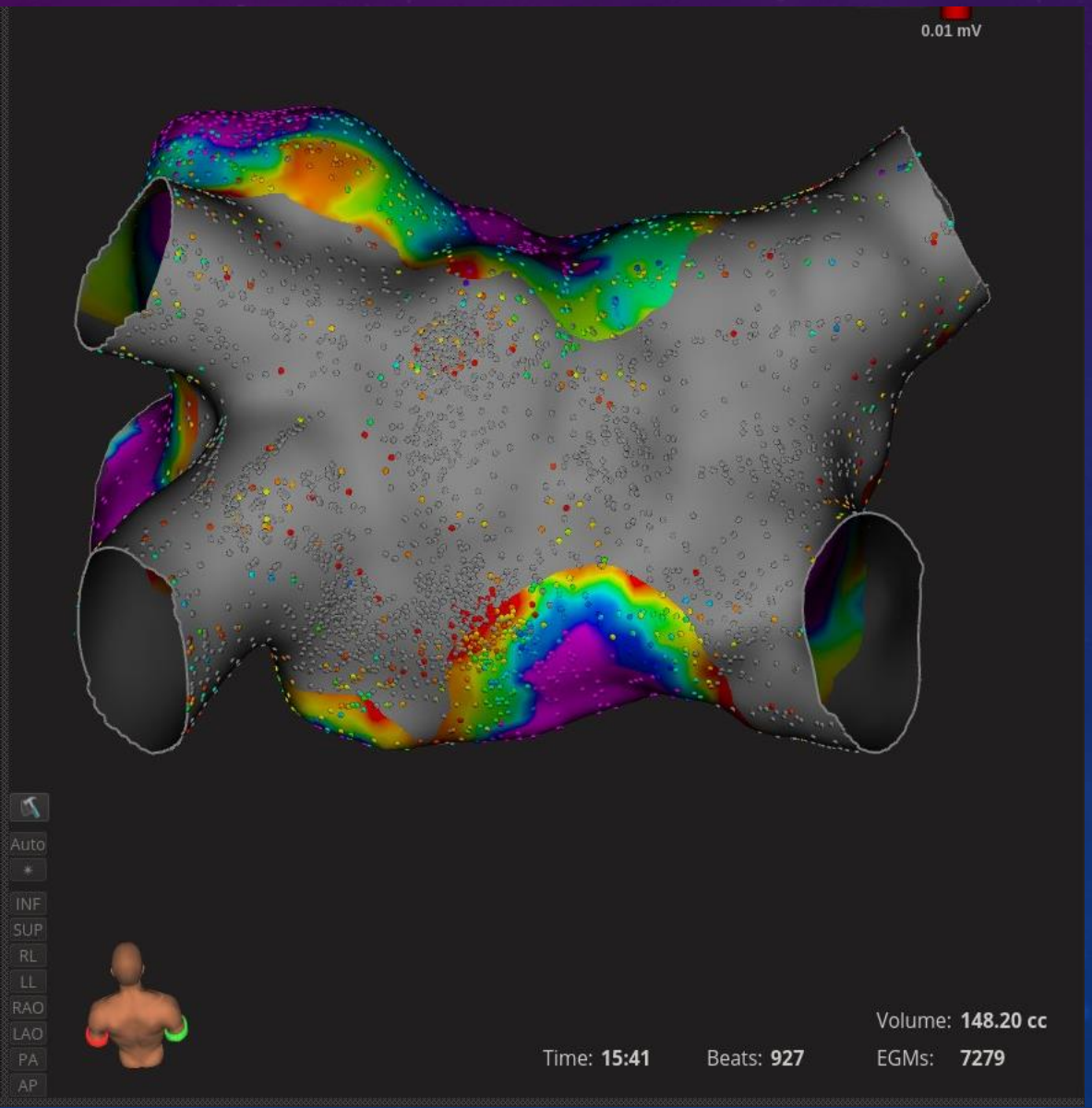
"Evidence of endocardial–epicardial dissociation in atrial fibrillation may also limit the effectiveness of endocardial posterior wall isolation, especially when considered in the context of suboptimal transmurality. Endocardial–epicardial dissociation, as evidenced by asynchronous activation of the epicardial and endocardial surfaces, was initially demonstrated in animal [50] and computational models [51]. More recently, real-time mapping has shown there may be up to 50–55% asynchronous activation between the epicardial and endocardial surfaces in patients with AF"

J. Clin. Med. 2021, 10, 3129. https://doi.org/10.3390/jcm10143129

Ασθενής 52 ετών, απουσία οργανικής καρδιοπάθειας, συχνά επεισόδια ρυθμικής ταχυκαρδίας τελευταίο 6μηνο

AF ablation 2016 (cryo – άλλο κέντρο) - AF ablation 2019 (RF Rhythmia – Ερρίκος Ντυνάν)





Ερρίκος Ντυνάν Hospital Center, Νοέμβριος 2022

EP CASE EXPRESS

https://doi.org/10.1093/europace/euac113

Unexpected fused posterior wall lesions after pulsed-field pulmonary vein isolation

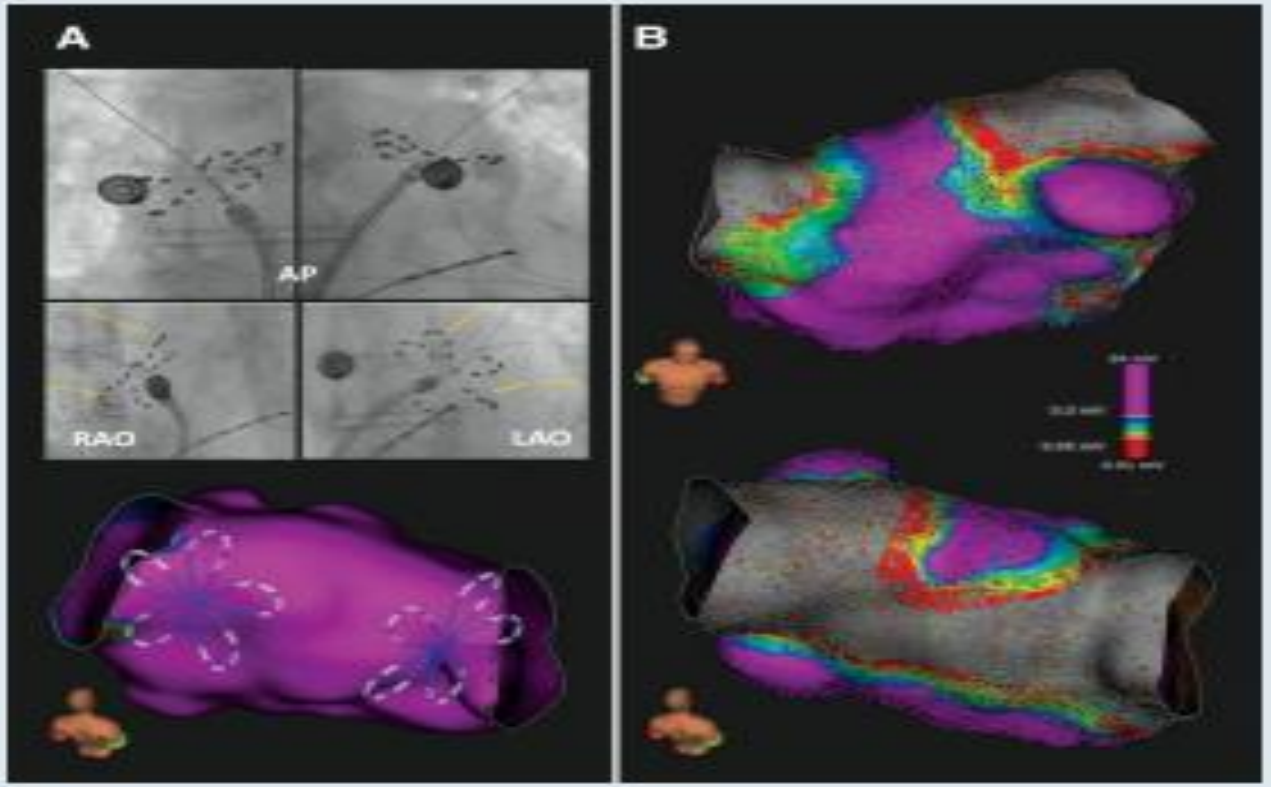
Vincenzo Miraglia, Felicia Lipartiti, Alvise Del Monte, Gian-Battista Chierchia, Carlo de Asmundis, and Erwin Ströker *

