PLACE

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

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FIBRILLAZIONE ATRIALE: NOVITÀ TECNOLOGICHE PER IL TRATTAMENTO ABLATIVO

Come rendere riproducibile il workflow nell'ablazione della fibrillazione atriale con tecnologia "very high power short duration"

Giuseppe Stabile

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ESC GUIDELINES

2016 ESC Guidelines for the management of atrial fibrillation developed in collaboration with EACTS

Recommendations for catheter ablation of atrial fibrillation and atrial fibrillation surgery

Recommendations	Class[a]	Level[b]	Ref[c]
Catheter ablation of symptomatic paroxysmal AF is recommended to improve AF symptoms in patients who have symptomatic recurrences of AF on antiarrhythmic drug therapy (amiodarone, dronedarone, flecainide, propafenone, sotalol) and who prefer further rhythm control therapy, when performed by an electrophysiologist who has received appropriate training and is performing the procedure in an experienced centre.	I	A	585–587, 713, 727
Ablation of common atrial flutter should be considered to prevent recurrent flutter as part of an AF ablation procedure if documented or occurring during the AF ablation.	IIa	B	827
Catheter ablation of AF should be considered as first-line therapy to prevent recurrent AF and to improve symptoms in selected patients with symptomatic paroxysmal AF as an alternative to antiarrhythmic drug therapy, considering patient choice, benefit, and risk.	IIa	B	585
Catheter ablation should target isolation of the pulmonary veins using radiofrequency ablation or cryothermy balloon catheters.	IIa	B	585, 715, 716, 734, 735
Catheter or surgical ablation should be considered in patients with symptomatic persistent or long-standing persistent AF refractory to AAD therapy to improve symptoms, considering patient choice, benefit and risk, supported by an AF Heart Team.	IIa	C	468, 735, 777, 831, 832, 1040

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Center experience does not influence long-term outcome and peri-procedural complications after cryoballoon ablation of paroxysmal atrial fibrillation: Data on 860 patients from the real-world multicenter observational project

Maurizio Landolina [a,*], Giuseppe Arena [b], Saverio Iacopino [c], Roberto Verlato [d], Paolo Pieragnoli [e], Antonio Curnis [f], Maurizio Lunati [g], Werner Rauhe [h], Gaetano Senatore [i], Luigi Sciarra [j], Giulio Molon [k], Pietro Maria G. Agricola [a,l], Luigi Padeletti [m,n], Claudio Tondo [o]

Table 2
Procedural, fluoroscopic, ablation duration time and procedural data according to center experience by quartiles.

Procedural characteristics	TOTAL ($N = 860$)	1st quartile ($N = 27$)	2nd quartile ($N = 91$)	3rd quartile ($N = 195$)	4th quartile ($N = 547$)	*P*-value
Procedure duration (min)	105.0	130.0	145.0	120.0	90.0	<0.001
Median (IQR)	(77–135)	(90–160)	(120–180)	(90–150)	(70–120)	
Fluoroscopy duration (min)	25.0	37.0	39.0	26.0	24.0	<0.001
Median (IQR)	(18–35)	(22–54)	(25–50)	(20–36)	(18–30)	
Ablation time (min)	20.0	20.0	26.0	24.0	19.0	<0.001
Median (IQR)	(16–32)	(15–32)	(20–32)	(16–35)	(16–29)	
Left superior pulmonary vein*	98.6%	100%	98.7%	97.4%	98.7%	0.564
Number of freeze applications	1.5 ± 0.8	1.5 ± 0.8	1.8 ± 1.1	1.6 ± 0.8	1.3 ± 0.7	<0.001
Left inferior pulmonary vein*	97.8%	96.3%	96.7%	96.9%	98.5%	0.098
Number of freeze applications	1.4 ± 0.6	1.4 ± 0.5	1.5 ± 0.8	1.5 ± 0.6	1.3 ± 0.6	<0.001
Right superior pulmonary vein*	98.9%	92.6%	96.7%	97.9%	99.3%	0.034
Number of freeze applications	1.3 ± 0.6	1.4 ± 0.6	1.5 ± 0.7	1.4 ± 0.6	1.2 ± 0.5	<0.001
Right inferior pulmonary vein*	97.2%	88.3%	87.9%	90.7%	98.3%	<0.001
Number of freeze applications	1.3 ± 0.6	1.3 ± 0.5	1.6 ± 0.9	1.4 ± 0.6	1.2 ± 0.5	<0.001

*The percentage refers to successfully isolated pulmonary vein.

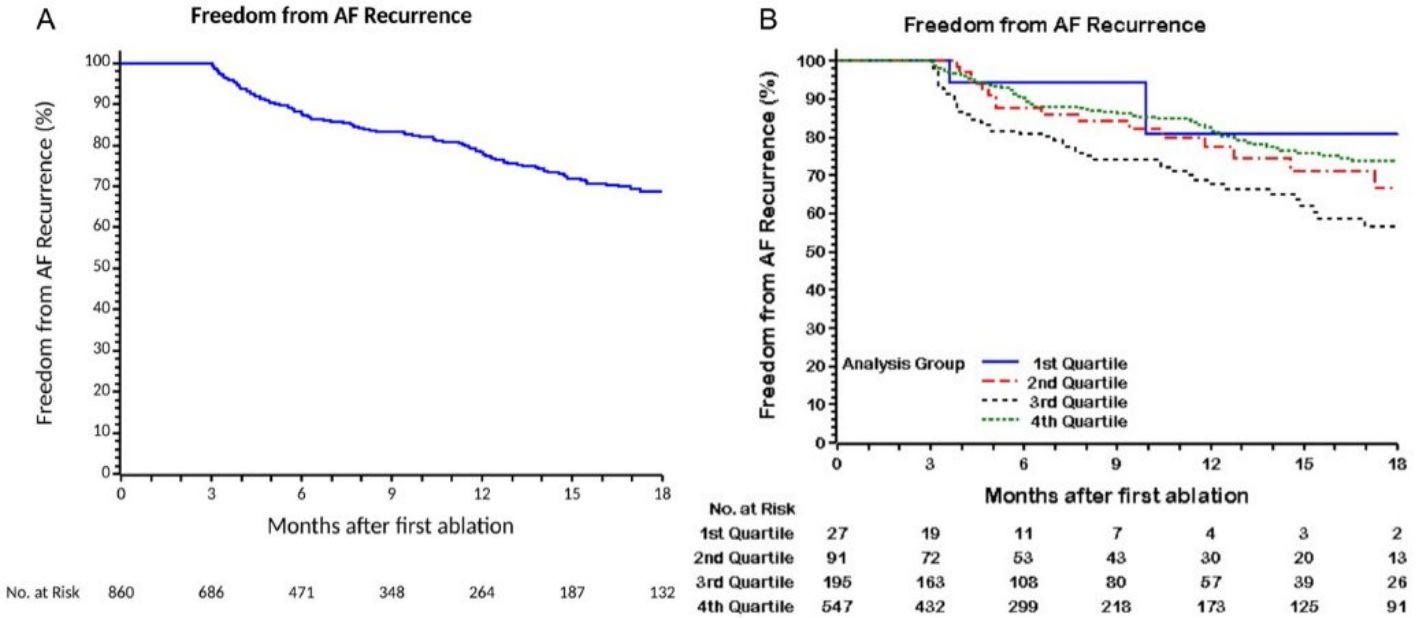

Fig. 1. Freedom from first AF recurrence in the total population (Panel A) and according to center experience (Panel B).

