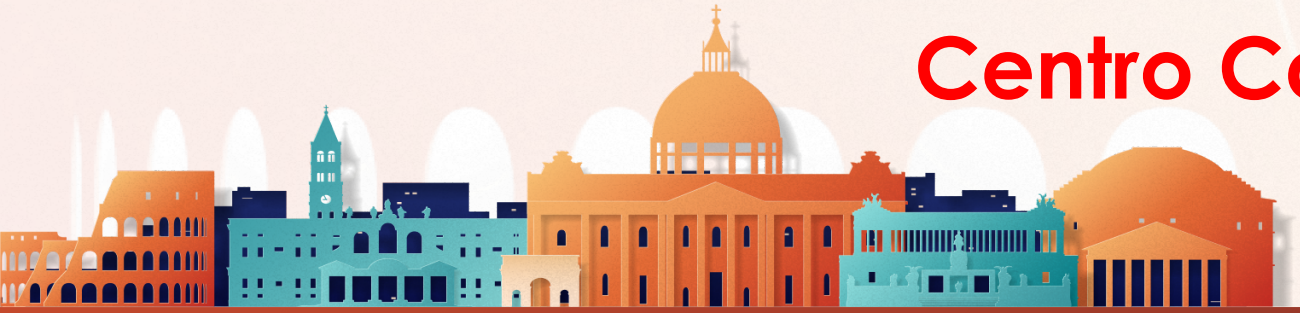
PLACE 2026
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

CONGRESSO
ROMA, 25 - 27 Giugno 2026

Ablazione Della Fibrillazione Atriale: Hot News

Il ruolo dell'energia pulsata nell'ablazione delle aritmie cardiache

Stefania Riva , MD
Centro Cardiologico Monzino, Milano



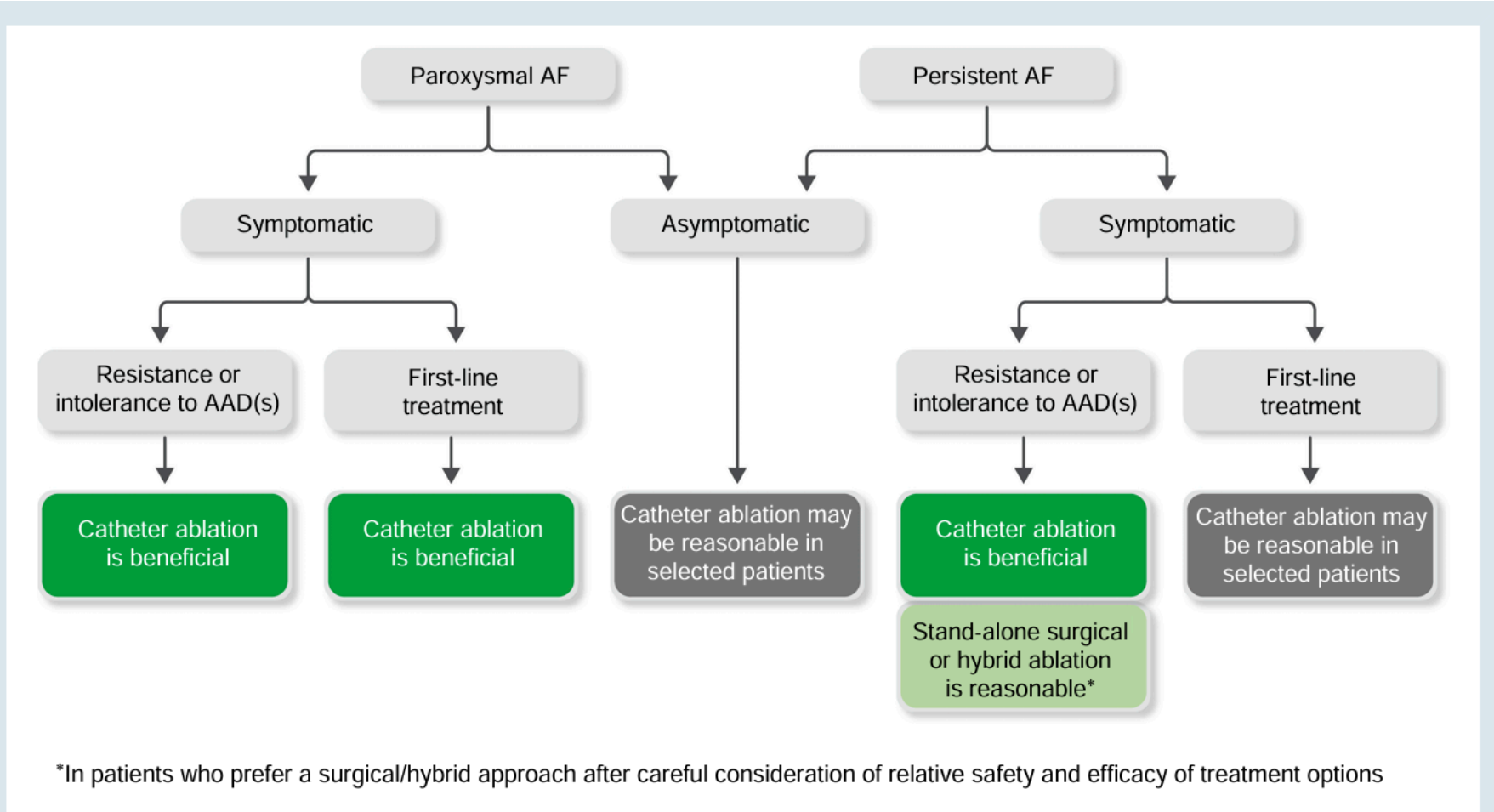


Figure 7 Suggested advice for catheter ablation in patients with paroxysmal or persistent AF in relation to the presence of AF-related symptoms. AAD, antiarrhythmic drug; AF, atrial fibrillation.

Tzeis et al, 2024 European Heart Rhythm Association/ Heart Rhythm Society/Asia Pacific Heart Rhythm Society/Latin American Heart Rhythm Society expert consensus statement on catheter and surgical ablation of atrial fibrillation; Europace 2024

Elettroporazione

- **Impulsi elettrici ultra-rapidi ad alto voltaggio**

Marcato aumento del campo elettrico attraverso la membrana cellulare: il potenziale transmembrana accumulato supera un valor critico

- Formazione di **pori di dimensioni nanometriche (nanopori permanenti):** morte cellulare (**elettroporazione irreversibile**)
- **Nanopori transitori:** recupero cellulare (**elettroporazione reversibile**)
- L'**elettroporazione irreversibile (IRE)** determina:
  - Denaturazione elettro-conformazionale delle proteine
  - Squilibrio osmotico
  - Rapido flusso in entrata e in uscita di ioni
  - Deplezione dell'adenosina trifosfato (**ATP**)
  - Assorbimento di molecole tossiche o estranee alla cellula

Expert Rev Cardiovasc Ther. 2018 May;16(5):349-360,
Chang D.C., and Reese T.S.. Biophys J 1990; 58

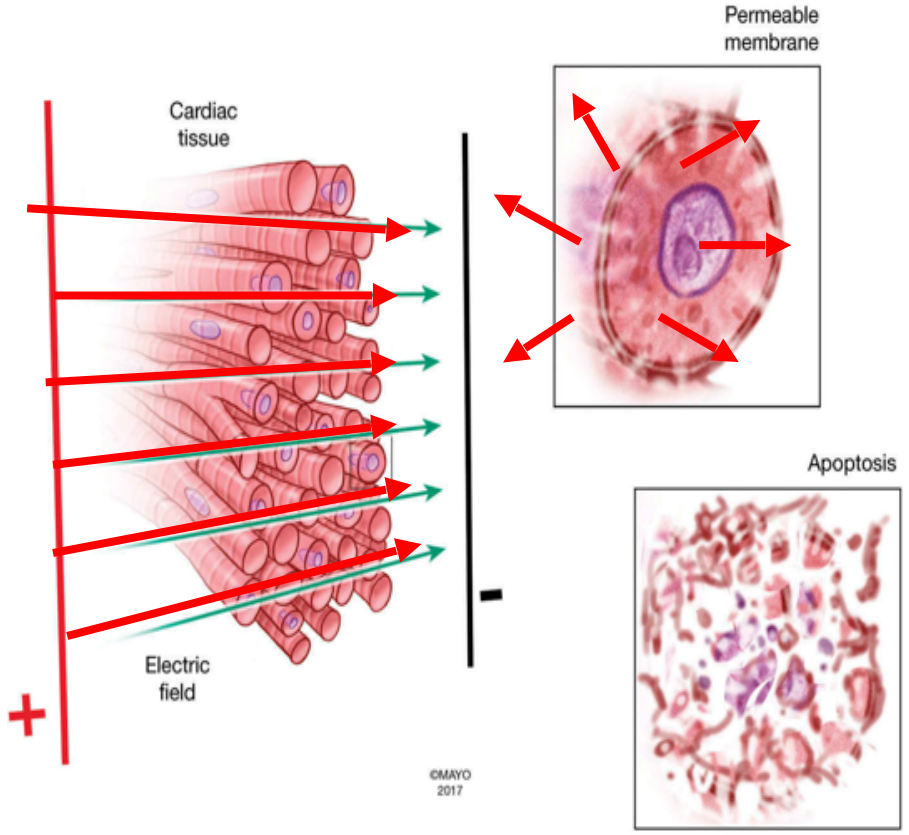
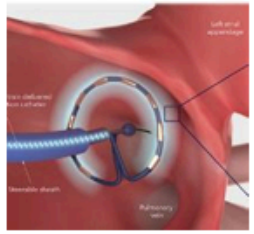
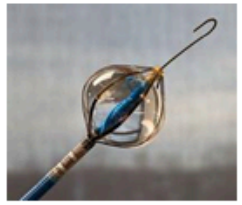
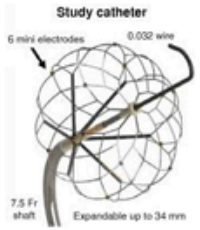


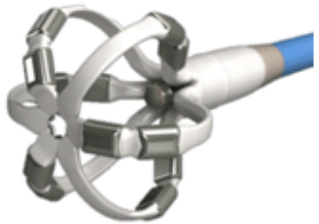
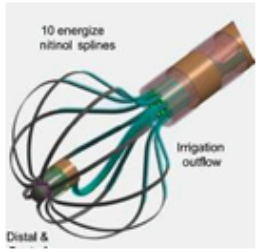
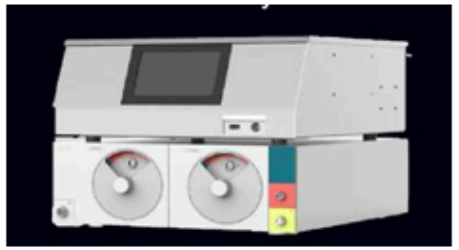
Table 2 Overview of contemporary circumferential PVI tools

	 Farapulse™ Boston Scientific	 PulseSelect™ Medtronic	 Inspire™ Biosense Webster	 Globe PF™ Kardium	 Volt™ Abbott	 Sphere 360™ Medtronic	 Adagio Adagio	 Lotos™ Lifetech	 CellFX nsPFA™ Pulse Bioscience
Diameter	31/35 mm	25 mm	25–35 mm	30 mm	28 mm	34 mm	25 mm variable	28/31 mm	30 mm
Size	12F	9F	8.5F	16F	13F	8.5F	8.5F	12F	11F
Over the wire	Yes	Yes	No	No	Yes	Yes	No	No	No
PVI	++++	++++	++++	++++	++++	++++	+++	++++	++++
Non-PV lesions/ versatility	+++	++	++	++	+	+	++	++	++
Clinical experience	+++++	+++	++	+	+	++	+	No	+
Ablation mode	Bipolar	Bipolar	Bipolar	Bipolar	Bipolar	Monopolar	Bipolar	Bipolar	Bipolar
Dedicated 3D mapping	No	No	Yes	Yes	Yes	Yes	No	No	No
Approval	EU/USA	EU/USA	EU/Japan	No	No	No	No	No	No

Several systems are currently under investigation; thus, scientific references are not always available. The assessment of clinical applicability is based on the authors' opinion. For more details, please see text.
PF, pulsed field; PFA, pulsed field ablation; PVI, pulmonary vein isolation.