Heart Rhythm Management Centre, Postgraduate Course in Cardiac Electrophysiology and Pacing, European Reference Networks Guard-Heart, Vrije Universiteit Brussel, Universitair Ziekenhuis Brussel, Brussels, Belgium

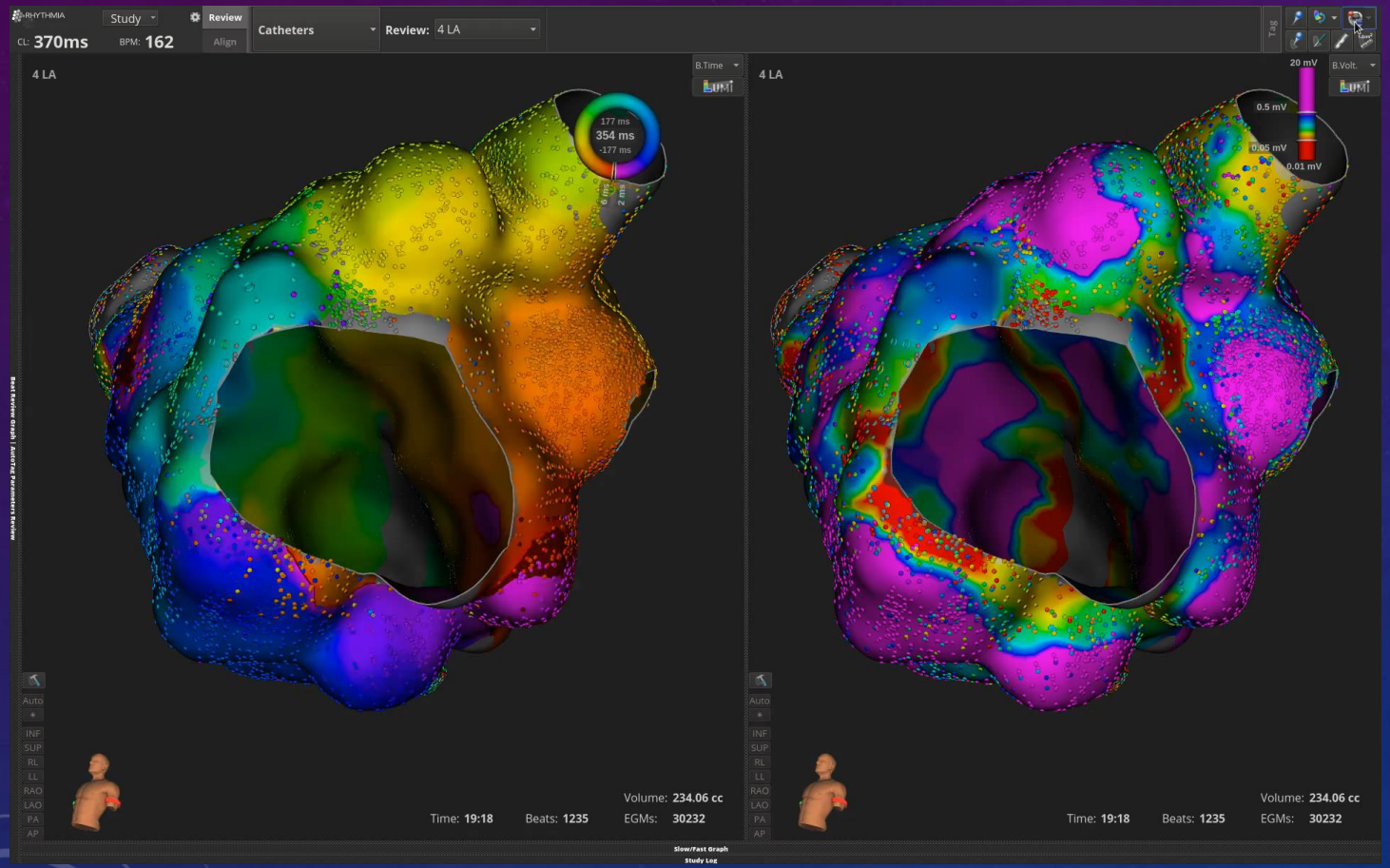
*Corresponding author. Tel: +32 24776009; Fax: +32 24776851, *E-mail address*: erwin.stroker@uzbrussel.be

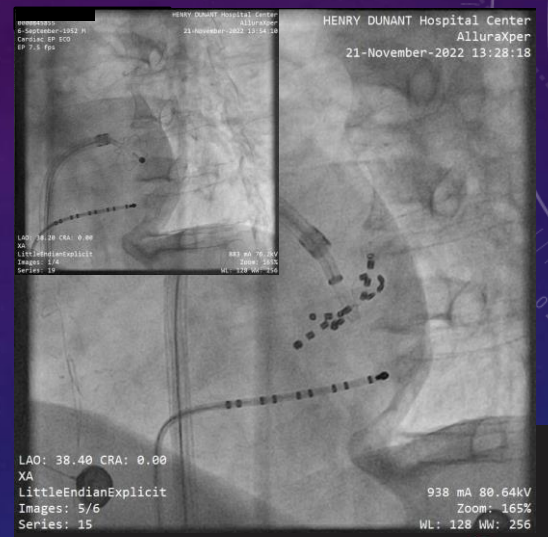
We present the case of a 55-year-old patient with paroxysmal atrial fibrillation referred for pulmonary vein isolation (PVI) by means of pulsed-field ablation (PFA). Based on preprocedural imaging (computed tomography) showing a bilateral common ostium (CO) as PV variant, the larger penta-spline PFA catheter measuring 35 mm was selected for ablation. Bilaterally, acute PVI was observed during the first applications at the CO wiring the superior branches. Overall, eight application pairs were delivered with four pairs per CO (two pairs wiring superior and inferior branches, respectively, 'basket' and 'flower petal' deployment pose per pair). Pre- and post-ablation 3D ultra-high-density voltage map of the left atrium was acquired with a 64-pole basket mapping catheter (Orion). The post-ablation map confirmed acute PVI, but showed unexpected fused lesions on the lower posterior wall (PW) in addition (*Panel B*). Although the PFA applications were intentionally delivered for PVI, the finding of extended PW lesions may be explained by the larger sized PFA catheter, the relatively shorter posterior inter-venal distance (although still 39 mm), but clearly also by the unique property of PF technology to obtain tissue lesions not necessarily through high catheter contact, but also in the proximity of the tissue–electrodes interface.