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CLINICAL RESEARCH

Results from a multicentre comparison of cryoballoon vs. radiofrequency ablation for paroxysmal atrial fibrillation: is cryoablation more reproducible?

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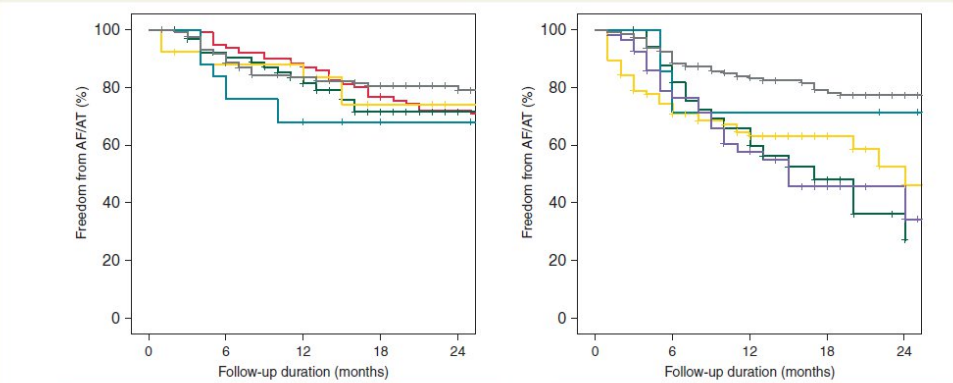


	0	6	12	18	24	0	6	12	18	24
A	25	20	17	15	13	7	6	5	5	4
B	100	95	88	67	62	0	0	0	0	0
C	72	55	43	15	4	34	29	21	10	4
D	0	0	0	0	0	107	33	21	13	8
E	26	21	19	4	2	100	64	47	16	8
F	170	153	132	89	53	219	198	139	87	32

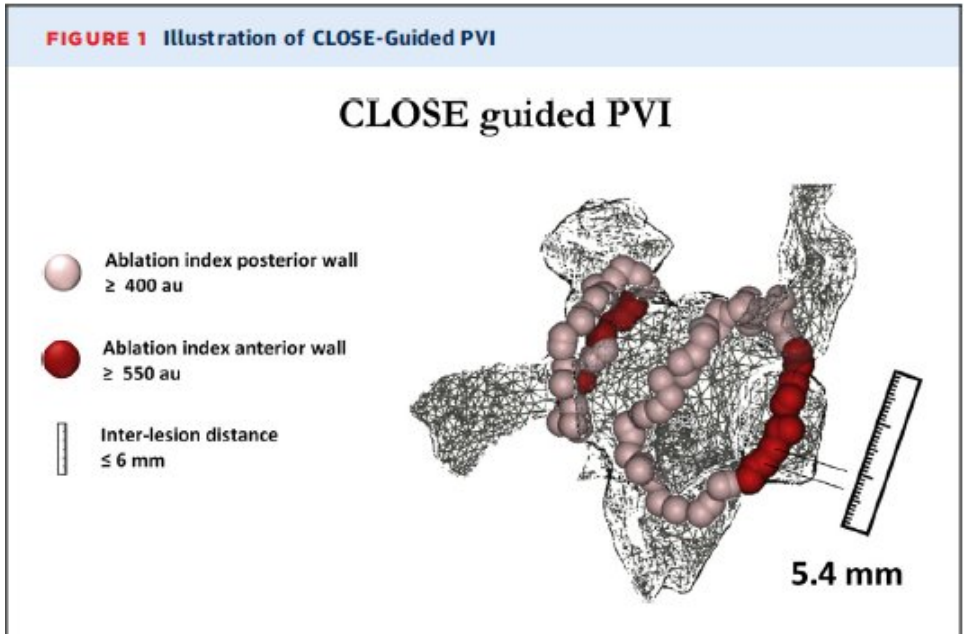
Figure 2 An overview of procedural results and freedom from AF in patients treated with Cryoballoon (left) and RF (right). RF, radiofrequency ablation; Cryoballoon, Cryoballoon ablation; A, B, C, D, E, and F, centres.

Evaluation of a Strategy Aiming to Enclose the Pulmonary Veins With Contiguous and Optimized Radiofrequency Lesions in Paroxysmal Atrial Fibrillation

A Pilot Study

Philippe Taghji, MD,[a] Milad El Haddad, MSc, PhD,[b] Thomas Phlips, MD,[a] Michael Wolf, MD,[a] Sebastien Knecht, MD, PhD,[a] Yves Vandekerckhove, MD,[a] Rene Tavernier, MD, PhD,[a] Hiroshi Nakagawa, MD, PhD,[c] Mattias Duytschaever, MD, PhD[a,b]

FIGURE 1 Illustration of CLOSE-Guided PVI



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ELECTROPHYSIOLOGY

PACE WILEY

Reproducibility of acute pulmonary vein isolation guided by the ablation index

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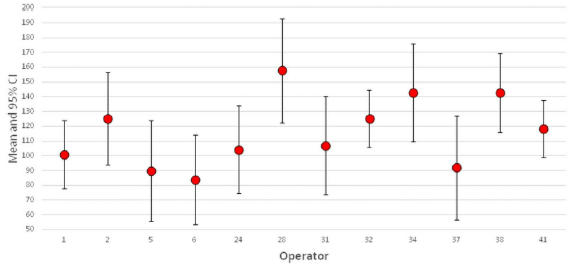


FIGURE 1 Distribution of procedure time (minutes) among the 12 operators who performed at least 15 ablation procedures [Color figure can be viewed at wileyonlinelibrary.com]