Chun J. et al. Europace 2024

Table 3 Overview of focal point-by-point large/intermediate footprint PFA catheters and a specific generator enabling PFA using conventional RF catheters

					
	Sphere 9™ Medtronic	**Omnypulse ™ Biosense Webster**	**Faraflex ™ Boston Scientific**	**LFC Centauri**	**Centauri**
Diameter	9 mm	12 mm	10 mm	10 mm	3.5–4 mm
Size	8F	7.5F	8F	8.5Fs	8F
Catheter deflection	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Unidirectional/bidirectional
PVI	++++	+++	+++	NA	+++
Non-PV lesions/versatility	++++	++++	++++	NA	++++
Clinical experience	++++	+	+	No	++
Ablation mode	Monopolar	Bipolar	Bipolar Monopolar	Monopolar	Monopolar
PFA/RFC	Yes/Yes	Yes/No	Yes/No	Yes/No	Yes/Yes
Dedicated 3D mapping	Yes	Yes	Yes	multiple	multiple
Approval	EU	No	No	No	EU

Several systems are currently under investigation; thus, scientific references are not always available. The assessment of clinical applicability is based on the authors' opinion. For more details, please see text.
PFA, pulsed field ablation; PVI, pulmonary vein isolation; RF, radiofrequency; RFC, radiofrequency current.

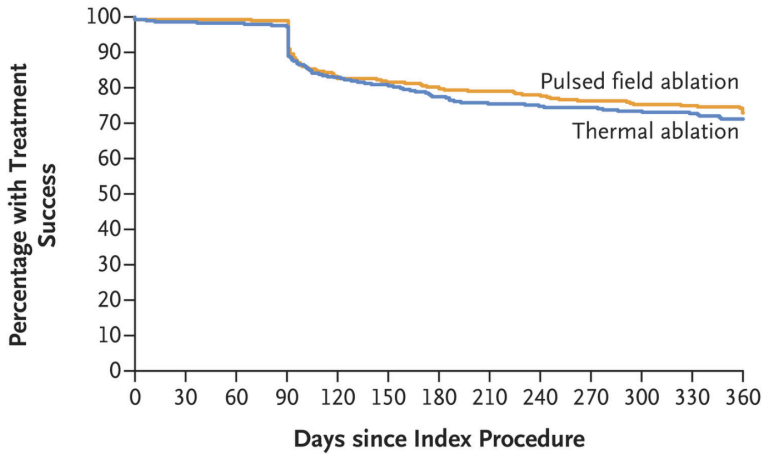
Chun J. et al. Europace 2024

ORIGINAL ARTICLE

Pulsed Field or Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation

Authors: Vivek Y. Reddy, M.D., Edward P. Gerstenfeld, M.D., Andrea Natale, M.D., William Whang, M.D., Frank A. Cuoco, M.D., Chinmay Patel, M.D., Stavros E. Mountantonakis, M.D., +13, for the ADVENT Investigators* Author Info & Affiliations

Il **tempo procedurale totale medio (± deviazione standard)** è stato di **105,8 ± 29,4 minuti** nei pazienti sottoposti ad **ablazione con campi pulsati (PFA)** e di **123,1 ± 42,1 minuti** nei pazienti sottoposti ad **ablazione termica**.



No. at Risk

Pulsed field ablation	301	298	238	228	176
Thermal ablation	296	292	228	219	150

Treatment Success (%)

Pulsed field ablation	99.3	99.0	79.7	76.4	73.1
Thermal ablation	98.7	97.3	77.5	74.5	71.3

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)

La **PFA** è risultata più rapida, ma non sono state osservate differenze negli esiti procedurali delle procedure di **isolamento delle vene polmonari (PVI)** nei pazienti con **fibrillazione atriale parossistica**

Pulsed Field vs Conventional Thermal Ablation for Paroxysmal Atrial Fibrillation: Recurrent Atrial Arrhythmia Burden

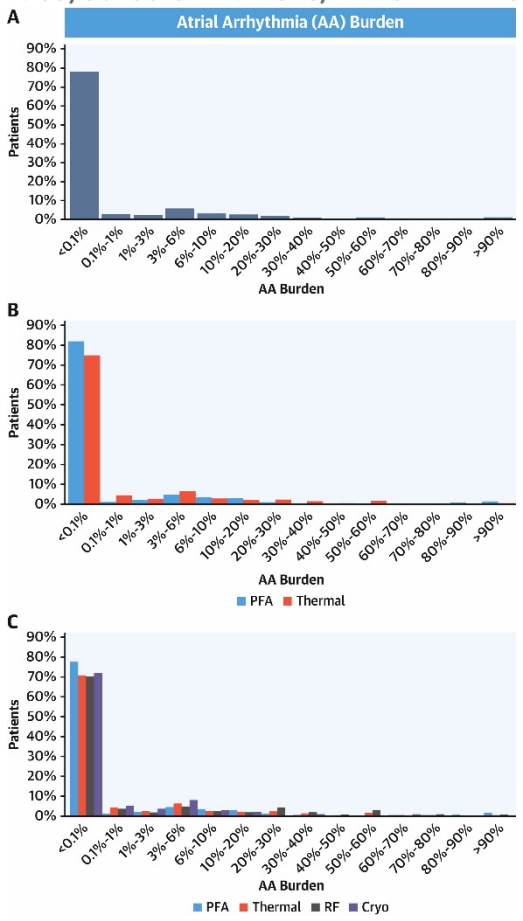
OPEN ACCESS

Original Research

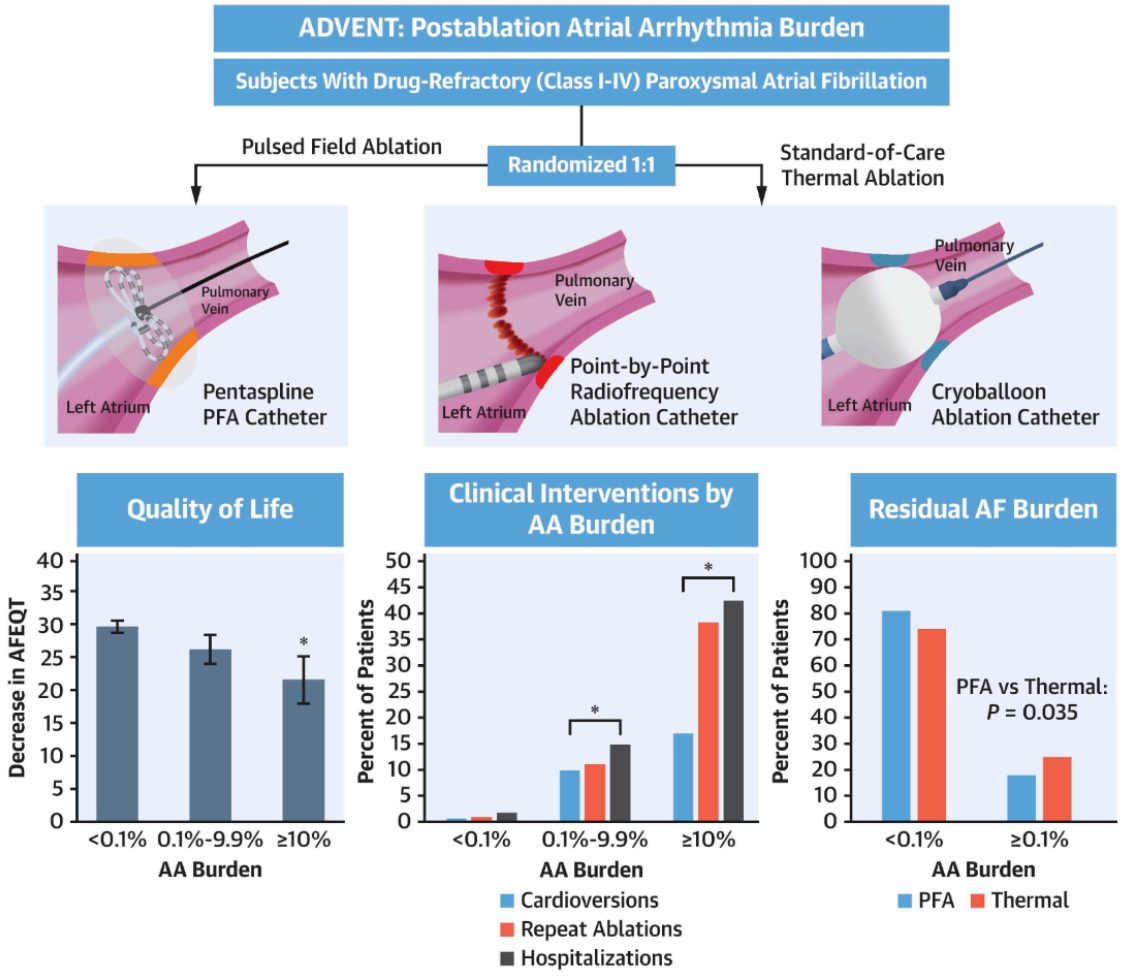
Vivek Y. Reddy, Moussa Mansour, Hugh Calkins, Andre d'Avila, Larry Chinitz, Christopher Woods, Sanjaya Zayd A. Eldadah, Robert A. Pickett, Jeffrey Winterfield, Wilber W. Su, Jonathan W. Waks, ... SEE ALL AUTH

Il **burden di aritmia atriale (AA)** è stato calcolato come percentuale di AA registrata su **Holter e monitor elettrocardiografici transtelefonici**. Le valutazioni della **qualità di vita** sono state effettuate al basale e a 12 mesi

Rispetto all'**ablazione termica**, la **PFA** ha più frequentemente determinato una **AA burden inferiore alla soglia clinicamente significativa dello 0,1%**



CENTRAL ILLUSTRATION: Postablation Atrial Arrhythmia Burden and Outcomes in the FARAPULSE ADVENT PIVOTAL Trial PFA System vs SOC Ablation for Paroxysmal Atrial Fibrillation



Reddy VY, et al. J Am Coll Cardiol. 2024;84(1):61-74.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Pulsed Field or Cryoballoon Ablation for Paroxysmal Atrial Fibrillation

Tobias Reichlin, M.D.,[1] Thomas Kueffer, Ph.D.,[1] Patrick Badertscher, M.D.,[2] Peter Jüni, M.D.,[3] Sven Knecht, Ph.D.,[2] Gregor Thalmann, M.D.,[1] Nikola Kozhuharov, M.D.,[1] Philipp Krisai, M.D.,[2] Corinne Jufer, M.S.,[1] Jens Maurhofer, M.D.,[1] Dik Heg, Ph.D.,[4] Tiago V. Pereira, Ph.D.,[3] Felix Mahfoud, M.D., Ph.D.,[2] Helge Servatius, M.D.,[1] Hildegard Tanner, M.D.,[1] Michael Kühne, M.D.,[2] Laurent Roten, M.D.,[1] and Christian Sticherling, M.D.,[2] for the SINGLE SHOT CHAMPION Investigators*

In questo **studio randomizzato di non inferiorità condotto in Svizzera**, i pazienti con **fibrillazione atriale parossistica sintomatica** sono stati assegnati casualmente in rapporto **1:1** a sottoporsi a **PFA** oppure a **Cryoablazione**

Tutti i pazienti hanno ricevuto un **monitor cardiaco impiantabile** per la rilevazione delle **tachiaritmie atriali**

L'**endpoint primario** era rappresentato dalla **prima recidiva di una tachiaritmia atriale** verificatasi tra il **91° e il 365° giorno dopo l'ablazione**

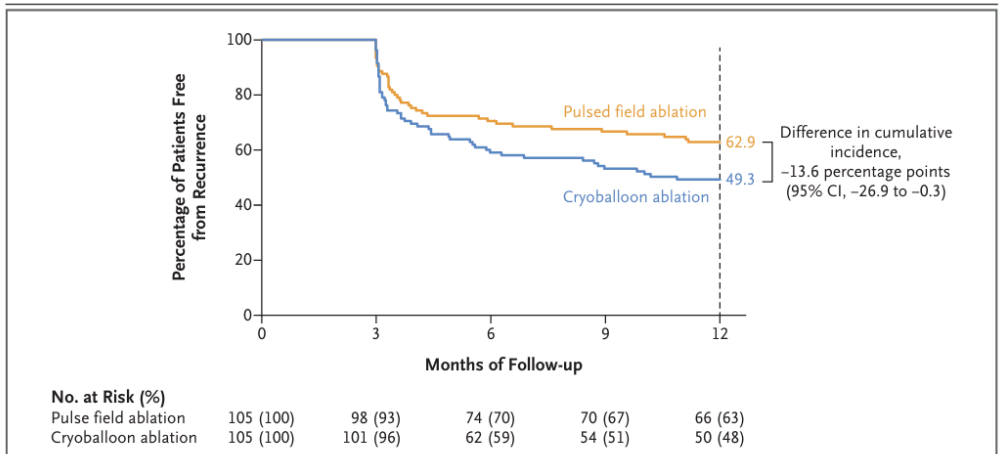


Figure 2. Freedom from Recurrence of Atrial Tachyarrhythmia during the Period from 91 to 365 Days.