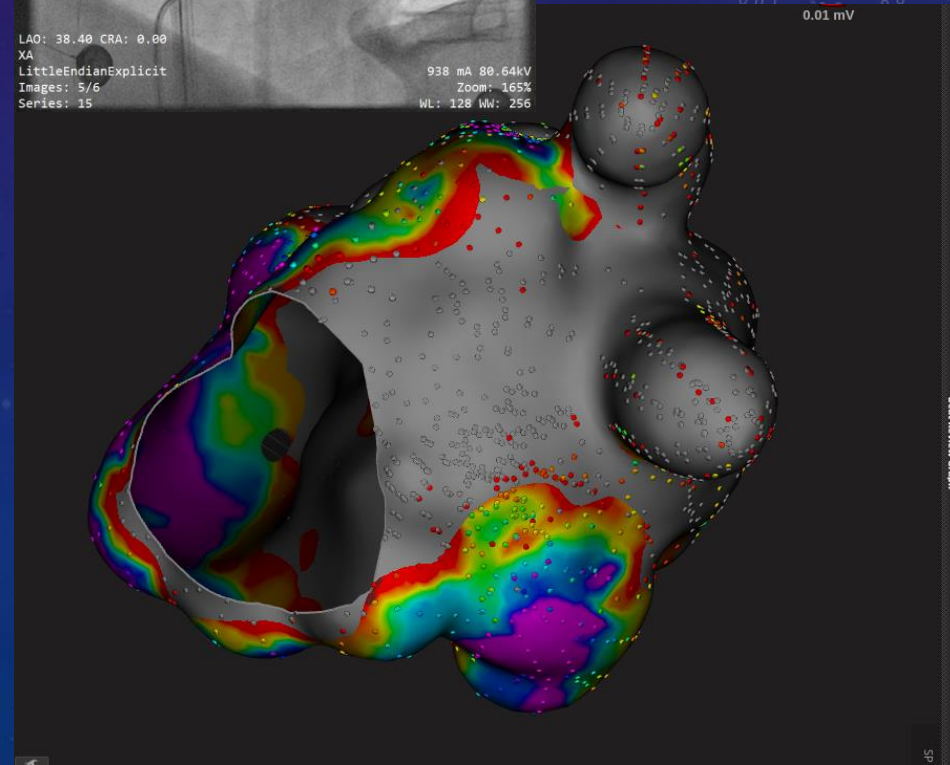
The full-length version of this report can be viewed at: https://www.escardio.org/Education/E-Learning/Clinical-cases/Electrophysiology.



ΜΕ ΤΟ PFA ΜΠΟΡΟΥΜΕ ΝΑ....