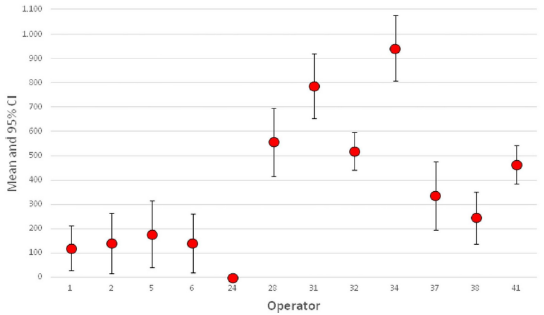


FIGURE 2 Distribution of fluoroscopy time (seconds) among the 12 operators who performed at least 15 ablation procedures [Color figure can be viewed at wileyonlinelibrary.com]

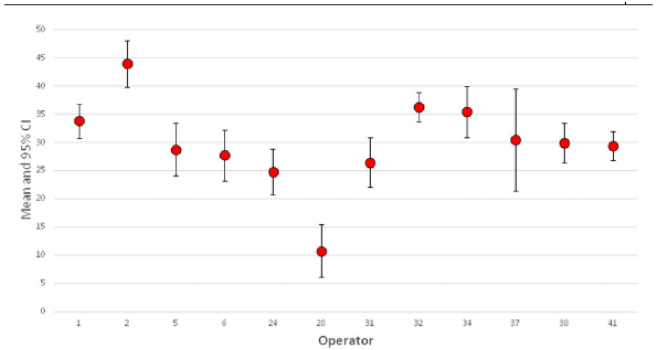


FIGURE 3 Distribution of ablation time (minutes) among the 12 operators who performed at least 15 ablation procedures [Color figure can be viewed at wileyonlinelibrary.com]

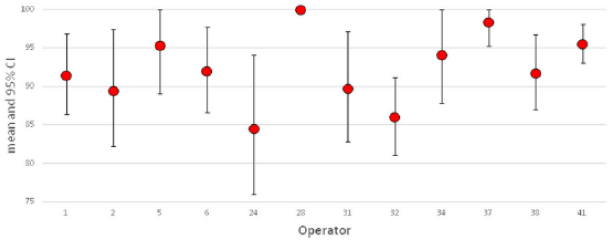
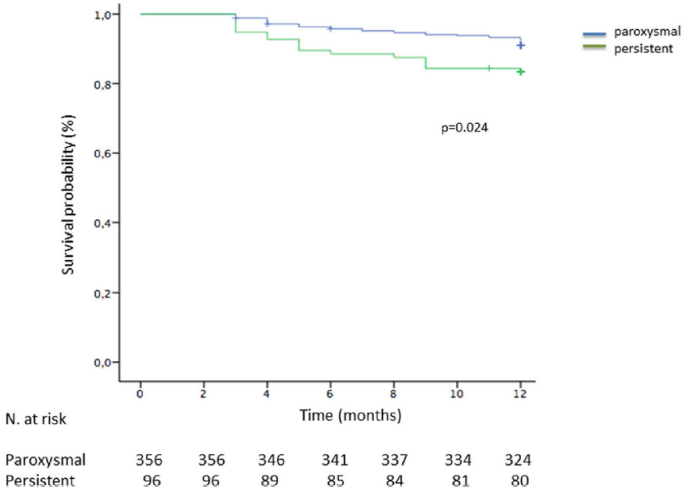


FIGURE 4 Distribution of rate of first-pass pulmonary vein isolation (%) among the 12 operators who performed at least 15 ablation procedures [Color figure can be viewed at wileyonlinelibrary.com]

Reproducibility of pulmonary vein isolation guided by the ablation index: 1-year outcome of the AIR registry

Giuseppe Stabile MD[1,2,3] | Antoine Lepillier MD[4] | Ermenegildo De Ruvo MD[5] | Marco Scaglione MD[6] | Matteo Anselmino MD[7] | Frederic Sebag MD[8] | Domenico Pecora MD[9] | Mark Gallagher MD[10] | Mariano Rillo MD[11] | Graziana Viola MD[12] | Luca Rossi MD[13] | Valerio De Santis MD[14] | Maurizio Landolina MD[15] | Antonello Castro MD[16] | Massimo Grimaldi MD[17] | Nicolas Badenco MD[18] | Maurizio Del Greco MD[19] | Antonio De Simone MD[2] | Ennio Pisanò MD[20] | Salim Abbey MD[21] | Filippo Lamberti MD[22] | Antonio Pani MD[23] | Giulio Zucchelli MD[24] | Giuseppe Sgarito MD[25] | Daniela Dugo MD[26] | Emanuele Bertaglia MD[27] | Teresa Strisciuglio MD[1,28] | Francesco Solimene MD[1]



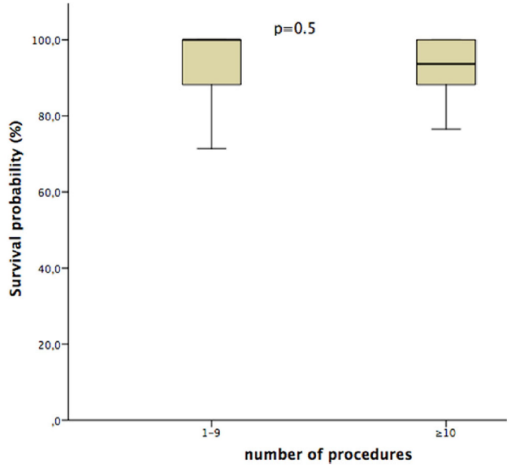


FIGURE 5 Atrial fibrillation recurrence rate between low-volume (<10 procedures) and high-volume (≥10 procedures) operators

Standardized pulmonary vein isolation workflow to enclose veins with contiguous lesions: the multicentre VISTAX trial

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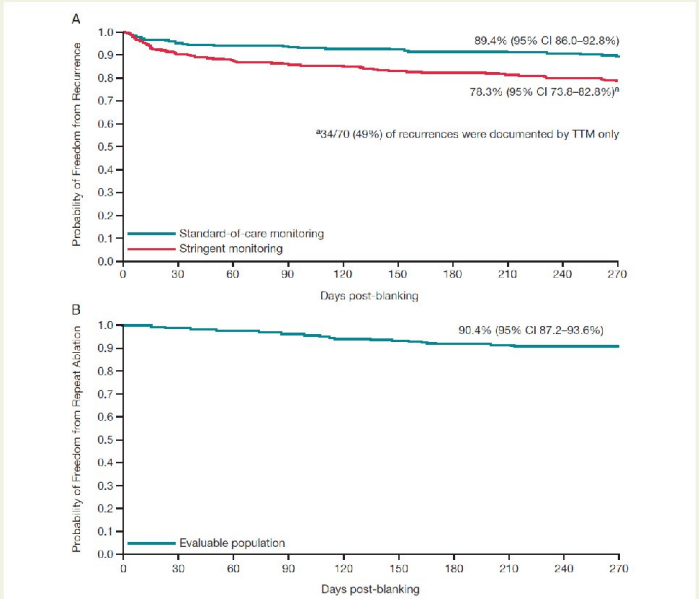