Shown are Kaplan–Meier estimates of the percentage of patients who were free from recurrence of atrial tachyarrhythmia (the primary end point) during the period from 91 to 365 days after ablation (i.e., after the 90-day blanking period). Estimates of freedom from recurrence of 62.9% in the group that underwent pulsed field ablation and 49.3% in the group that underwent cryoballoon ablation at 365 days correspond to 100% minus the cumulative incidence of the outcome in each of the two groups.

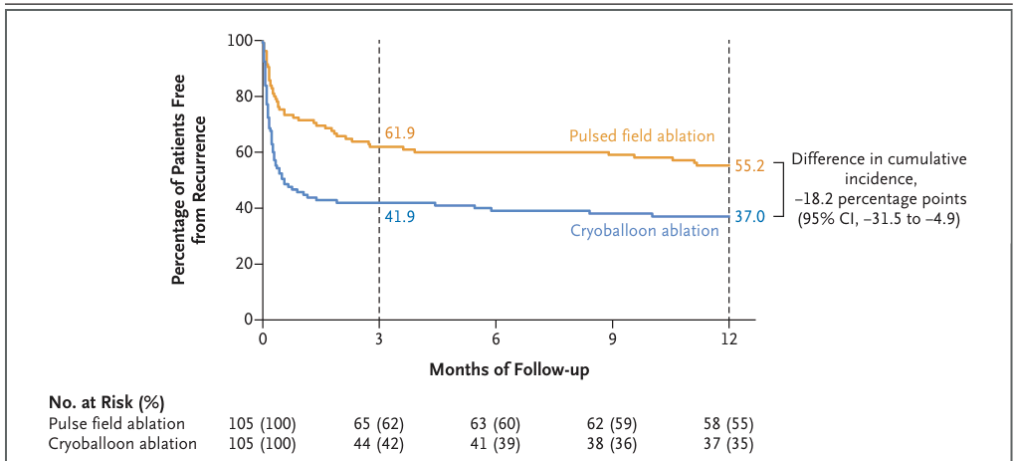


Figure 3. Freedom from Recurrence of Atrial Tachyarrhythmia during the Period from Day 1 to Day 365.

Shown are Kaplan–Meier estimates of the percentage of patients who were free from recurrence of atrial tachyarrhythmia during the period from day 1 to day 365. At the end of the 3-month blanking period, estimates of freedom from recurrence were of 61.9% in the group that underwent pulsed field ablation and 41.9% in the group that underwent cryoballoon ablation; the estimates were 55.2% and 37.0%, respectively, at 1 year, which correspond to 100% minus the cumulative incidence in each group.

Recidive di FA all'ILR:

- **37.1% nel gruppo PFA**
- **50.7% nel gruppo cryo.**

ESC European Society of Cardiology
Europace (2025) **27**, euaf012
https://doi.org/10.1093/europace/euaf012

Repeat procedures after pulsed field ablation for atrial fibrillation: *MANIFEST-REDO* study

Daniel Scherr [1]*, Mohit K. Turagam [2], Philippe Maury [3,4], Yuri Blaauw[5],

CLINICAL DATA!

Central Figure: Repeat Procedures After Pulsed Field Ablation for Atrial Fibrillation: MANIFEST-REDO Study

Aim

Report EP findings and procedural outcomes in patients undergoing repeat ablation after initial PFA using a pentaspline catheter

Methods

Multi-center registry, 22 centers
Repeat ablation after initial PFA, regardless of technology used for redo procedure.
Follow up: repeated Holter ECGs, ECG in case of symptoms

Results

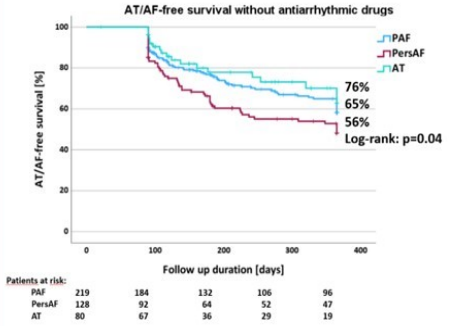
427 patients, FU 284 (90-366) days, age 64±11 years

Recurrence type:
PAF 51%, PersAF 30%, AT 19%

Reconnected veins / patient:
0:44%; 1:29%; 2:16%; 3:9%; 4:1%

Complication rate: 2.8%

PersAF predicts AT/AF recurrence after repeat ablation (HR 1.241 (95% CI 1.534-1.005; p=0.045)



Conclusion

**PV reconnections not uncommon after initial PFA-PVI.
Repeat ablation can be performed safely & effectively.**

- La **durabilità delle lesioni** nei pazienti sottoposti a una procedura **redo dopo PFA** è uno dei fattori determinanti delle recidiva di **FA** o **AT**
- **S**olo il **45% dei pazienti** sottoposti ad ATC redo presentava un **isolamento completo delle VP**
- **L'ATC redo per FA/AT** dopo una precedente ablazione con **PFA** può essere eseguita con un profilo di **sicurezza ed efficacia accettabile**, con una **percentuale di successo clinico del 65%** nel primo anno e un **tasso di complicanze procedurali del 2,8%**
- La **FA persistente** come aritmia recidivante rappresenta un **fattore predittivo di minore successo** durante il follow-up

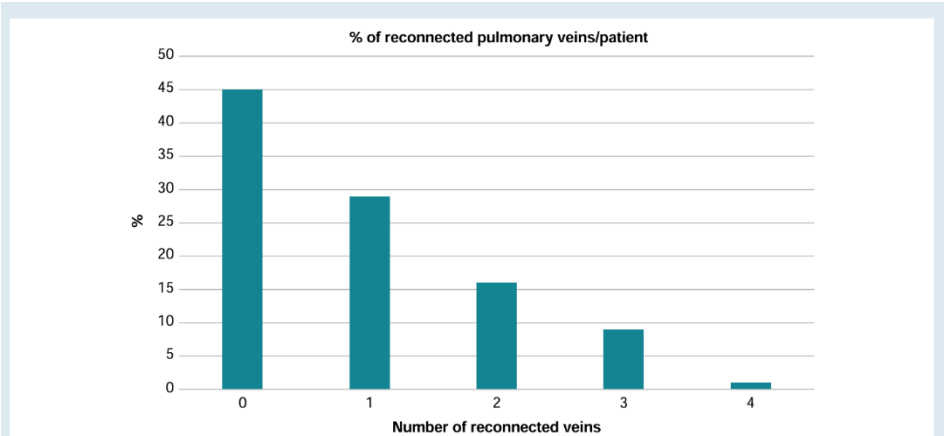


Figure 1 Percentage (respective number: *x*-axis) of reconnected veins (respective number: *y*-axis) per patient during repeat ablation.

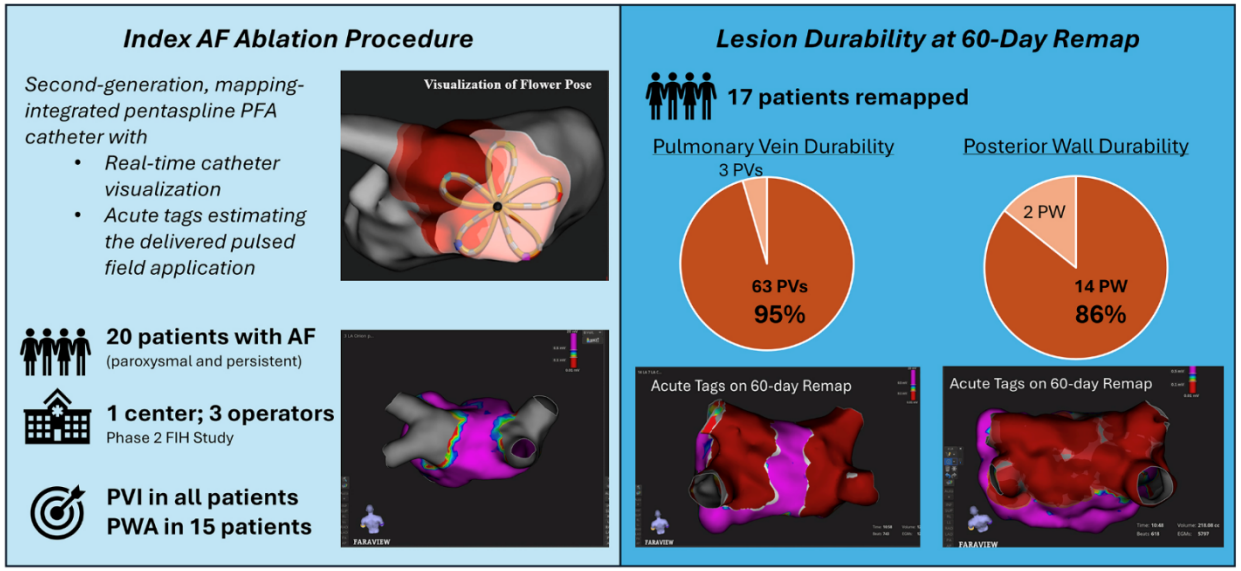
Does contact matter?

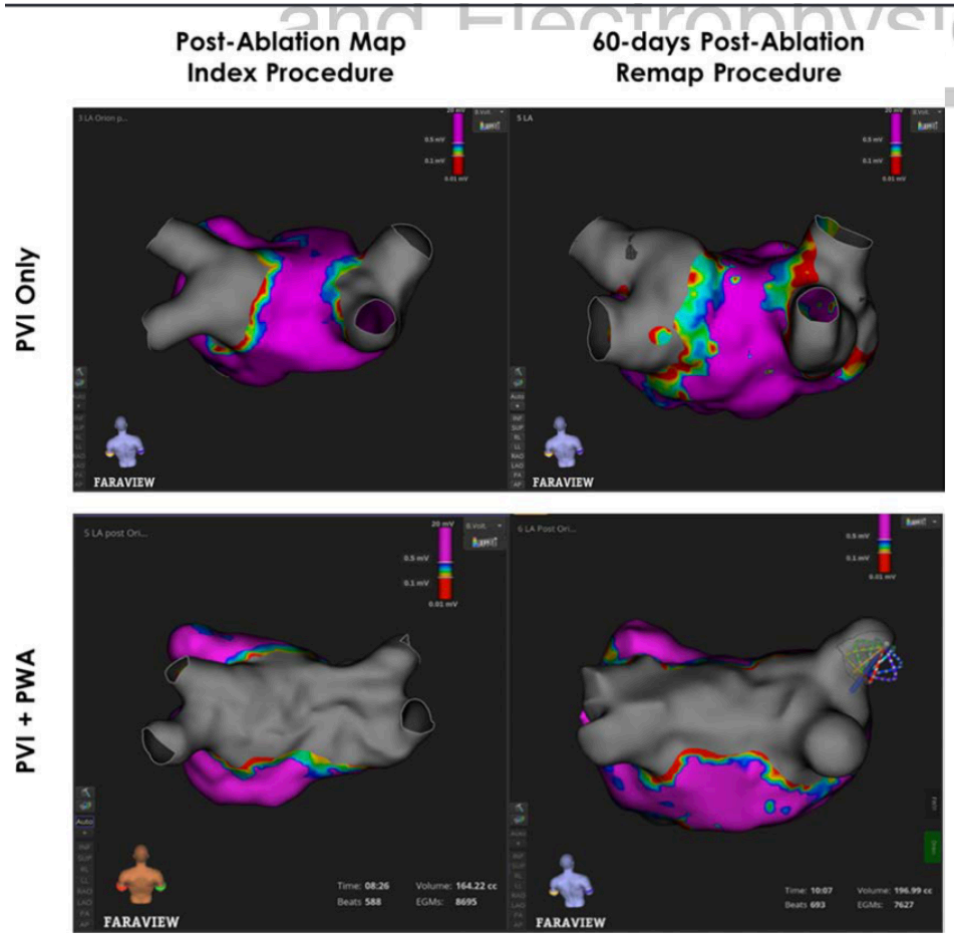
ORIGINAL ARTICLE

Lesion Durability of the Second Generation Pentaspline Pulsed Field Ablation Catheter *NAVIGATE-PF* Phase 2 Results