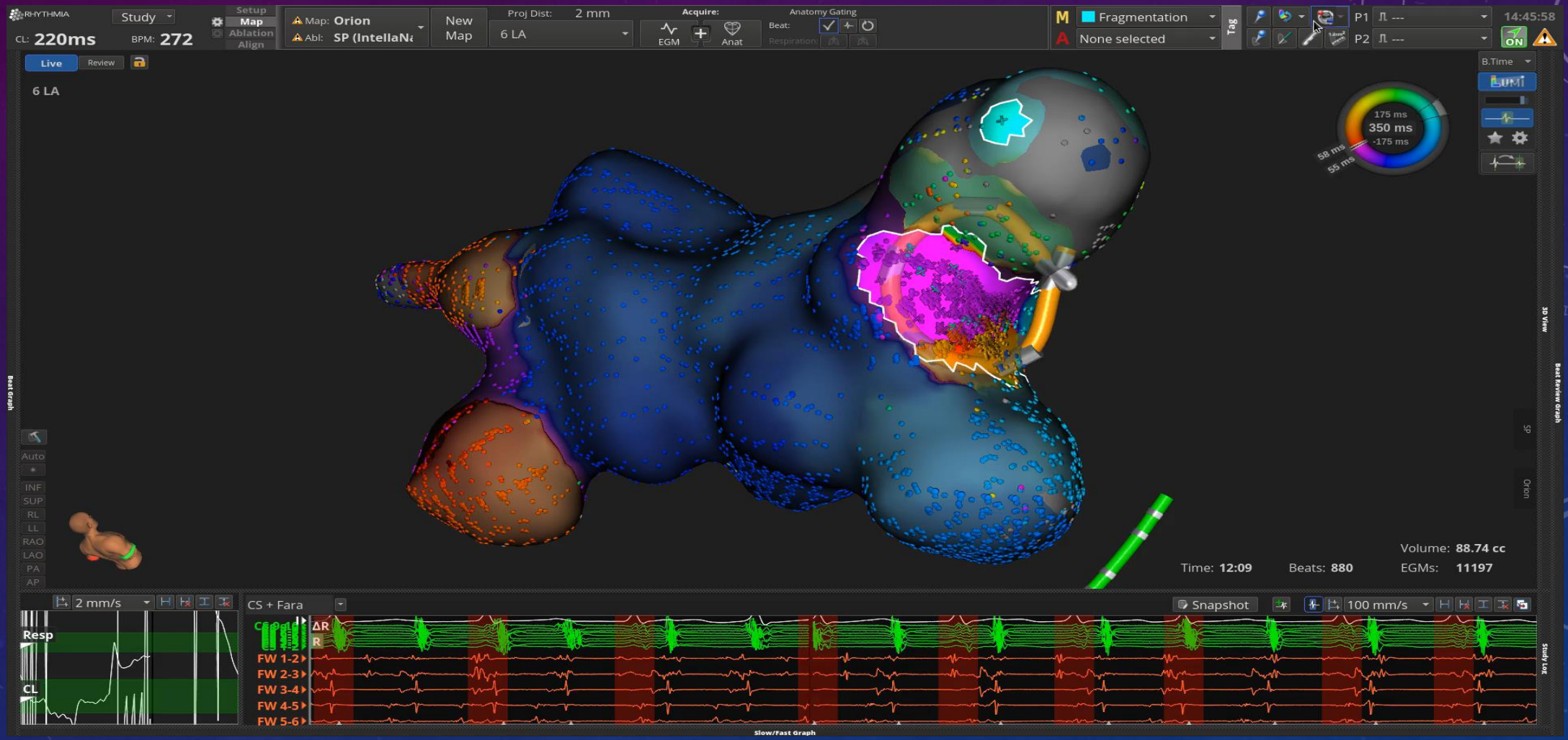






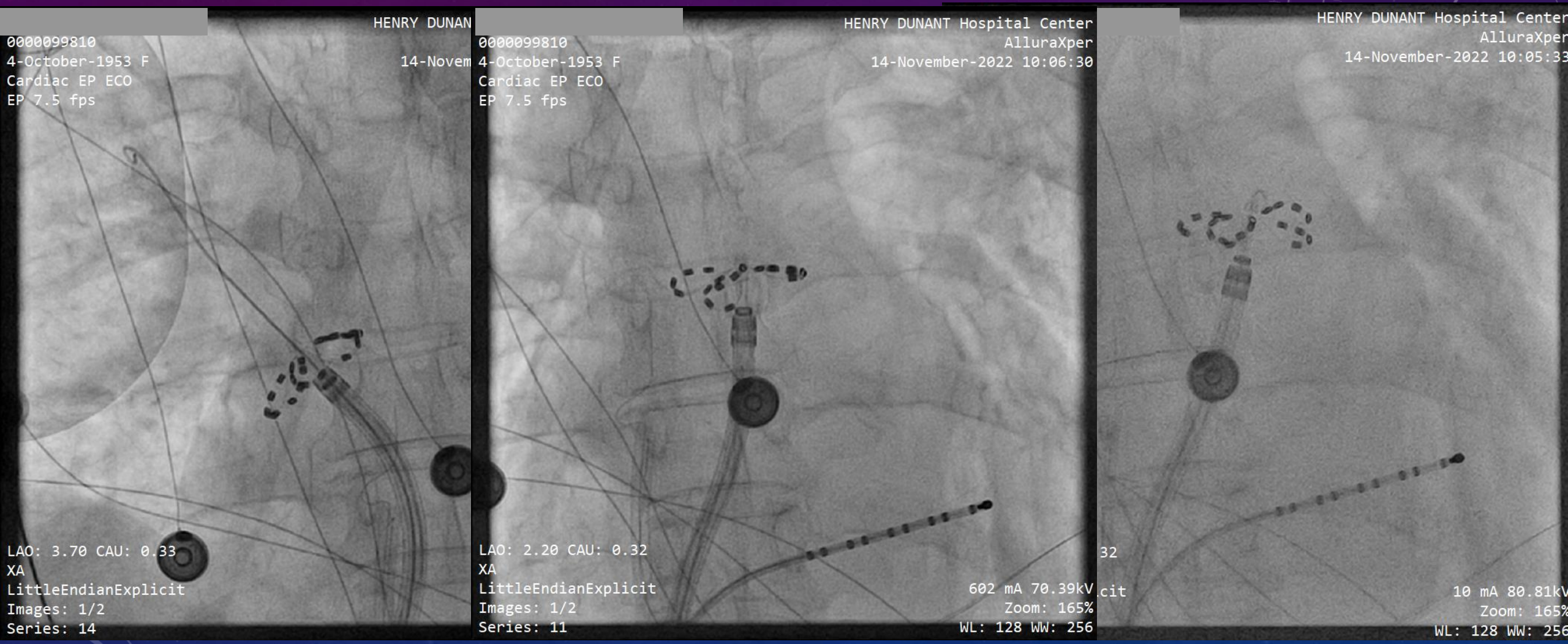
Ερρίκος Ντυνάν Hospital Center, Νοέμβριος 2022

Ασθενής 61 ετών, ιατρός, προσέρχεται λόγω πολλαπλών κρίσεων κολπικής ταχυκαρδίας και κολπικής μαρμαρυγής μετά από RF ablation