Figure 1 The Kaplan–Meier analyses in the evaluable population, during a 9-month post-blanking period, of (*A*) time to first documented AF/AT/atrial flutter recurrence with stringent arrhythmia monitoring using ECG, Holter, and TTM (red line) and freedom from documented AF/AT/atrial flutter recurrence with standard-of-care monitoring (excluding TTM, green line), and (*B*) freedom from repeat ablation. (*A*, *B*) AF, atrial fibrillation; AT, atrial tachycardia; CI, confidence interval; TTM, transtelephonic monitoring.

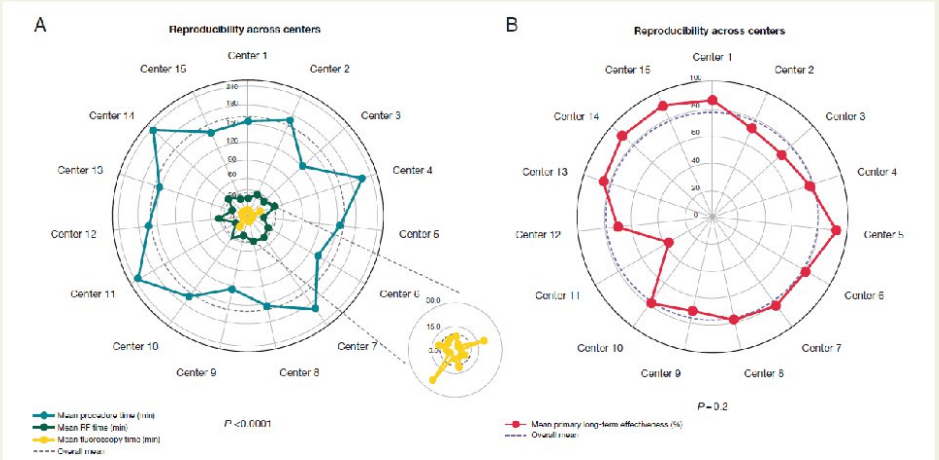


Figure 2 Reproducibility of procedural efficiency (*A*) and long-term effectiveness (*B*) in the evaluable population ($n = 329$). (*A*, *B*) RF, radiofrequency.

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]

FIGURE 1 Comparison Between Standard Ablation and High-Power, Short-Duration Ablation

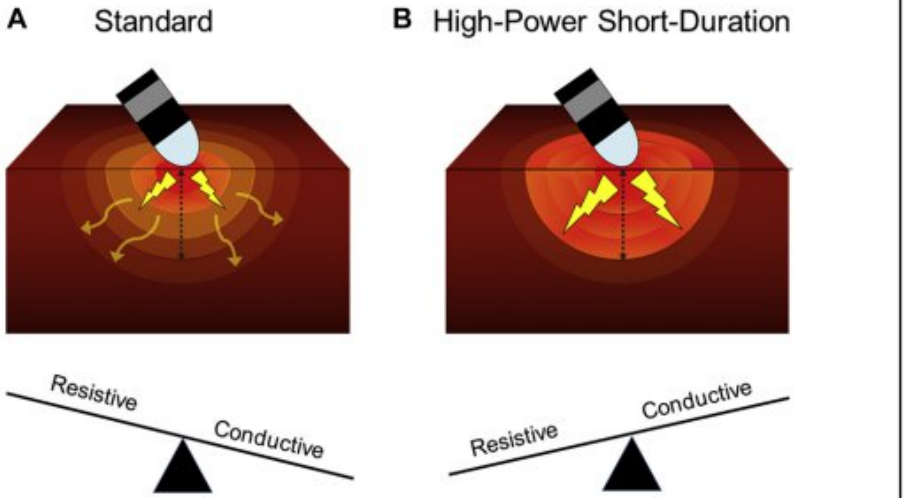
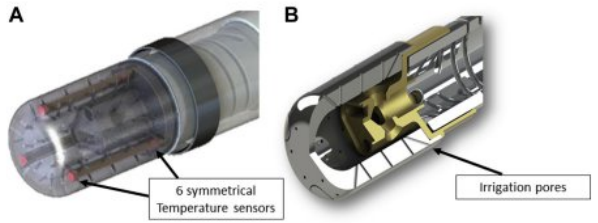


FIGURE 2 Novel Ablation Catheter Design



The QDOT Micro Ablation Catheter is based on the Thermocool SmartTouch SF Catheter. It incorporates 6 thermocouples symmetrically embedded in the circumference of the tip electrode **(A)** and an improved irrigation system **(B)**. See text for details.

FIGURE 5 Comparison of Right Atrial Lines Between HP-SD and Standard Ablation

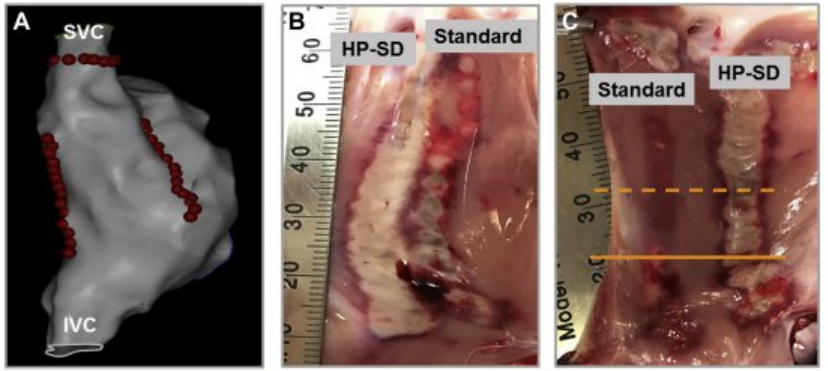
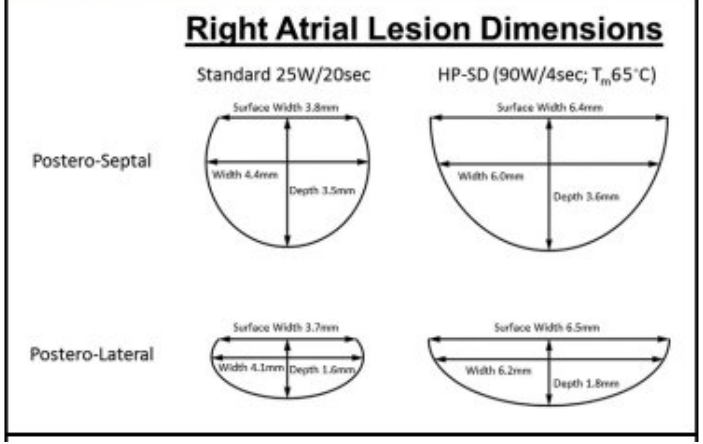