Vivek Y. Reddy, MD; Jan Petru, MD; Moritoshi Funasako, MD; Silvia Canepa, PhD; Camille Metzdorff, MEng; Brynn Okeson, MS; Evripidis Mikos, MS; Tobias Oesterlein, PhD; Sarah R. Gutbrod, PhD; Brendan E. Koop, PhD; Petr Neuzil, MD, PhD

Second-Generation Pentaspline PFA Catheter demonstrated High Lesion Durability at 60-day Remap (NAVIGATE-PF)





La **valutazione in tempo reale del contatto e il mappaggio integrato** hanno migliorato significativamente la **durabilità dell'isolamento PV** e dell'**isolamento della parete posteriore** rispetto ai cateteri **PFA di prima generazione**

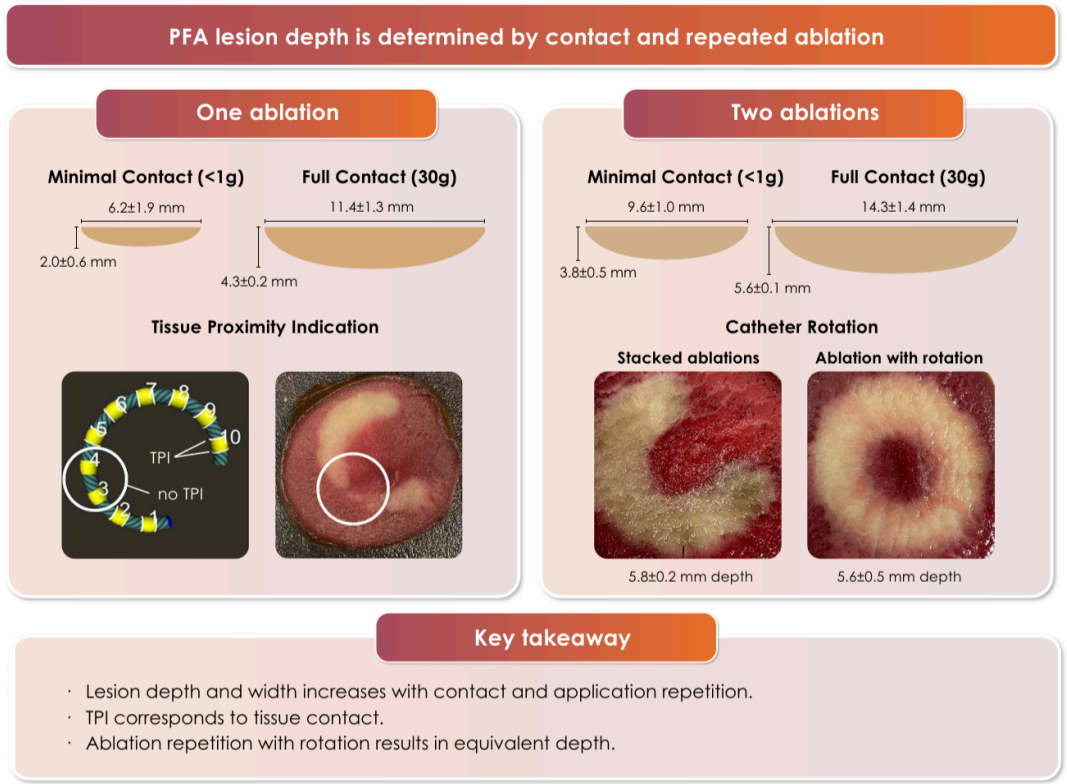
Does contact matter?

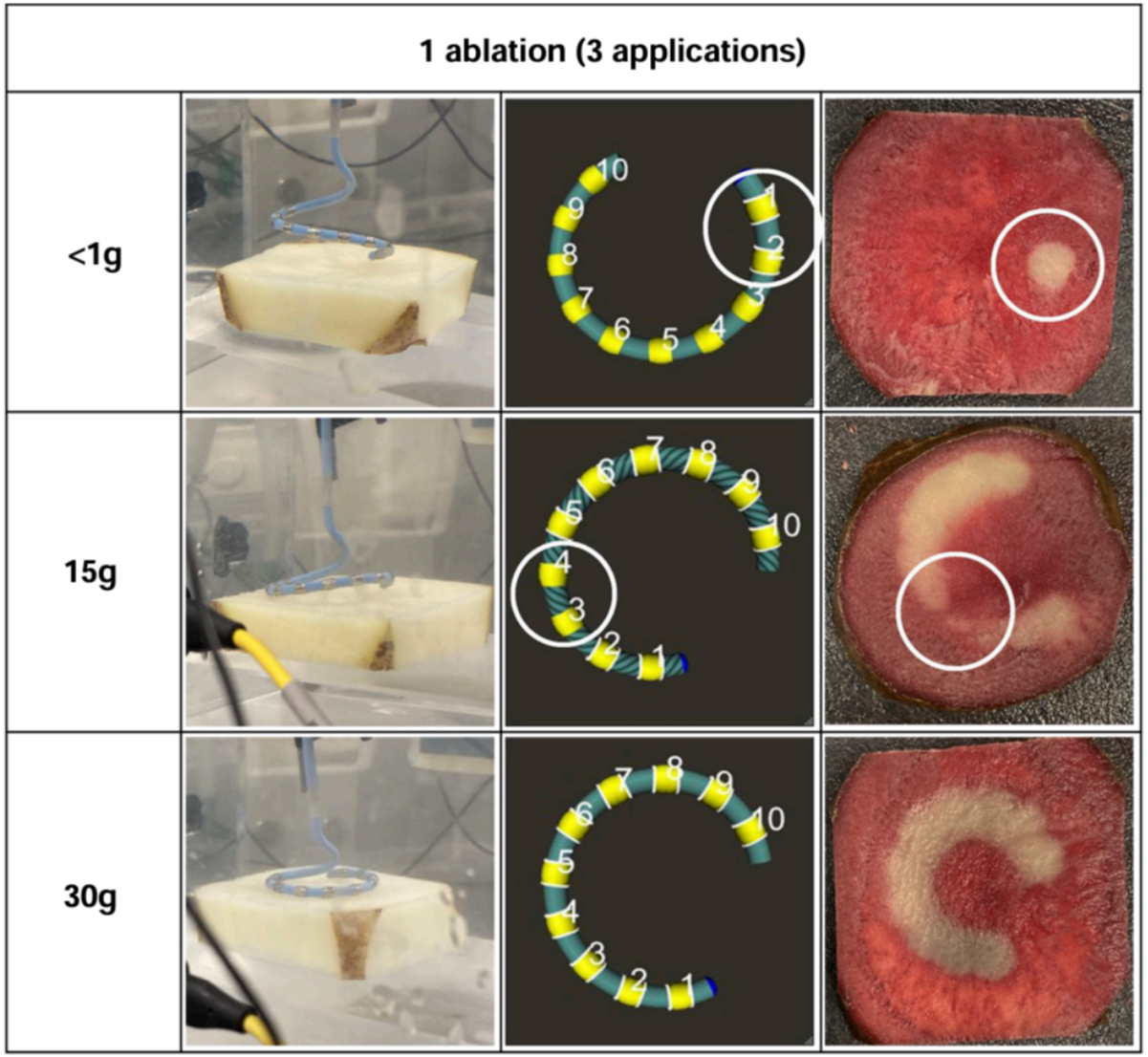
ESC European Society of Cardiology
Europace (2024) 26, euae220
https://doi.org/10.1093/europace/euae220

TRANSLATIONAL RESEARCH

Application repetition and electrode–tissue contact result in deeper lesions using a pulsed-field ablation circular variable loop catheter

Luigi Di Biase [1]*, Jacopo Marazzato [1,2], Tara Gomez [3], Eric Byun [3], Fengwei Zou [1], Vito Grupposo [3], Sanghamitra Mohanty [4], Vincenzo Mirco La Fazia [4], Giuseppe Ammirati [1], Aung Lin [1], Domingo Ynoa Garcia[1], Domenico Della Rocca [4], Amin Al Ahamad [4], Marco Schiavone [5], Alessio Gasperetti [6], Michael Freilich[1], Juan Cedeno Serna[1], Giovanni Forleo [7], Xu Liu[8], Dhanunjaya Lakkireddy [9], Claudio Tondo [5], Andrea Natale [4], and Xiao-Dong Zhang [1]





Does contact matter?

HeartRhythm
The Official Journal of the Heart Rhythm Society, The Cardiac Electrophysiology Society, and The Pediatric & Congenital Electrophysiology Society
Heart Rhythm Society

Durability of pulmonary vein isolation: Does the pulsed field ablation system matter?

Saikiran Kakarla, MBBS, MD, DM, Hidehiro Iwakawa, MD, Jonathan P. Ariyaratnam, MBBS, PhD, Jason Varzaly, MBBS, PhD, Alessandra Pina, MD, Sanjai Pattu Valappil, MBBS, MD, DM, Mohanaraj Jayakumar, MD, Mohamed Abbas, MD, Adrian D. Elliott, PhD, Melissa E. Middeldorp, MPH, PhD, FHRS, Mehrdad Emami, MD, PhD, Christopher X. Wong, MD, PhD, Glenn D. Young, MBBS, FHRS, Prashanthan Sanders, MBBS, PhD, FHRS

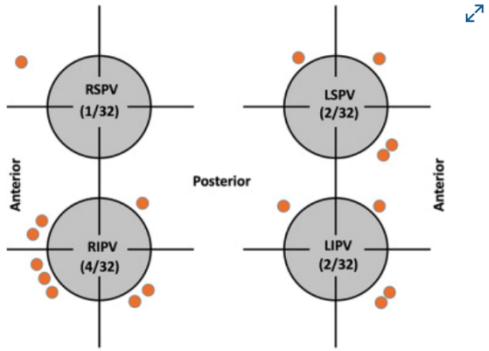


Figure viewer

Figure 2 Segmental reconnections in the pentaspline catheter cohort. Each *circle* represents 1 pulmonary vein: RSPV, RIPV, LSPV, and LIPV. *Orange dots* around each circle denote individual segmental reconnections (anterior, inferior, posterior, superior) observed across all 8 patients. Inset values indicate the number of veins reconnected per total number of evaluated veins (eg, 1 of 32 for RSPV). LIPV = left inferior pulmonary vein; LSPV = left superior pulmonary vein; RIPV = right inferior pulmonary vein; RSPV = right superior pulmonary vein.