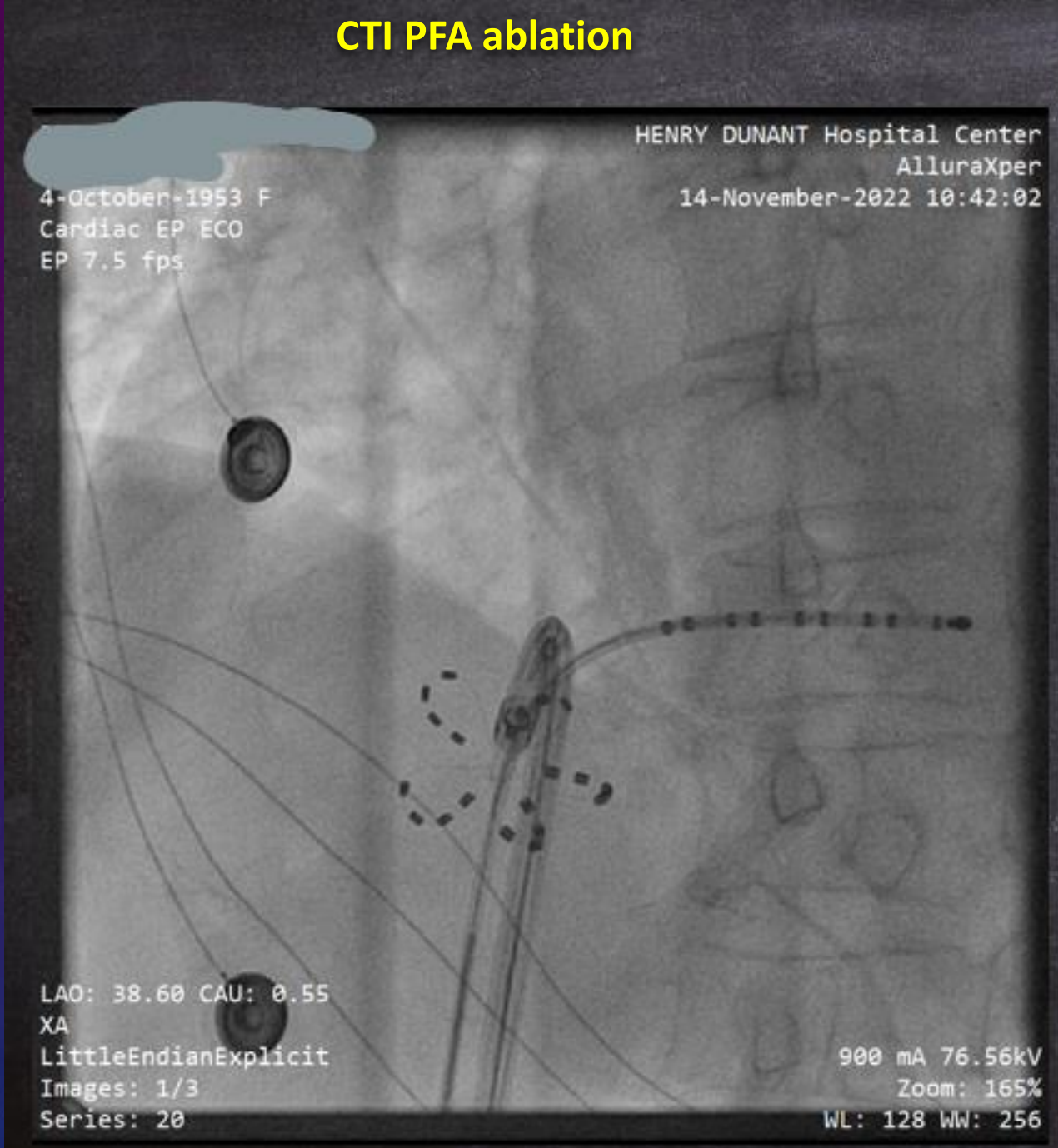
Αρχείο Γ.Ανδρικόπουλου, 2023

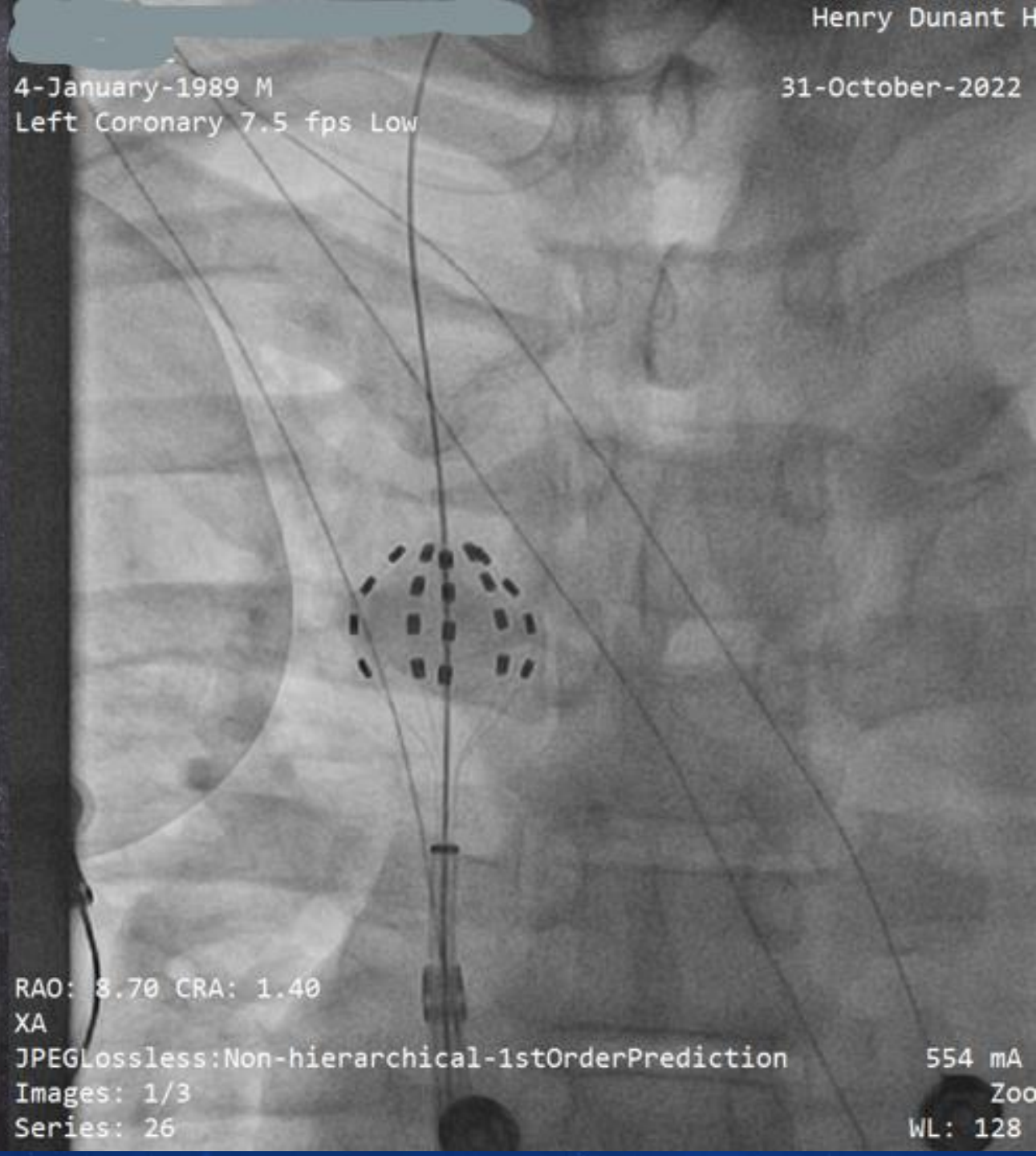
LA Roof “Line” with PFA



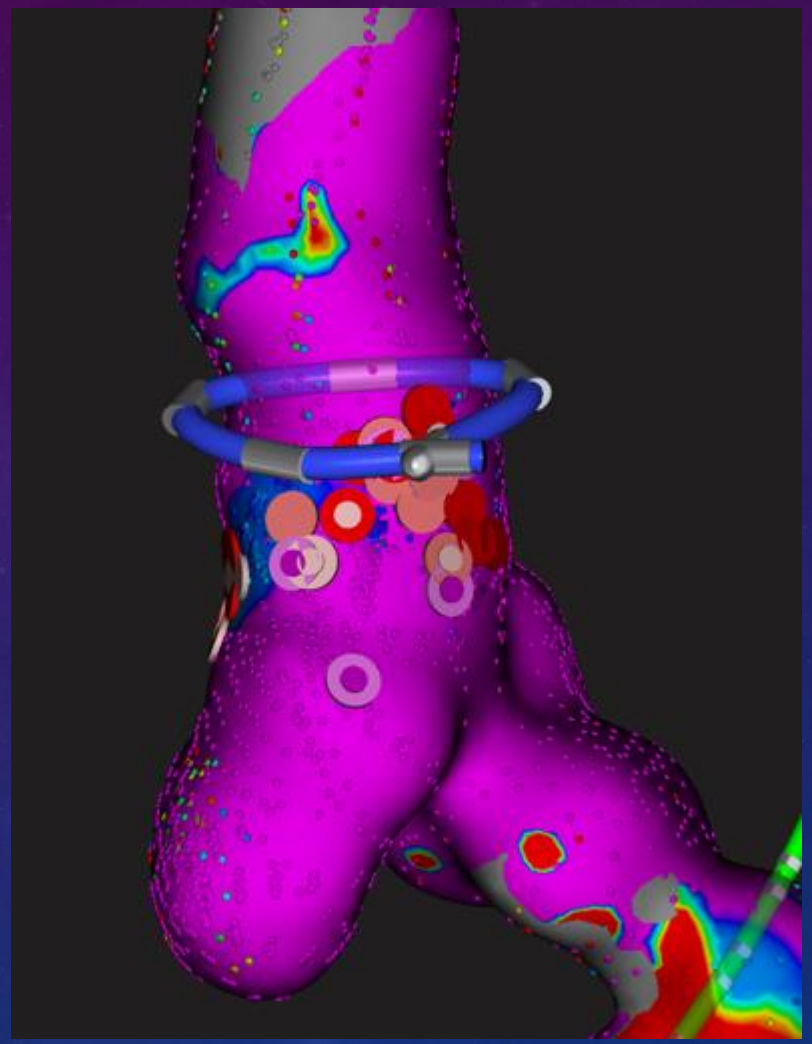
Αρχείο Γ.Ανδρικόπουλου, Νοέμβριος 2022

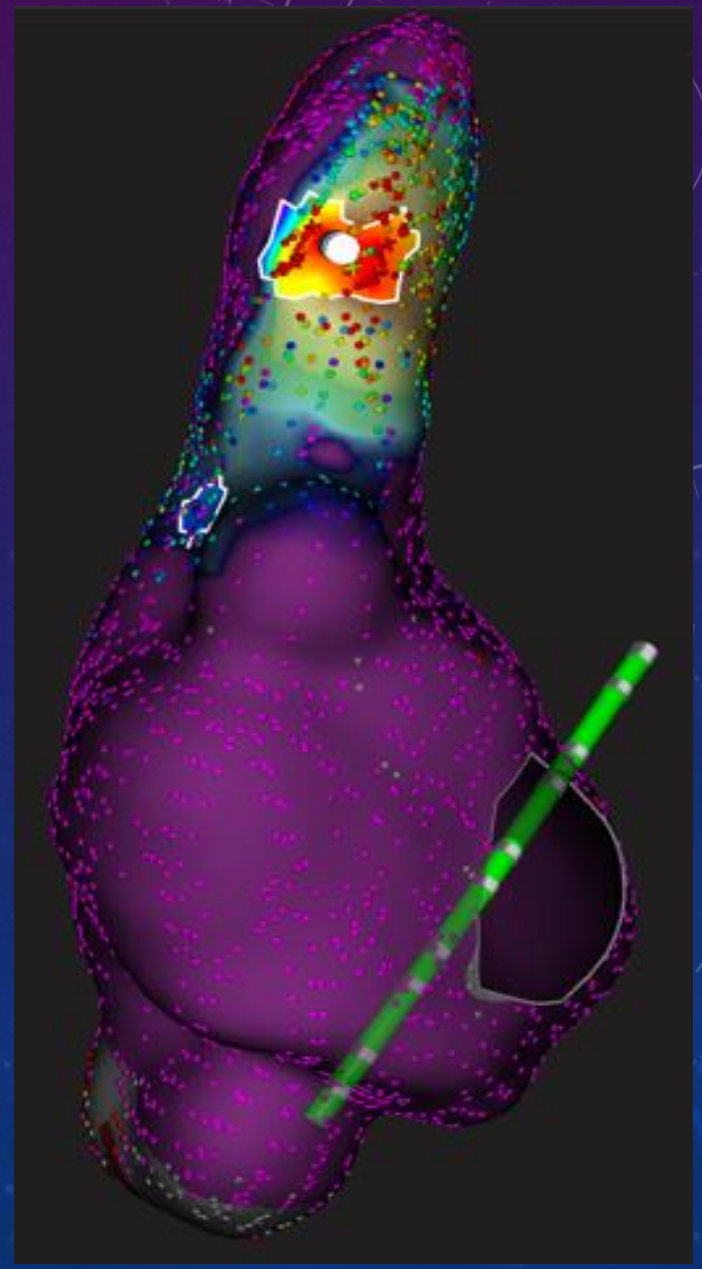
CTI PFA ablation





Ασθενής 40 ετών με συχνές κρίσεις NQRS ταχυκαρδίας που είχε χαρακτηριστεί «απρόσφορη φλεβοκομβική ταχυκαρδία κατά τη διάρκεια των πολλών νοσηλειών της



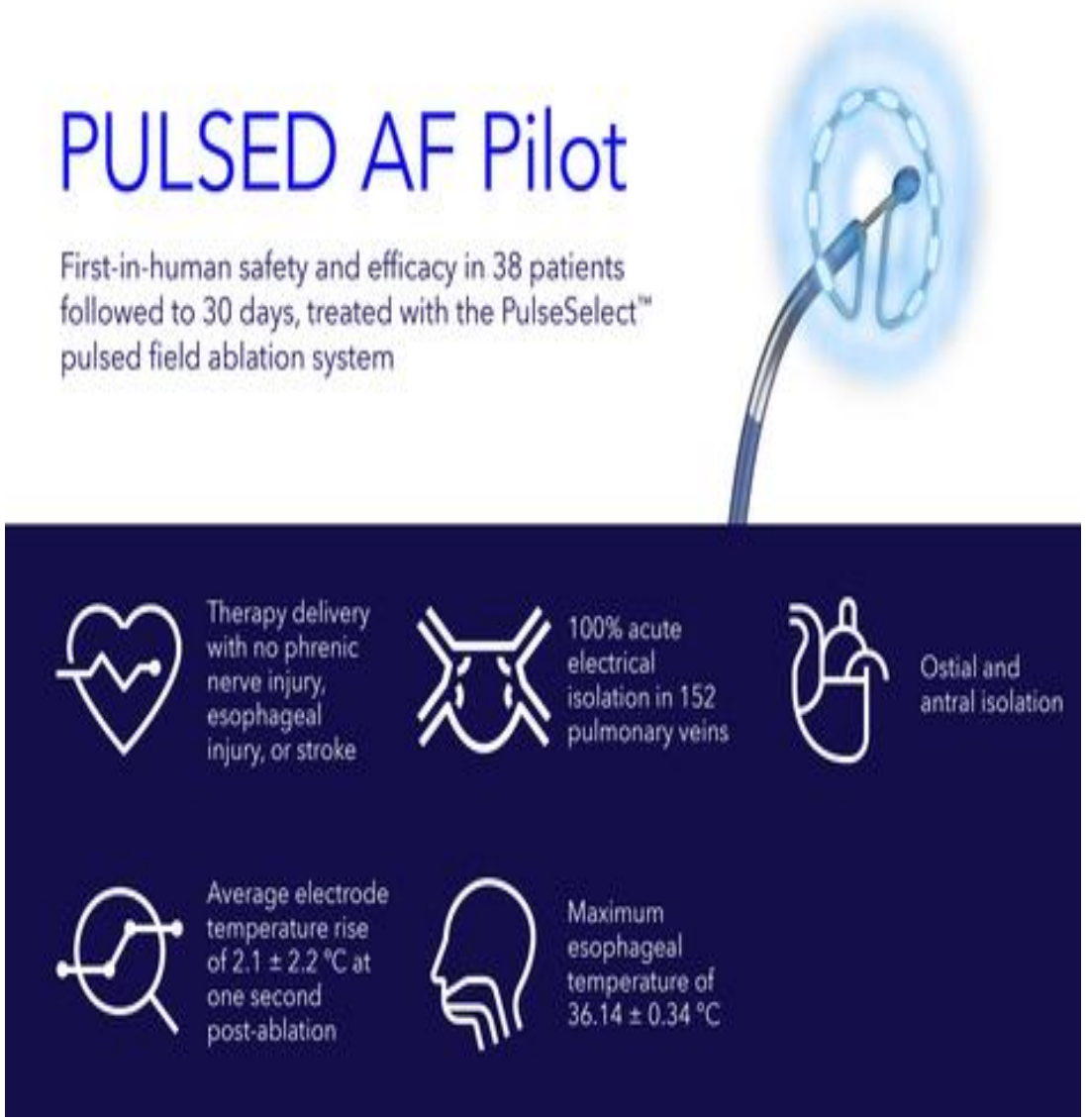


Ερρίκος Ντυνάν Hospital Center, Μάιος 2023

ΑΛΛΑ ΤΟ PFA ΑΠΑΙΤΕΙ….

- ✓ ΕΜΠΕΙΡΙΑ
- ✓ ΕΓΚΡΑΤΕΙΑ
- ✓ ΥΨΗΛΟΤΕΡΟ ΟΙΚΟΝΟΜΙΚΟ ΚΟΣΤΟΣ
- ✓ ΠΡΟΣΕΚΤΙΚΗ ΑΓΓΕΙΑΚΗ ΠΡΟΣΠΕΛΑΣΗ
- ✓ ΠΡΟΣΕΚΤΙΚΟ ΧΕΙΡΣΜΟ ΤΩΝ ΘΗΚΑΡΙΩΝ
- ✓ ΠΟΛΥ ΚΑΛΗ ΟΡΓΑΝΩΣΗ ΤΟΥ ΕΡΓΑΣΤΗΡΙΟΥ
- ✓ ΑΝΑΙΣΘΗΣΙΟΛΟΓΟ

Circulation: Arrhythmia and Electrophysiology



ORIGINAL ARTICLE

First-in-Human Experience and Acute Procedural Outcomes Using a Novel Pulsed Field Ablation System: The PULSED AF Pilot Trial

Atul Verma, MD; Lucas Boersma, MD; David E. Haines, MD; Andrea Natale, MD; Francis E. Marchlinski, MD; Prashanthan Sanders, MBBS; Hugh Calkins, MD; Douglas L. Packer, MD; John Hummel, MD; Birce Onal, PhD; Sofi Rosen, PhD; Karl-Heinz Kuck, MD; Gerhard Hindricks, MD; Bradley Wilsmore, MBBS

BACKGROUND: Pulsed field ablation (PFA) is a novel form of ablation using electrical fields to ablate cardiac tissue. There are only limited data assessing the feasibility and safety of this type of ablation in humans.