TABLE 2 Biophysical Ablation Parameters of Right Atrial Lines: HP-SD Lesions Compared With Standard Ablation

	Posteroseptal Right Atrial Lines			Posterolateral Right Atrial Lines		
	Standard Ablation 25 W/20 s (n = 64)	HP-SD Ablation 90 W/4 s (n = 63)	p Value	Standard Ablation 25 W/20 s (n = 61)	HP-SD Ablation 90 W/4 s (n = 67)	p Value
Maximal temperature, C°	28.9 ± 1	63.7 ± 7	<0.001	33.6 ± 7	62.7 ± 7	<0.001
Average temperature, C°	26.7 ± 1	52.6 ± 4	<0.001	30.8 ± 7	51.6 ± 4	<0.001
Average power, W	24.2 ± 1	72.7 ± 12	<0.001	24.0 ± 1	78.1 ± 10	<0.001
Impedance drop, Ω	14.4 ± 4	14.4 ± 3	0.92	14.5 ± 6	14.8 ± 4	0.26
Contact force, g (range)	15.7 ± 6 (3.8–34.9)	16.7 ± 7 (9.3–39.5)	0.42	14.6 ± 6 (6.1–39.2)	14.9 ± 5 (5.8–25.6)	0.43

Values are mean ± SD.
HP-SD = high power, short duration.

FIGURE 6 Differences in Architectural Properties of the HP-SD and Standard Ablation Lesions in the Right Atrium

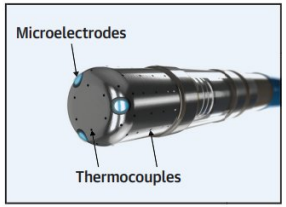


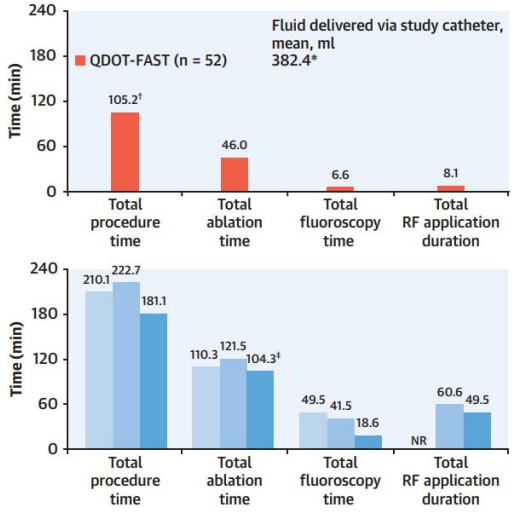
Pulmonary Vein Isolation With Very High Power, Short Duration, Temperature-Controlled Lesions

The QDOT-FAST Trial

Vivek Y. Reddy, MD,[a,b] Massimo Grimaldi, MD,[c] Tom De Potter, MD,[d] Johan M. Vijgen, MD,[e] Alan Bulava, MD, PhD,[f] Mattias Francis Duytschaever, MD,[g] Martin Martinek, MD,[h] Andrea Natale, MD,[i] Sebastien Knecht, MD, PhD,[g] Petr Neuzil, MD, PhD,[h] Helmut Pürerfellner, MD[h]

CENTRAL ILLUSTRATION A Novel Temperature-Controlled RF Ablation Catheter





*n = 50.
†Includes 20-minute waiting period.
‡Includes 30-minute waiting period.

Reddy, V.Y. et al. J Am Coll Cardiol EP. 2019;5(7):778-86.

TABLE 3 PAE in the Safety Population (n = 52)

	PAE	Relationship With Device or Procedure
Total PAE	2 (3.8)	
Death	0	–
Atrioesophageal fistula*	0	–
Cardiac tamponade/perforation	0	–
Myocardial infarction	0	–
Stroke	0	–
Cerebrovascular accident	0	–
Thromboembolism	1 (1.9)	Possibly related to device; probably related to procedure
Transient ischemic attack	0	–
Phrenic nerve paralysis	0	–
PV stenosis*	0	–
Major vascular access complication or bleeding	1 (1.9)	Not related to device; possibly related to procedure

Values are n (%). *Device- or procedure-related death, PV stenosis, and atrioesophageal fistula that occur >1 week (7 days) post-procedure are considered and analyzed as PAE.

PAE = primary adverse event; PV = pulmonary vein.

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ELECTROPHYSIOLOGY

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In vivo biophysical characterization of very high power, short duration, temperature-controlled lesions

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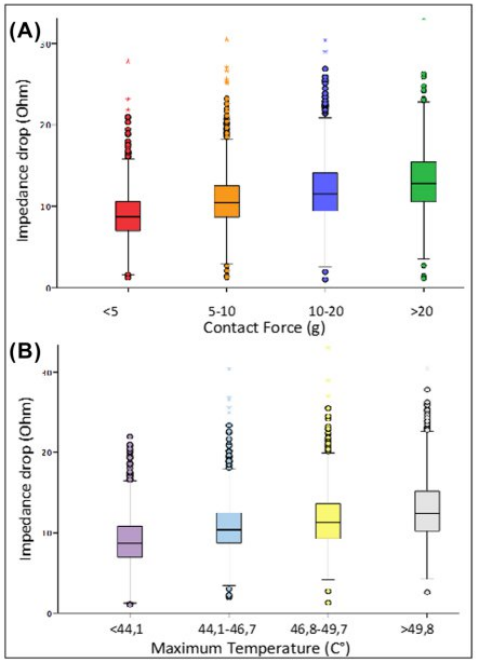