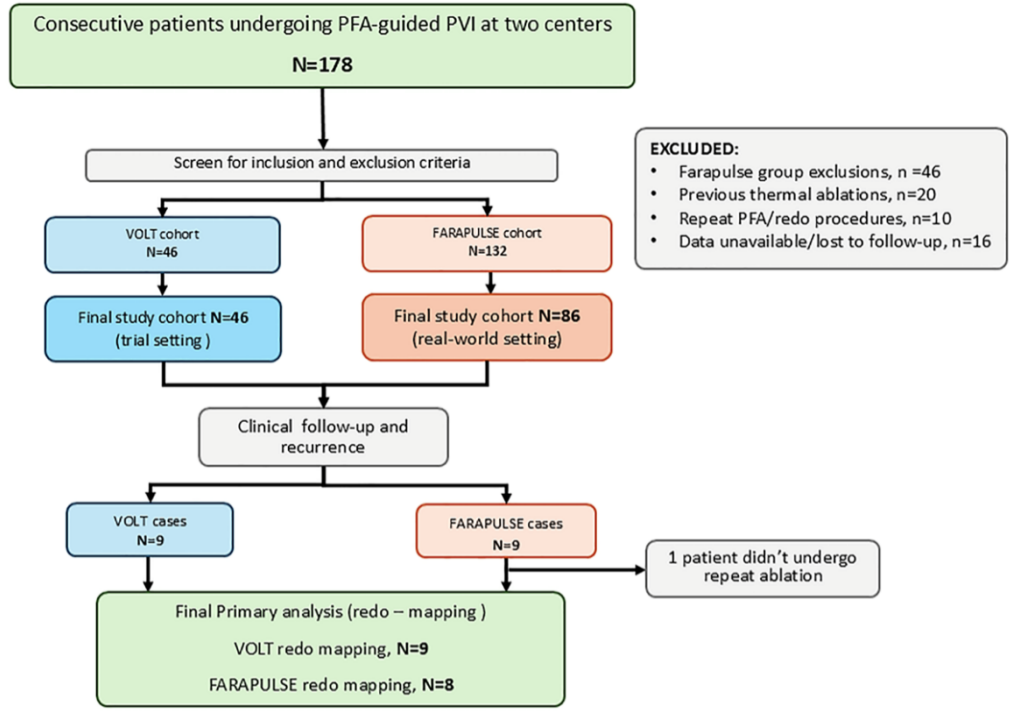


Figure 1
Study flow and cohort selection. PFA = pulsed field ablation; PVI = pulmonary vein isolation.

Lo studio aveva l'obiettivo di confrontare la **durabilità cronica dell'isolamento delle vene polmonari (PVI)** e i pattern di **riconnessione delle vene polmonari (PV)** dopo un'ablazione iniziale eseguita con catetere **FARAPULSE (pentaspline)** e con catetere **Volt (balloon-in-basket)**

Does contact matter?

HeartRhythm
The Official Journal of the Heart Rhythm Society, The Cardiac Electrophysiology Society, and The Pediatric & Congenital Electrophysiology Society
Heart Rhythm Society

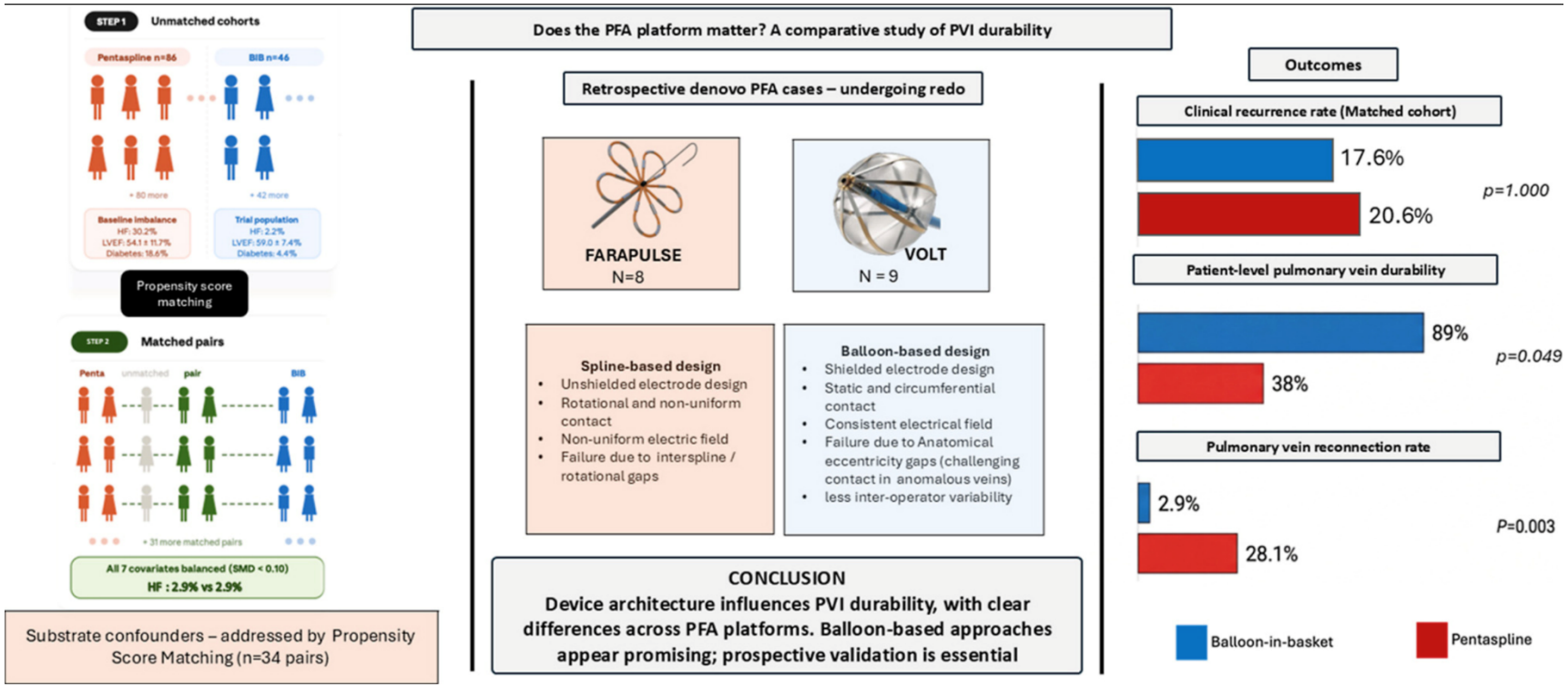
Durability of pulmonary vein isolation: Does the pulsed field ablation system matter?

Saikiran Kakarla, MBBS, MD, DM, Hidehiro Iwakawa, MD, Jonathan P. Ariyaratnam, MBBS, PhD, Jason Varzaly, MBBS, PhD, Alessandra Pina, MD, Sanjai Pattu Valappil, MBBS, MD, DM, Mohanaraj Jayakumar, MD, Mohamed Abbas, MD, Adrian D. Elliott, PhD, Melissa E. Middeldorp, MPH, PhD, FHRS, Mehrdad Emami, MD, PhD, Christopher X. Wong, MD, PhD, Glenn D. Young, MBBS, FHRS, Prashanthan Sanders, MBBS, PhD, FHRS

Table 3 Comparative analysis of PVI durability

Durability metric, n (%)	Balloon-in-basket catheter (n = 46)	Pentaspline catheter (n = 86)	*P* value
Patient-level durability	8 (89)	3 (38)	.049*
PV-level durability	34/35 (97.1)	23/32 (71.9)	.003*
Reconnected veins	1/35 (2.9)	9/32 (28.1)	.003*
Nature of recurrence			.082*
Atrial fibrillation	9 (100)	5 (62.5)	
Atrial tachycardia or flutter	0	3 (37.5)	

PV = pulmonary vein; PVI = pulmonary vein isolation.
*Statistically significant.



nature medicine

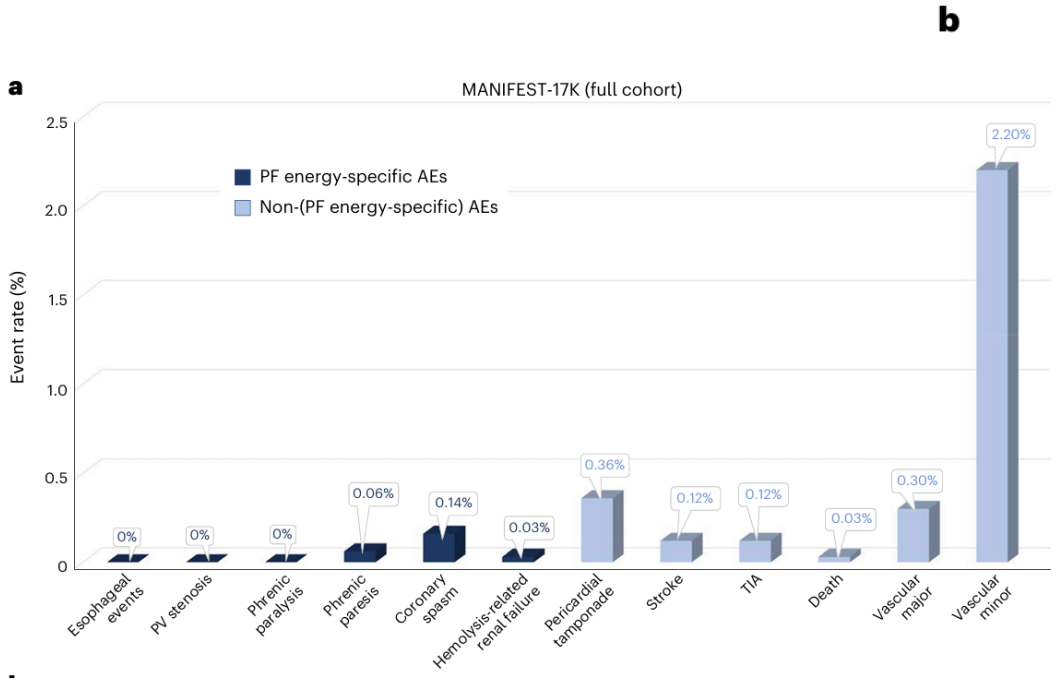
Article

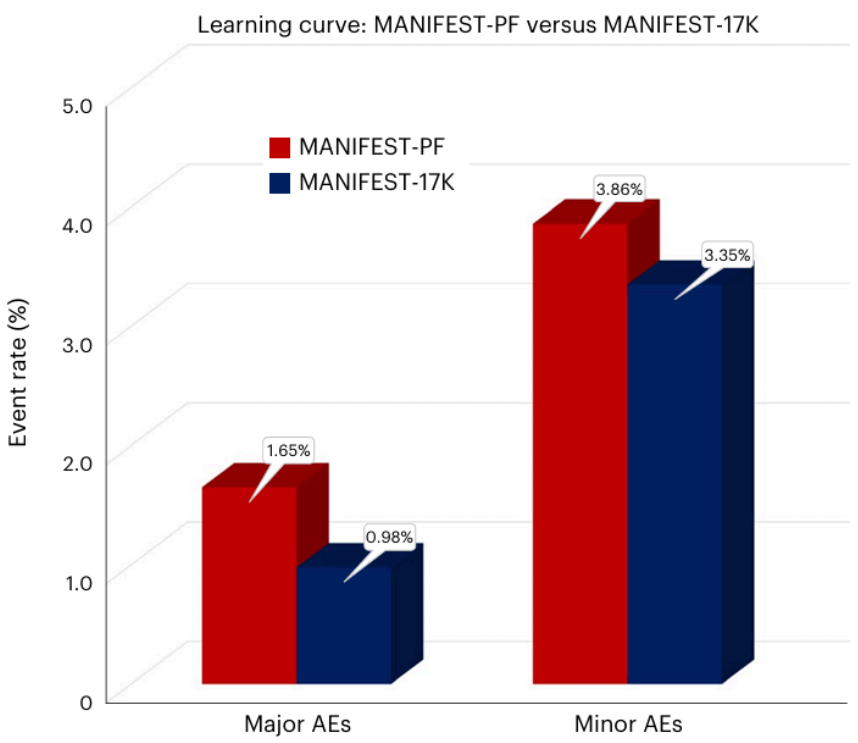
https://doi.org/10.1038/s41591-024-03114-3

Safety of pulsed field ablation in more than 17,000 patients with atrial fibrillation in the MANIFEST-17K study

17,642 patients sottoposti a PFA

Non sono state riportate **complicanze esofagee**, **stenosi delle vene polmonari** o **paresi frenica persistente**