METHODS: PULSED AF (Pulsed Field Ablation to Irreversibly Electroporate Tissue and Treat AF; https://www.clinicaltrials.gov; unique identifier: NCT04198701) is a nonrandomized, prospective, multicenter, global, premarket clinical study. The first-in-human pilot phase evaluated the feasibility and efficacy of pulmonary vein isolation using a novel PFA system delivering bipolar, biphasic electrical fields through a circular multielectrode array catheter (PulseSelect; Medtronic, Inc). Thirty-eight patients with paroxysmal or persistent atrial fibrillation were treated in 6 centers in Australia, Canada, the United States, and the Netherlands. The primary outcomes were ability to achieve acute pulmonary vein isolation intraprocedurally and safety at 30 days.

RESULTS: Acute electrical isolation was achieved in 100% of pulmonary veins (n=152) in the 38 patients. Skin-to-skin procedure time was 160±91 minutes, left atrial dwell time was 82±35 minutes, and fluoroscopy time was 28±9 minutes. No serious adverse events related to the PFA system occurred in the 30-day follow-up including phrenic nerve injury, esophageal injury, stroke, or death.

CONCLUSIONS: In this first-in-human clinical study, 100% pulmonary vein isolation was achieved using only PFA with no PFA system–related serious adverse events.

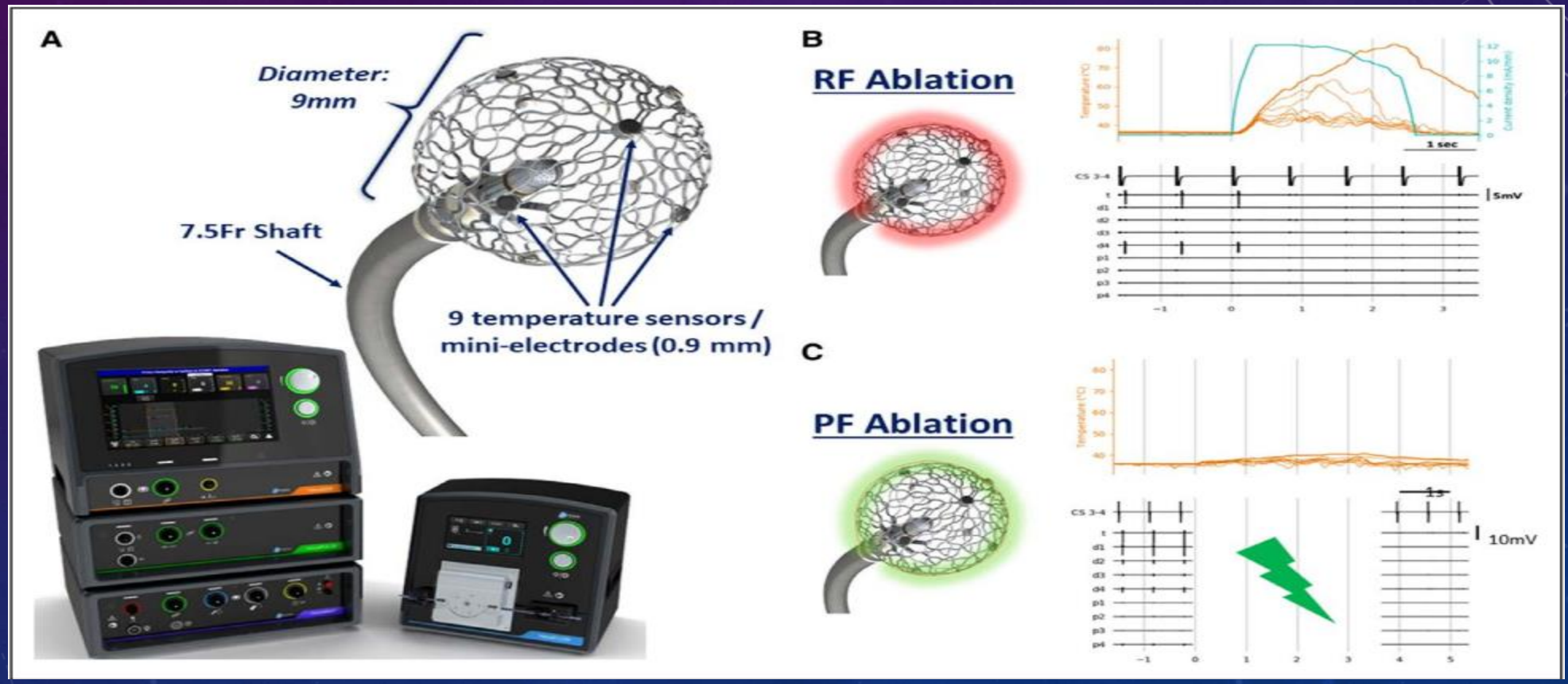
GRAPHIC ABSTRACT: A graphic abstract is available for this article.

Atul Verma et al. First-in-Human Experience and Acute Procedural Outcomes Using a Novel Pulsed Field Ablation System: The PULSED AF Pilot Trial, Circ Arrhythm Electrophysiol. 2022;15:e010168

ORIGINAL ARTICLE

Lattice-Tip Focal Ablation Catheter That Toggles Between Radiofrequency and Pulsed Field Energy to Treat Atrial Fibrillation

A First-in-Human Trial



Reddy Vivek et al. First-in-Human Experience and Acute Procedural Outcomes Using a Novel Pulsed Field Ablation System: The PULSED AF Pilot Trial, Circ Arrhythm Electrophysiol. 2022;15:e010168

ESC European Society of Cardiology
Europace (2023) 25, 1–11
https://doi.org/10.1093/europace/euad147

CLINICAL RESEARCH

Pulsed field ablation using focal contact force-sensing catheters for treatment of atrial fibrillation: acute and 90-day invasive remapping results

Ante Anić [1]*, Thomas Phlips [2], Toni Brešković [1], Pieter Koopman [2], Steven Girouard[3], Vikramaditya Mediratta [3], Zrinka Jurišić [1], Ivan Sikirić[1], Lucija Lisica [1], and Johan Vijgen [2]

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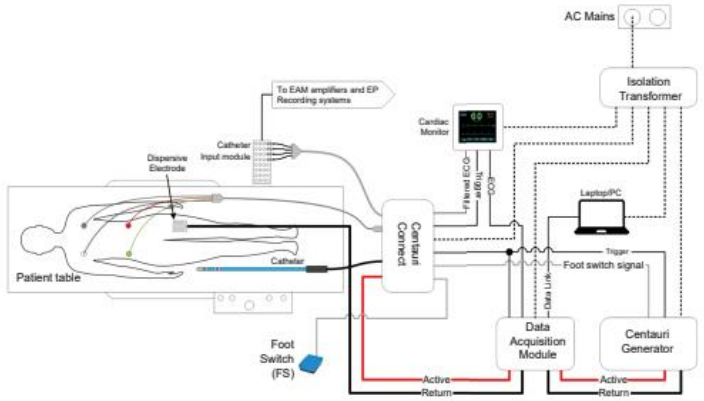


Figure 1 Configuration of the CENTAURI System in a standard EP laboratory. ECG, electrocardiogram; EP, electrophysiology.

Conclusion

ECLIPSE AF demonstrated that optimized PFA using the CENTAURI System with three commercial, contact force-sensing, solid-tip focal ablation catheters resulted in transmural lesion formation and high proportion of durable PVI with a favourable safety profile, thus providing a viable treatment option for AF that integrates with contemporary focal ablation workflows.