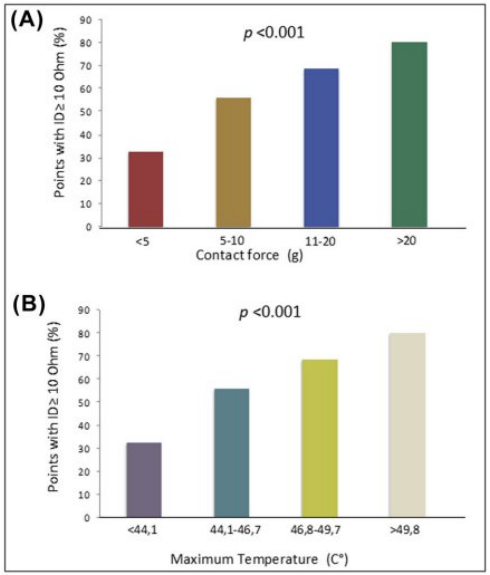

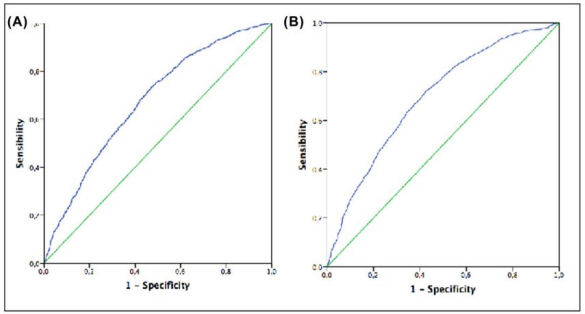

FIGURE 5 ROC curves of contact force (CF) (A) and maximum temperature (B). The AUC is 0.67 and 0.69, respectively [Color figure can be viewed at wileyonlinelibrary.com]

A CF of 8 g and a maximum temperature of 47◦C are the optimal cutoff discriminatory value for adequate lesion formation

Safety of very high-power short-duration radiofrequency ablation for pulmonary vein isolation: a two-centre report with emphasis on silent oesophageal injury

Philipp Halbfass [1*†], Jean-Yves Wielandts [2†], Sébastien Knecht[2], Jean-Benoît Le Polain de Waroux [2], René Tavernier [2], Vincent De Wilde[3], Kai Sonne [1], Karin Nentwich [1], Elena Ene [1], Artur Berkovitz [1], Julian Mueller[1], Lukas Lehmkuhl [4], Amelie Reichart[5], Ulrich Lüsebrink [5], Mattias Duytschaever[2], and Thomas Deneke [1]

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Table 2 Procedural and post-procedural parameters

	All patients ($n = 90$)	Bad Neustadt ($n = 45$)	Bruges ($n = 45$)	*P*-value
Procedure time (min)	95.5 ± 28.8	85.2 ± 21.8	105.8 ± 31.1	<0.001
Extra-PV ablation targets	26 (29)	9 (20)	17 (38)	0.10
Mean contact force at posterior wall (g)	16.5 ± 4.4	18.5 ± 4.1	14.5 ± 3.7	<0.001
Max ablation temperature (°C)	47.6 ± 3.8	46.0 ± 3.1	49.2 ± 3.6	<0.001

Patients undergoing PVI at Bad Neustadt EP centre were ablated using the nGEN generator, patients treated at Bruges EP centre were ablated using the nMARQ generator.
EP, electrophysiology; PV, pulmonary vein; PVI, pulmonary vein isolation.

First-pass isolation was achieved in 39 out of 90 patients (43% in the overall cohort, 40% BN vs. 47% BRU) requiring touch-up RF in 51 out of 90 (57%) of patients. The site of residual conduction in case of non-first-pass isolation was found at the carina in 45 out of 62 circles

No steam pop, cardiac tamponade, stroke, neurologic deficit, or fistula was reported

Post-ablation EGD was done in all patients included in this study on a mean of 8 ± 8 days after ablation. Median time between ablation procedure and EGD was 3 days (1–15) ranging from 1 to 28 days. None of the patients revealed ulceration. One patient at BRU centre (1.1%) revealed a small and superficial oesophageal erosion in loco typico.

Safety aspects of very high power very short duration atrial fibrillation ablation using a modified radiofrequency RF-generator: Single-center experience

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34 consecutive patients (67 ± 9 years; 62% male; 68% paroxysmal AF) were included. First-pass isolation of all PVs was achieved in 6/34 (18%) patients. First-pass isolation was seen in 37/68 (54%) of PV pairs. Early reconnection occurred in 11 (32%) patients (including reconnections at posterior LA wall sites n = 6 and at nonposterior sites n = 5). No patient had an EDEL (0%). In 6/23 (26%) patients undergoing postablation cerebral MRI SCEs were identified. In six patients, coagulation on the catheter tip was detected at the end of the procedure. No further peri- or postprocedural complications were detected.

Early AF recurrence before discharge was seen in 1/34 (3%) of the patients included in this study. Within 3 months 10/34 (29%) revealed AF recurrence during blanking period. After a mean follow-up of 7 months, 31/34 (88%) patients revealed sinus rhythm.

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Very high-power short-duration temperature-controlled ablation versus conventional power-controlled ablation for pulmonary vein isolation: The fast and furious - AF study

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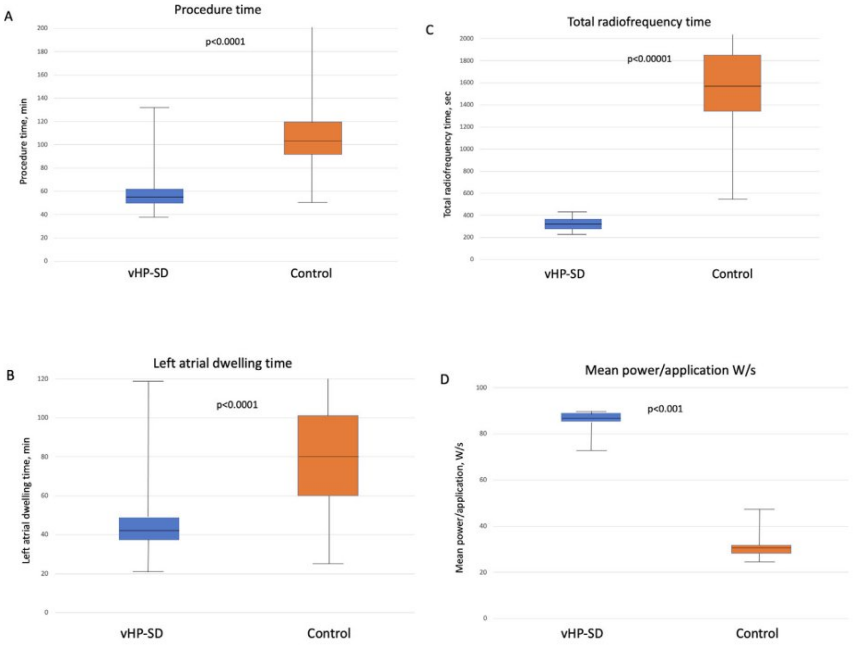

Table 3
Procedural details - individual pulmonary vein.