Le **complicanze maggiori**, riportate in circa **l'1% dei pazienti**, sono state il **tamponamento pericardico** e le **complicanze vascolari** (non correlate all'energia di ablazione)

nature medicine

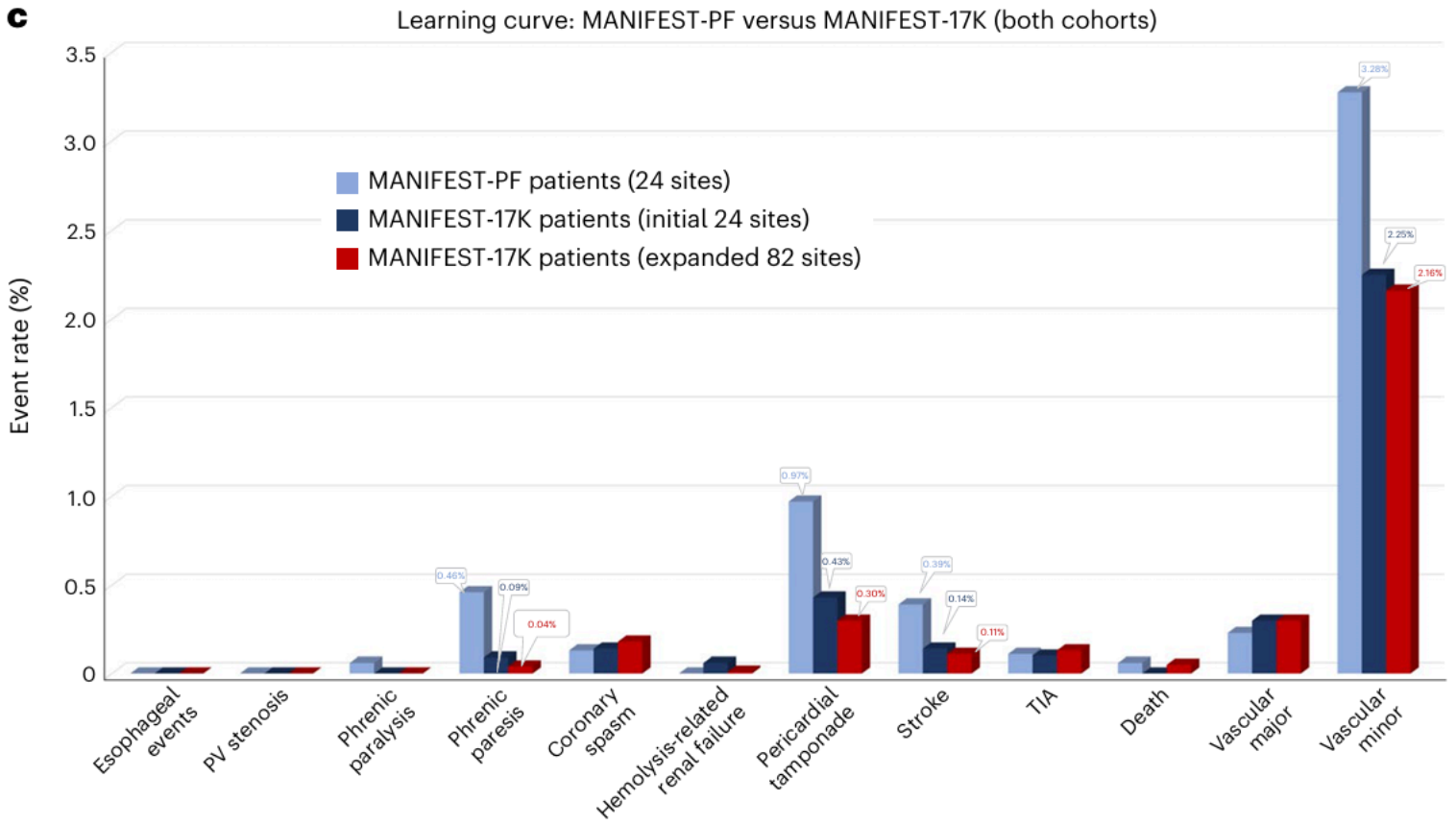
Article

https://doi.org/10.1038/s41591-024-03114-3

Safety of pulsed field ablation in more than 17,000 patients with atrial fibrillation in the MANIFEST-17K study

Nel complesso, questi dati indicano che la **PFA** presenta un **profilo di sicurezza favorevole**, evitando gran parte dei **danni collaterali più gravi osservati con l'ablazione termica convenzionale**

Le **complicanze inaspettate della PFA** includevano lo **spasmo delle arterie coronarie** nel **0,14% dei pazienti (25 su 17.642)** e l'**insufficienza renale acuta correlata a emolisi**, che ha richiesto **emodialisi**, nello **0,03% dei pazienti**



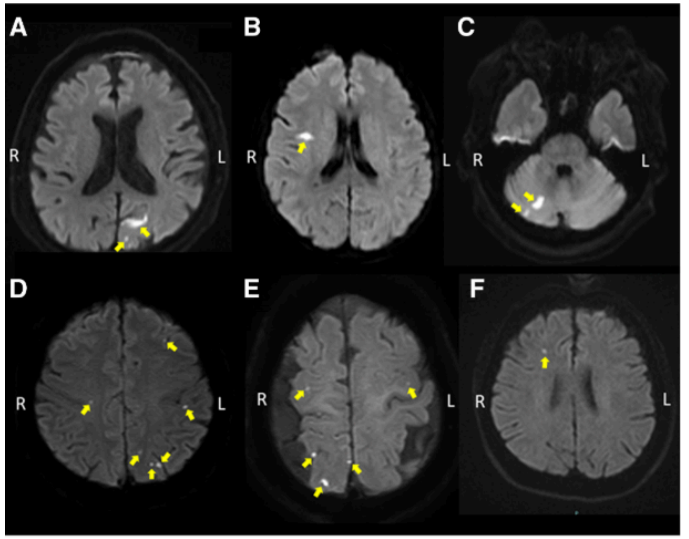
Ischemia cerebrale silente

Circulation: Arrhythmia and Electrophysiology
Volume 18, Issue 5, May 2025; Page e013719
https://doi.org/10.1161/CIRCEP.125.013719

RESEARCH LETTERS

Different Incidence and Size of Silent Strokes After Pulsed Field Ablation With Circular Shaped Ablation Catheters

Shinsuke Miyazaki, MD, Iwanari Kawamura, MD, Yoshihiro Iwasa, MD, Miho Negishi, MD, Ryo Tateishi, MD, Masaki Honda, MD, Kentaro Goto, MD, Takuro Nishimura, MD, Kazuya Yamao, MD, Susumu Tao, MD, Masateru Takigawa, MD, and Tetsuo Sasano, MD

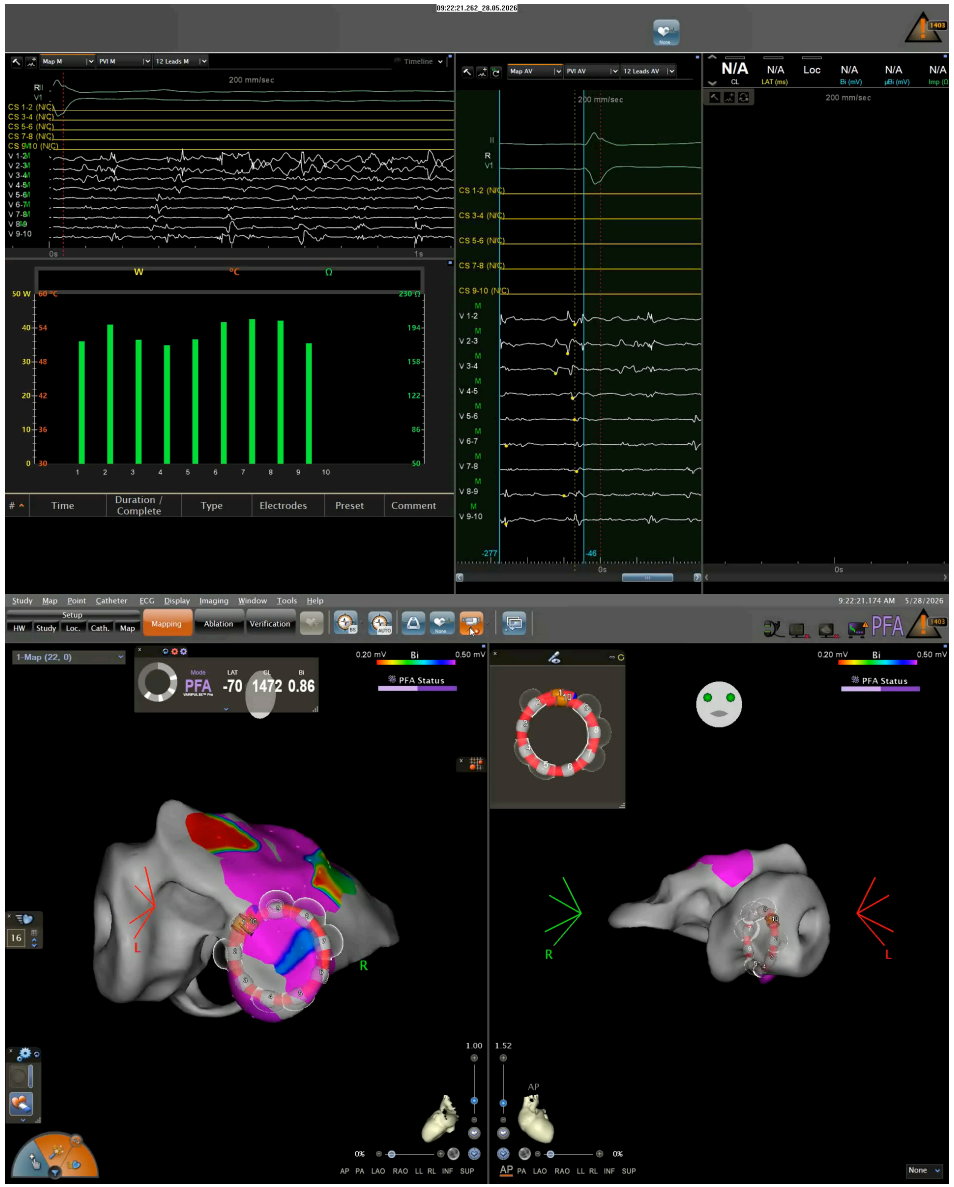


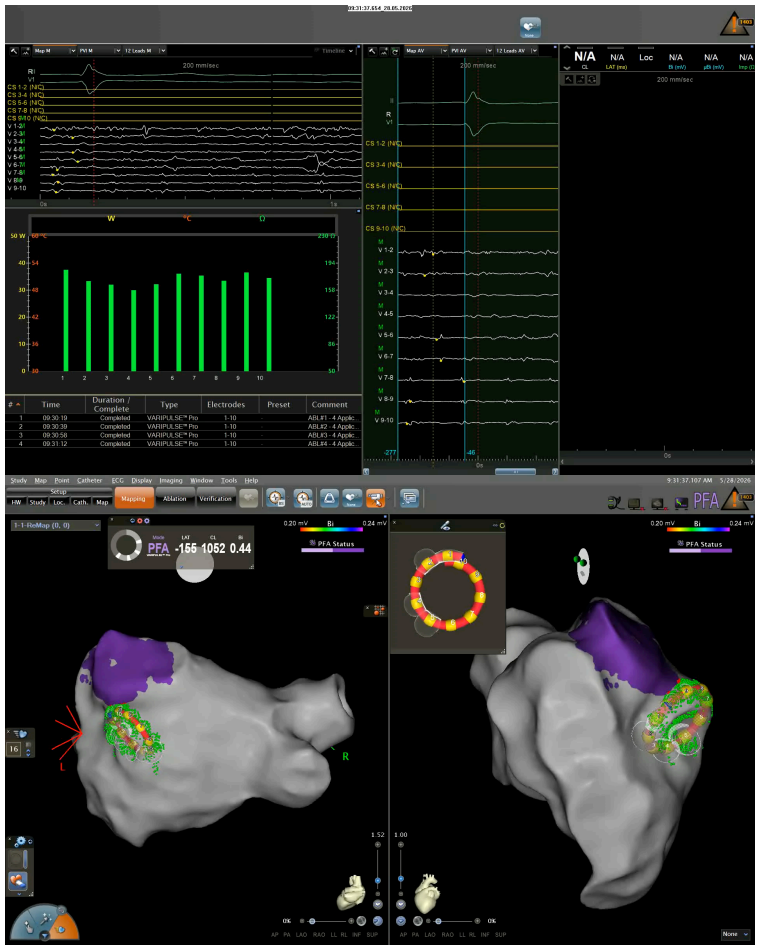
I dati relativi alle **ischemie cerebrali silenti** durante la **PFA per l'isolamento delle vene polmonari (PVI)** derivano da sottostudi