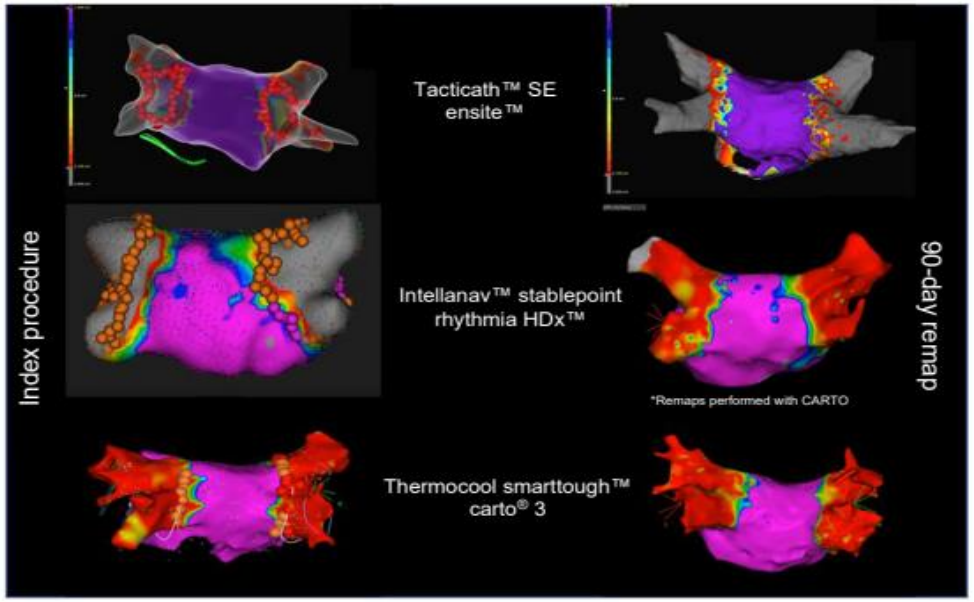


Figure 3 Acute PVI and 90-day chronic PVI durability were assessed using high-density remapping to verify entrance and/or exit block. Voltage maps correlated with placement of PEF applications, and 90-day remaps confirmed no degradation of the line of block created at the index procedure. PEF, pulsed electric field; PVI, pulmonary vein isolation.

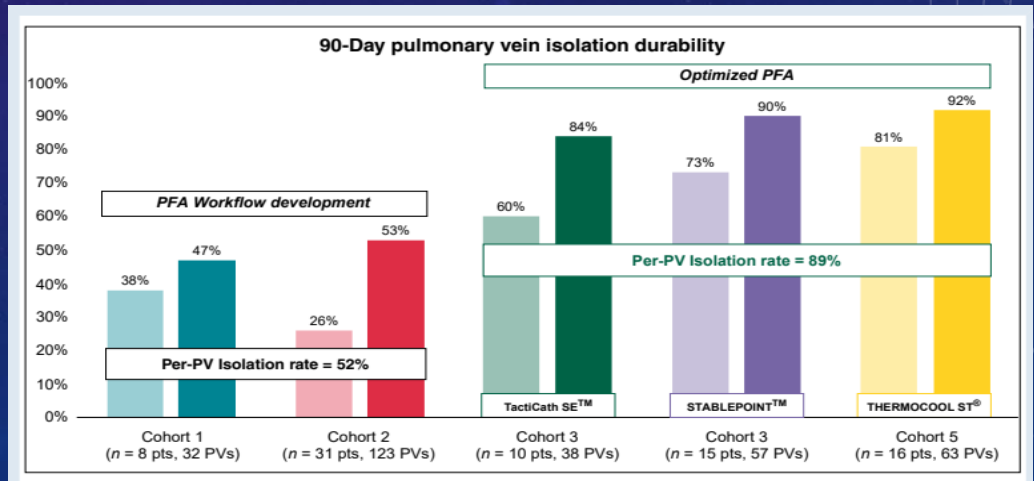
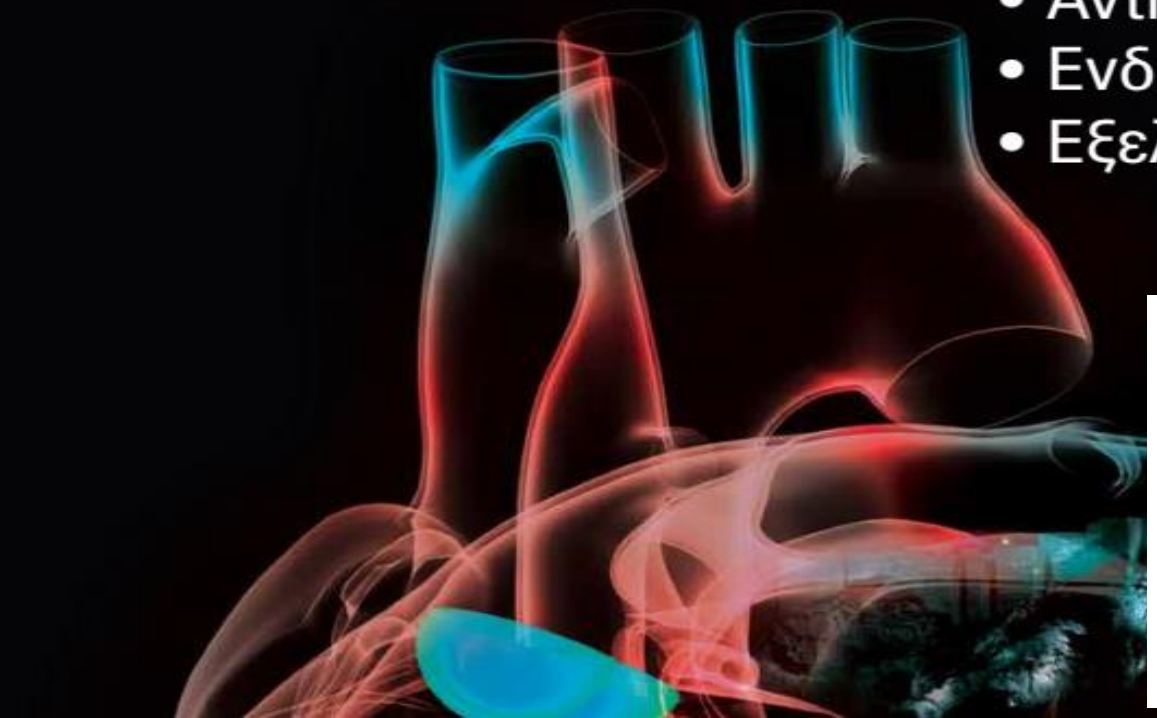


Figure 4 Chronic PFA lesion durability, measured by per-patient and per-PV isolation rate at 90 days, for each cohort. Patients in the PFA workflow development Cohorts 1 and 2 showed a per-patient isolation rate of 38% and 26%, and a per-pulmonary vein isolation rate of 47% and 53%, respectively. Patients in the optimized PFA Cohorts 3–5 showed a per-patient isolation rate of 60%, 73%, and 81% and a per-PV isolation rate of 84%, 90%, and 92%, respectively. There were no AEs associated with the optimization in energy settings and clinical workflows. PFA, pulsed field ablation; PV, pulmonary vein.

9ο WORKSHOP

Αρρυθμιών & Βηματοδότησης

- Ενδιαφέροντα ηλεκτροκαρδιογραφήματα
- Αντιπαραθέσεις
- Ενδιαφέροντα περιστατικά
- Εξελίξεις στην αντιμετώπιση των αρρυθμιών



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