Variable	vHP-SD	Control	P
Right-sided PVs	28	28	
Total ablation time, sec	154 (124, 176)	750 (580, 1006)	<0.0001
Total number of applications	39 (31, 44)	40 (27, 53)	0.296
Mean application duration, sec	4 (4, 4)	21 (16, 23)	0.001
Mean contact force, g	16 (14, 19)	20 (18, 25)	<0.0001
Mean power/application, Watt	84 (82, 85)	31 (29, 32)	<0.001
Total delivered power/lesion, Joule	338 (328, 339)	594 (500, 683)	<0.001
FAVI	27 (96)	16 (57)	0.005
Left-sided PVs	28	28	
Total ablation time, sec	172 (143, 211)	831 (545, 972)	<0.0001
Total number of applications	43 (36, 53)	40 (27, 58)	0.658
Mean application duration, sec	4 (4, 4)	21 (15, 24)	0.001
Mean contact force, g	14 (11, 17)	16 (14, 19)	<0.0001
Mean power/application, Watt	84 (82, 85)	31 (29, 31)	<0.001
Total delivered power/lesion, Joule	336 (328, 338)	608 (460, 709)	0.002
FAVI	18 (64)	20 (71)	0.571

Values are counts, n (%) or median (first quartile, third quartile). PV(s) = Pulmonary vein(s), FAVI = first attempt vein isolated, sec = seconds, g = grams.

Impact of High-Power and Very High-Power Short-Duration Radiofrequency Ablation on Procedure Characteristics and First-Pass Isolation During Pulmonary Vein Isolation

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TABLE 2 | Procedural characteristics.

Ablation characteristics	LPLD (*n* = 53)	HPSD (*n* = 50)	vHPSD (*n* = 53)	*P*-value
Procedure time (min)	85 (75–101)	79 (65–91)	70 (53–83)	**<0.0001**
LA dwelling time (min)	61 (55–70)	53 (41–56)	45 (34–52)	**<0.0001**
DAP (mGym^2)	0.16 (0.11–0.25)	0.1 (0.08–0.18)	0.17 (0.11–0.27)	**0.0014**
Ablation points	61 (52–69)	56 (44–65)	85 (63–99)	**<0.0001**
RF ablation time (s)	1,567 (1,366–1,761)	1,398 (1,021–1,711)	336 (247–386)	**<0.0001**
Total RF energy (J)	47,010 (40,980–52,830)	69,900 (51,050–85,538)	30,240 (22,095–34,875)	**<0.0001**
FPI both sides	30 (57%)	39 (78%)	43 (80%)	**0.0097**
FPI of the left PVs	35 (66%)	46 (92%)	46 (85%)	**0.0015**
FPI of the right PVs	38 (72%)	44 (88%)	48 (88%)	**0.0188**

DAP, dose area product; LA, left atrial; LPLD, low-power long-duration group; HPSD, high-power short-duration group; LA, left atrium; RF, radiofrequency; FPI, first pass isolation; PV, pulmonary vein. The continuous variables were expressed as medians and interquartile ranges, while the categorical variables were expressed as percentages with event numbers. The bold variables are statistically significant.

All patients from the study reached the 9-month follow-up period. At this time, there was a significant difference in the AF recurrence between the three groups (36, 10, and 8% in the LPLD, HPSD, and vHPSD groups, respectively, p = 0.0001).

One-year outcomes in patients undergoing very high-power short-duration temperature-controlled ablation for atrial fibrillation vHPSD ablation for PVI: procedural and one year outcomes.

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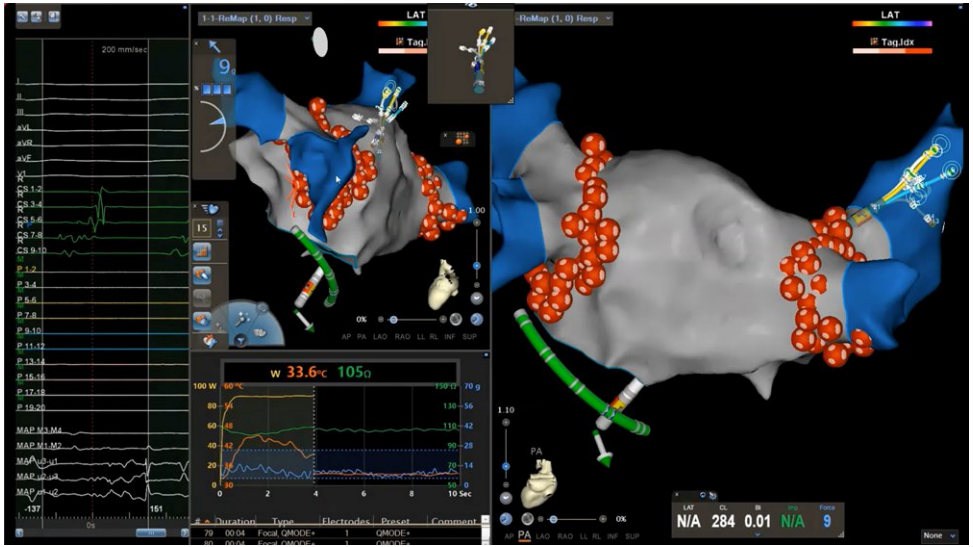
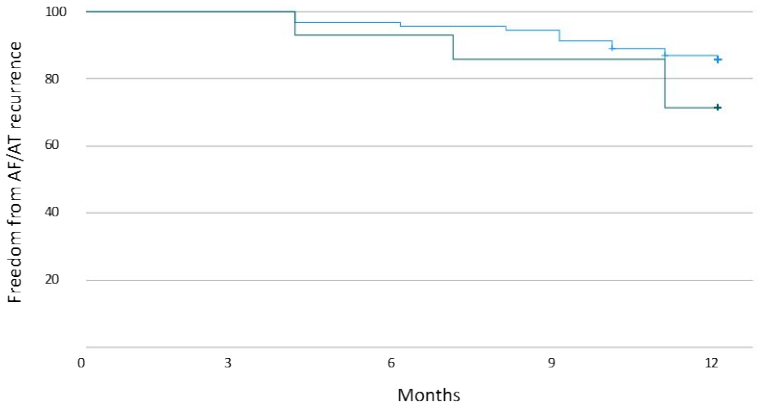


Overall, 163 patients were enrolled in the study (29 persistent AF, 134 paroxysmal AF).