Nel trial **PULSED-AF (PulseSelect)** è stato riportato un tasso di **ischemie cerebrali silenti** dell'**8,9%** (**4/45 pazienti**), mentre nello studio **InspIRE (Varipulse - VLCC)** il tasso è stato del **12,1%** (**4/33 pazienti**)
L'elevata incidenza di **ischemie cerebrali silenti** nel gruppo **VLCC**, nonostante un'adeguata anticoagulazione e il massimo impegno per prevenire l'ingresso di aria nel sistema, potrebbe essere correlata al **maggior numero di applicazioni** utilizzate per ottenere **l'isolamento della parete posteriore dell'atrio sinistro**

Tra le possibili fonti emboligene sono stati ipotizzati:
- **microemboli gassosi** generati dalla PFA
- **microparticelle eritrocitarie** prodotte dagli effetti diretti della PFA sui globuli rossi

VARIPULSE PRO



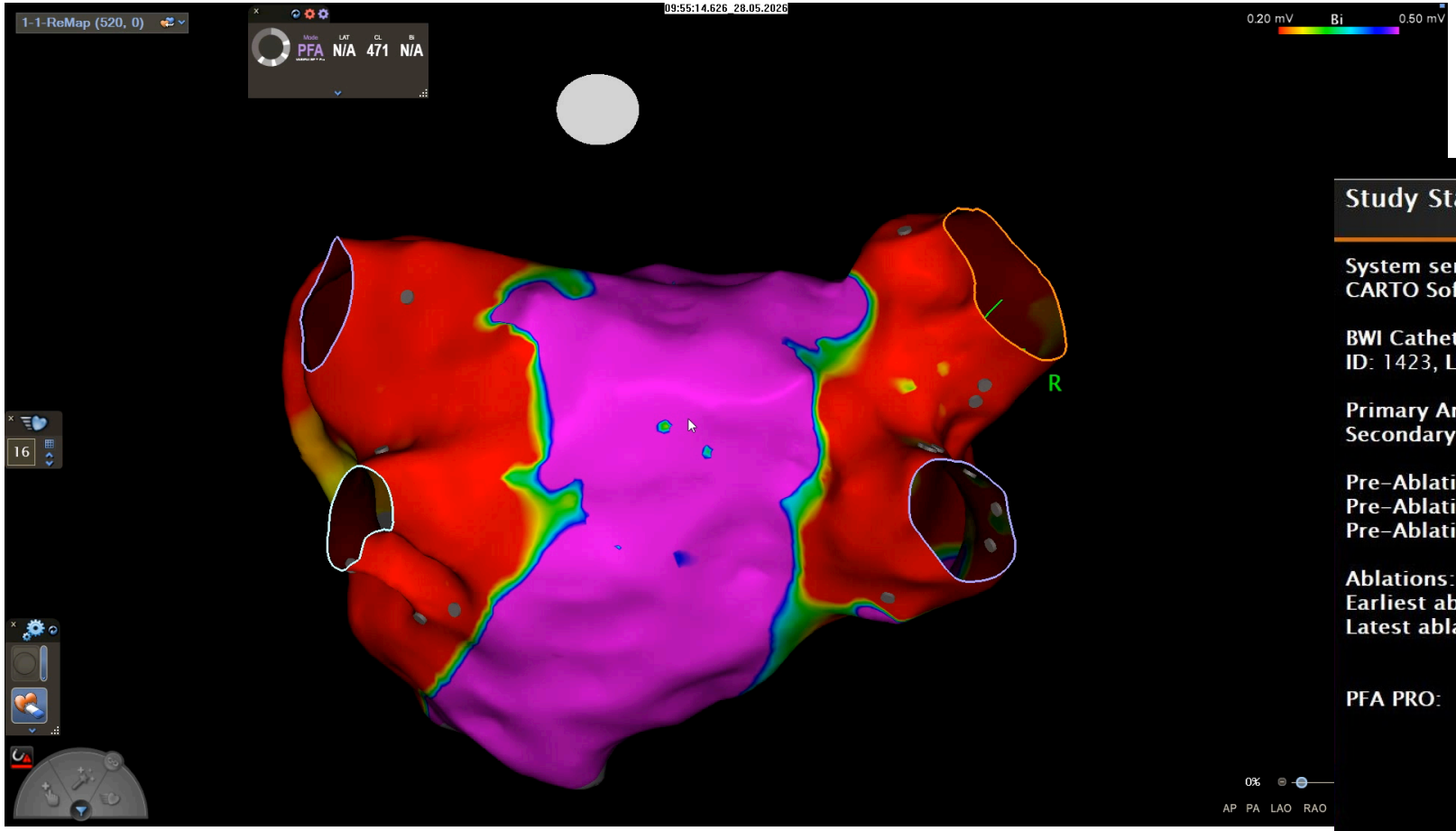


Dimensione bolle indice del contatto

4 polsi PFA in 3,8 sec

Irrigazione durante PFA 30 ml/h

Rosso zone ablate
Verdi zone non ablate



Study Statistics

System serial number: 10316
CARTO Software version: 8.1.3.17

BWI Catheter PN#:
ID: 1423, **LOT Number**: N/A (VARIPULSE™ Bi-Directional Catheter, Ablation, Mapping)

Primary Arrhythmia type: N/A
Secondary Arrhythmia type: N/A

Pre-Ablation mapping start time: 09:21:28
Pre-Ablation mapping end time: 09:29:41
Pre-Ablation mapping duration: 00:08:13

Ablations:
Earliest ablation session start time: 09:30:19
Latest ablation session end time: 09:45:34

PFA PRO:
No. of Sessions: 28
Total Time of Sessions: 00:01:56
First session start time: 09:30:19
Last session end time: 09:45:34

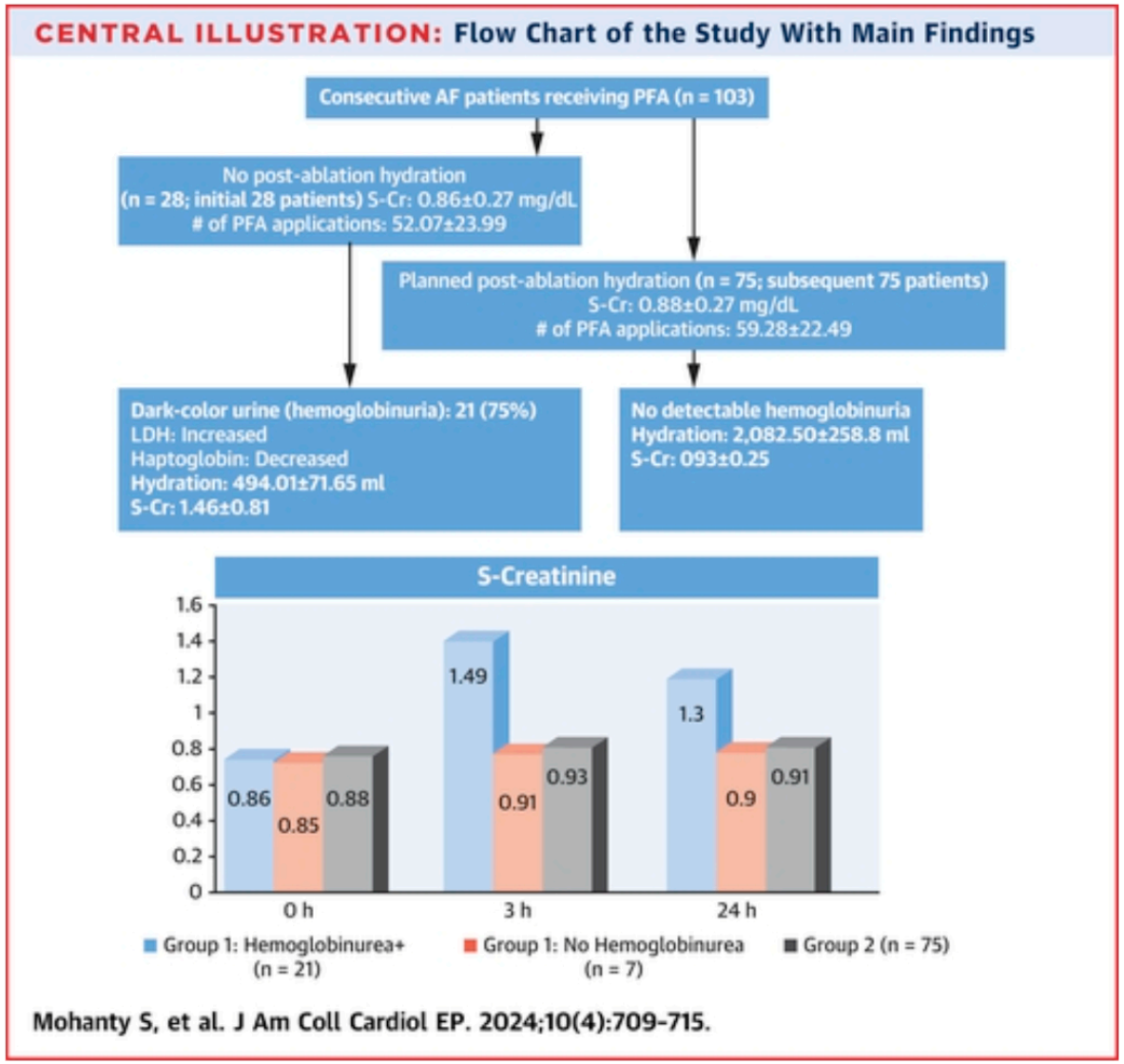
Export OK

Acute Kidney Injury Resulting From Hemoglobinuria After Pulsed-Field Ablation in Atrial Fibrillation: Is it Preventable?

Catheter Ablation - Atrial Fibrillation

Sanghamitra Mohanty, Michela Casella, Paolo Compagnucci, Prem Geeta Torlapati, Domenico Giovanni De
Vincenzo Mirco La Fazia, Carola Gianni, Gian-Battista Chierchia, Bryan MacDonald, Angel Mayedo, ... SEE

Sia il **numero di applicazioni di PFA** sia l'**idratazione post-ablazione** sono risultati **predittori indipendenti di danno renale**, che potrebbe essere prevenuto mediante una **infusione di liquidi pianificata immediatamente dopo la procedura**



Mohanty S, et al. J Am Coll Cardiol EP. 2024;10(4):709-715.

Severe acute kidney injury related to haemolysis after pulsed field ablation for atrial fibrillation

Sandrine Venier [1]*, Nathan Vaxelaire [1], Peggy Jacon[1], Adrien Carabelli [1], Antoine Desbiolles [1], Frederic Garban [2], and Pascal Defaye [1]

I due gruppi sono stati confrontati: il gruppo **haemolysis+** (haptoglobina < 0,04 g/L) e il gruppo **haemolysis–**.
Il **numero totale di applicazioni** è risultato significativamente più elevato nel gruppo **haemolysis+** rispetto al gruppo haemolysis–: rispettivamente **75 (62; 127) vs 62 (54; 71), P = 0,011**

Un numero superiore a **70 applicazioni** sembra avere **maggiore sensibilità e specificità** nel predire l'emolisi

Schiavone et al.

Parameter	Overall population (*n* = 249)	Redo procedures (*n* = 38)	De novo PVI only (*n* = 93)	De novo PVI plus additional lesion set (*n* = 118)	*p* (De novo PVI only vs. De novo additional lesion set)

Gunawardene et al.

Number of PFA delive	Additional PFA applications		;–56]	0.0552
	LAPWI (n = 59)		19 [10–26]	+32 for PVI = 51

Kueffer et al.

Total number of PFA applications for PWA	36.0 [32.0, 44.0]	High number (67%) of redo proc.

Letters

RESEARCH LETTER

Does Acute Coronary Spasm From Pulsed Field Ablation Translate Into Chronic Coronary Arterial Lesions?

Sono stati valutati i pazienti provenienti da **tre studi prospettici, a singolo braccio e monocentrici,** sottoposti ad ablazione con PFA per la fibrillazione atriale che hanno sviluppato **vasospasmo di prossimità** (**n = 30**)

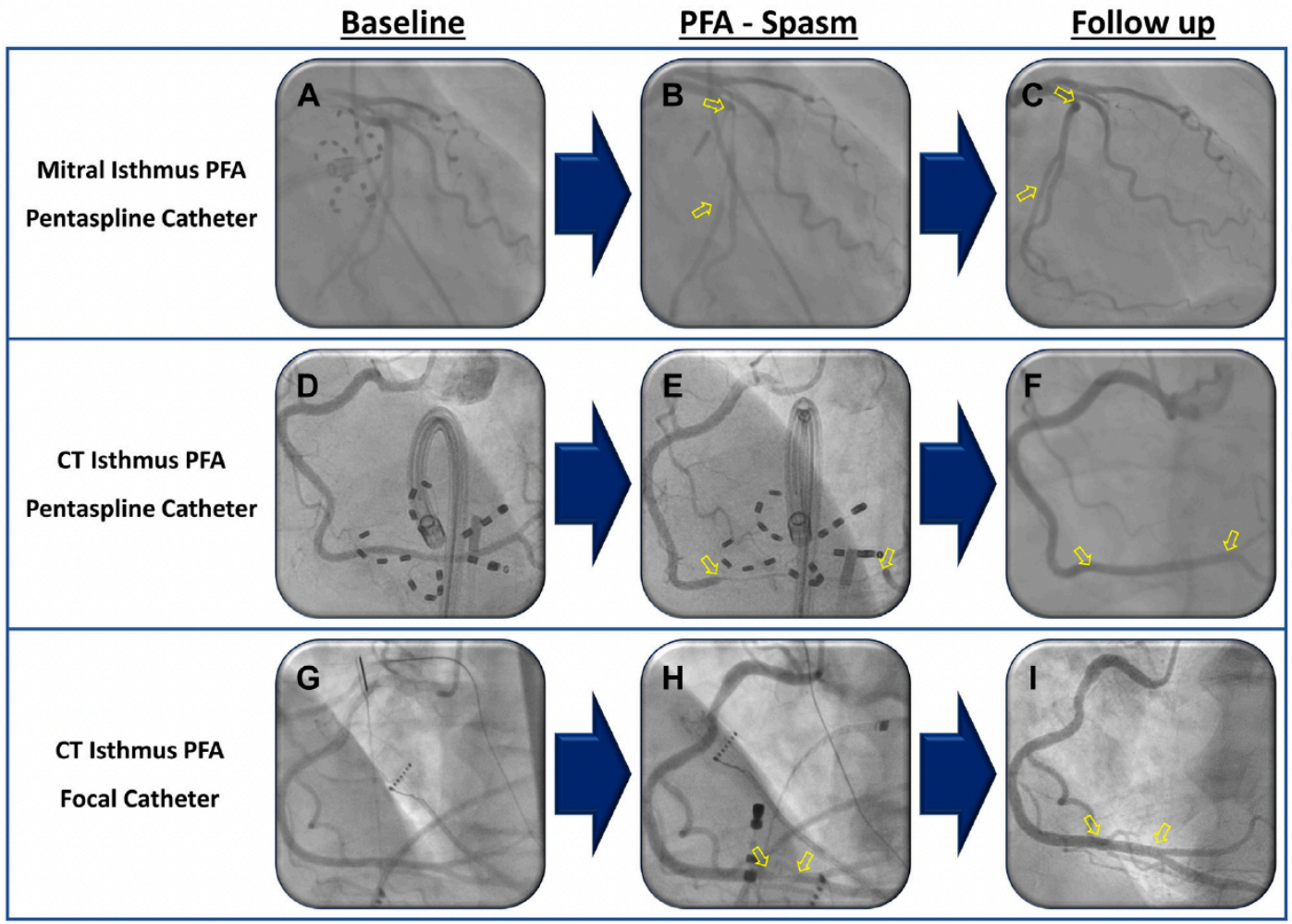
Come riportato in precedenza, la **coronarografia** è stata eseguita prima, durante e dopo la PFA nel corso della procedura iniziale

La coronarografia è stata ripetuta dopo un **follow-up mediano di 11 mesi (Q1–Q3: 9–11 mesi)** dall'ablazione. Nessun paziente (**0 su 30**) ha mostrato **nuove irregolarità coronariche o stenosi** nel sito del precedente **vasospasmo**

Questo lavoro indica una **sicurezza a lungo termine della PFA**, anche quando eseguita in **stretta prossimità dei vasi coronarici**

Protocollo di profilassi NTG: bolo ev 3mg, seguito da boli 2mg ogni 2 min dopo l'inizio della PFA

FIGURE 1 Coronary Angiograms of Selected Patients



(Top) Mitral isthmus ablation with a pentaspline pulsed field ablation (PFA) catheter. Coronary angiogram before (A), during (B), and at follow-up (C). (Middle) Cavotricuspid (CT) isthmus ablation with a pentaspline PFA catheter. Coronary angiogram before (D), during (E), and at follow-up (F). (Bottom) CT isthmus ablation with a focal PFA catheter. Coronary angiogram before (G), during (H), and at follow-up (I). Yellow arrows indicate areas of coronary vasospasm.

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Spasmo coronarico generalizzato

Multicenter Study on the Safety of Pulsed Field Ablation in Over 40,000 Patients

MANIFEST-US

Spasmo generalizzato dopo PFA applicata lontano dalle arterie coronarie in **10 pazienti/ 40000,** durante o dopo 10-45 minuti dalla procedura

In 7 su 10 pazienti si sono verificate significative sequele cliniche **(BAV completo, FV, Shock cardiogeno)**

Curiosamente 4 pazienti su 10 discendevano da abitanti delle **isole di Marshall**

Meccanismo ipotizzato: **attivazione del SNA** per stimolazione dei plessi ganglionati periatriali

Lo spasmo generalizzato si verifica raramente anche nell'ablazione termica in particolare durante **Cryoablazione**

TABLE 3 ST-Segment Elevations Following PFA at Sites Remote From Coronary Arteries

No.	Age (y)	Sex	Race/Ethnicity	Hx Vascular Disease	Hx of Vasospasm	ECG Changes	Timing of Spasm	Site of Ablation When Spasm Was Observed	NTG Given to Treat Spasm	Duration of Spasm	Other Sequelae
1	72	M	Caucasian	None	None	Yes	Intraprocedural	LSPV	No	<10 min	VF resolved
2	77	F	Caucasian	None	None	Yes	Intraprocedural	LSPV	No	<10 min	Sinus arrest that resolved
3	81	F	African American	None	None	Yes	Intraprocedural	LIPV	No	<10 min	Transient CHB
4[a,b]	72	F	Pacific Islander/ Marshallese descent	CAD with prior PCI	None	Yes—inferior leads	Intraprocedural	PWI along RSPV	Yes[c]	16 min	Cardiogenic shock/pLVAD
5[a,b]	78	M	Pacific Islander/ Marshallese descent	CAD with prior PCI	None	Yes—-diffuse ST-segment changes	Postprocedure—45 min postablation	PVI, PWI, CTI, and SVC	Yes[c]	34 min	VF/cardiogenic shock, pLVAD
6[a,b]	66	F	Pacific Islander/ Marshallese descent	None	None	Yes—diffuse ST-segment changes	Intraprocedural	PWI along roof	Yes[c]	12 min	None
7	67	F	Caucasian	None	None	Yes—diffuse ST-segment changes	Intraprocedural	PVI	No	2-3 min	None
8	73	F	Caucasian	None	None	Yes—diffuse ST-segment changes	Intraprocedural	PVI	No	1-2 min	None
9	64	M	African American	None	None	Yes—inferior-lateral leads	Intraprocedural	PVI-ECG changes noted during PFA at RIPV	Yes[c]	4 min	2:1 AV block, NSVT that recovered with chest compressions
10[b,d]	75	F	Pacific Islander/ Marshallese descent	CAD with prior PCI	None	Yes—inferior leads	Postprocedure 10 min postablation	PVI, PWI, CTI, and SVC	Yes[c]	45 min	Heart block, cardiogenic shock/pLVAD

[a]On emergent coronary angiography no spasm was seen (ST-segment elevations had resolved). Intracoronary NTG was administered. [b]These patients are of Marshallese origin—after atomic testing in the South Pacific, some from this community emigrated many years ago from the Marshall Islands to Arkansas (location of the largest such immigrant community in the United States). All 4 patients are first-generation immigrants. [c]Intracoronary NTG was administered. [d]Emergent coronary angiography revealed spasm of the right coronary artery. Intracoronary NTG was administered.

AV = atrioventricular; CAD = coronary artery disease; CHB = complete heart block; CTI = cavotricuspid isthmus; ECG = electrocardiogram; F = female; Hx = history; LIPV = left inferior pulmonary vein; LSPV = left superior pulmonary vein; M = male; NSVT = nonsustained ventricular tachycardia; NTG = nitroglycerine; PCI = percutaneous coronary intervention; PFA = pulsed field ablation; PVI = pulmonary vein isolation; pLVAD = percutaneous left ventricular assist device; PWI = posterior wall isolation; RIPV = right inferior pulmonary vein; RSPV = right superior pulmonary vein; SVC = superior vena cava; VF = ventricular fibrillation.

RESEARCH LETTER

Life-Threatening Delayed Myocardial Ischemia and Malignant Arrhythmias Occurring After Pulsed Field Ablation of Atrial Fibrillation

Melanie A. Gunawardene, MD; Boris Schmidt, MD; Petr Peichl, MD; Devi Nair, MD; Prashanthan Sanders, MD, PhD; Mohamed Abbas, MD; Arash Aryana, MD; Tom De Potter, MD; Vishal Luther, MD; Atul Verma, MD; Paul Martin, MD; Callum Yates, MD; David Schaack, MD; K.R. Julian Chun, MD

Late coronary spasms?

- Serie di pazienti provenienti da 7 diversi Centri tra marzo 2023 e dicembre 2025 che hanno avuto **gravi e tardivi eventi avversi** dopo una procedura di PFA per FA (11 su 6721 pazienti; 0,16%)
- Sebbene la maggior parte dei pazienti avesse ricevuto ablazioni aggiuntive oltre le vene polmonari, **un caso fatale si è verificato anche dopo una semplice procedura di isolamento delle vene polmonari**, suggerendo che tali complicanze possano interessare anche pazienti a rischio relativamente basso
- Al momento non è possibile né confermare né escludere con certezza un **rapporto causale** tra la **PFA** e i decessi cardiaci improvvisi tardivi osservati, eventi che possono verificarsi anche dopo ablazione termica della fibrillazione atriale
- Tuttavia, la comparsa di **rari ma gravi eventi avversi ischemici e aritmici** sottolinea la necessità di una migliore identificazione, segnalazione e comprensione dei meccanismi sottostanti, al fine di ottimizzare ulteriormente la sicurezza della PFA

CONCLUSIONI

- La **PFA è la più importante recente innovazione** in elettrofisiologia interventistica, e ha modificato radicalmente l'approccio all'ablazione della fibrillazione atriale

- I dati più recenti, inclusi quelli derivanti da studi con **monitoraggio continuo mediante ILR**, suggeriscono una **maggiore efficacia rispetto alle tecniche termiche** nel ridurre il burden aritmico e le recidive

- Grazie alla sua **selettività tissutale**, la PFA evita gran parte delle complicanze tipiche dell'ablazione termica, come **danno esofageo, stenosi delle vene polmonari e paralisi persistente del nervo frenico**

- Sono però emerse **nuove complicanze specifiche** della PFA: **IRA da emolisi, lesioni cerebrali silenti e spasmo coronarico di prossimità e generalizzato.** Sono rare e in parte in progressiva riduzione grazie all'ottimizzazione delle strategie procedurali, ma ne andranno chiariti meccanismi e reale incidenza