The procedures were performed under general anesthesia in all patients except for 5 that received deep sedation. With a median number of 80 RF tags (IQR 74-90) the PVI could be reached in all patients and in 88% cases at first pass. In 2% of patients acute PV reconnections were observed.
The procedural time (skin to skin) was 75±20 min, the RF time was 5,5±1 min and the fluoroscopy time was 9±6 min.
No steam pops, tamponade, death nor stroke occurred, however 5 patients experienced an access site related vascular complication.

Overall, 91/134 paroxysmal AF patients and 14/29 persistent AF patients completed the 12-months follow-up. The freedom from any atrial tachyarrhythmias recurrence was 84%, (14 AF recurrence and 1 patient had electrocardiographic evidence of both AF and atrial flutter recurrence) in the paroxysmal cohort and 71% (3 AF recurrence and 1 atrial flutter /tachycardia) in the persistent group.

Nine patients underwent a redo procedure for AF/AT recurrence. In 4 patients all the veins were still isolated, whereas in the remaining 5 patients, one reconnected vein was observed in 4 patients and 2 reconnected veins in 1 patient. Thus, 30/36 veins were still isolated and the PVI durability was 83%.



	N. at risk				
Paroxysmal AF patients (blue curve)	91	91	88	86	76
Persistent AF patients (green curve)	14	14	13	12	10

Patient experience of very high power short duration radiofrequency ablation for atrial fibrillation under mild conscious sedation

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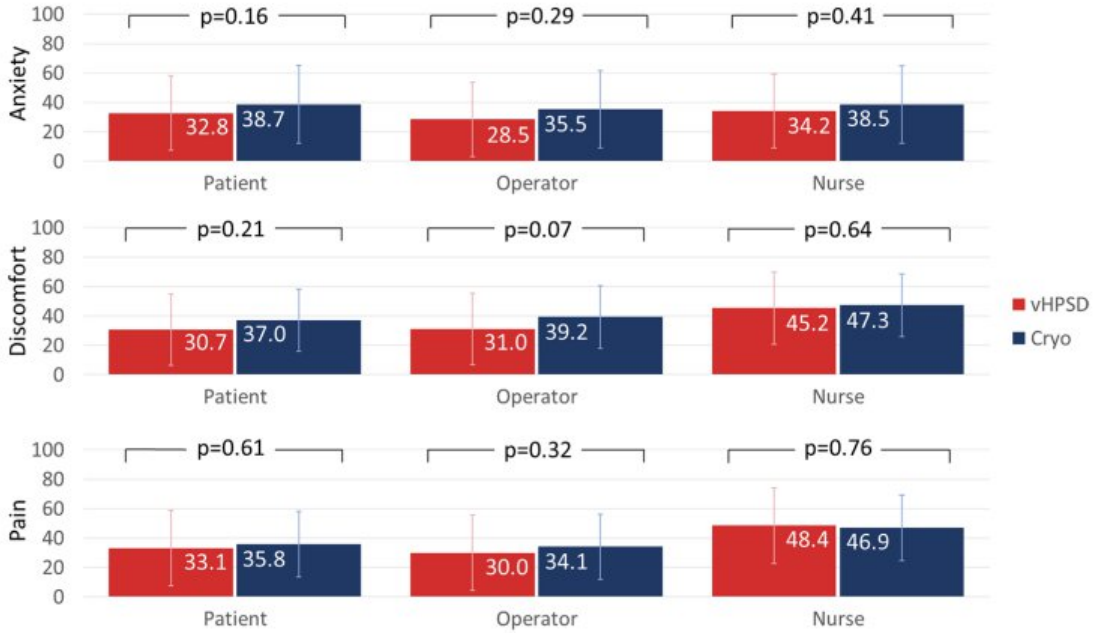
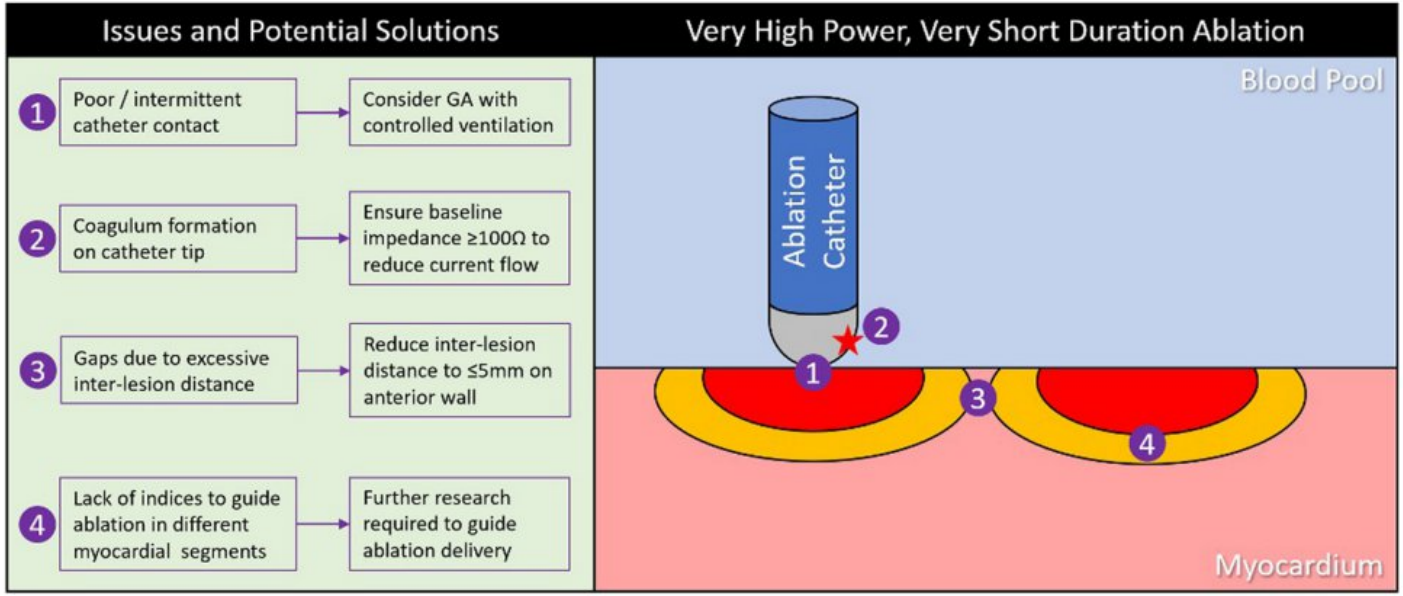


Very high power very short duration ablation for atrial fibrillation: With great power comes great responsibility



AIR Q Registry