PRATICO

RYTHMO

Le séminaire de rythmologie pratique
dédié aux cardiologues

7ÈME ÉDITION

SAMEDI 29 NOVEMBRE 2025

PULLMAN LYON
44 Bd Marius Vivier Merle
69003 Lyon

Le rôle clef de l'IA pour aider dans l'ablation de la FA persistante

Dr Julien SEITZ

Coordinateur de l'unité de Rythmologie interventionnelle

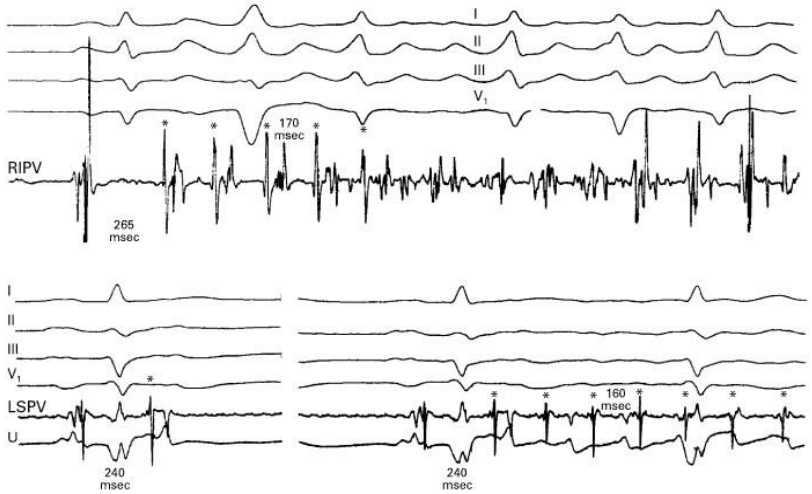
Hôpital Saint Joseph-Marseille

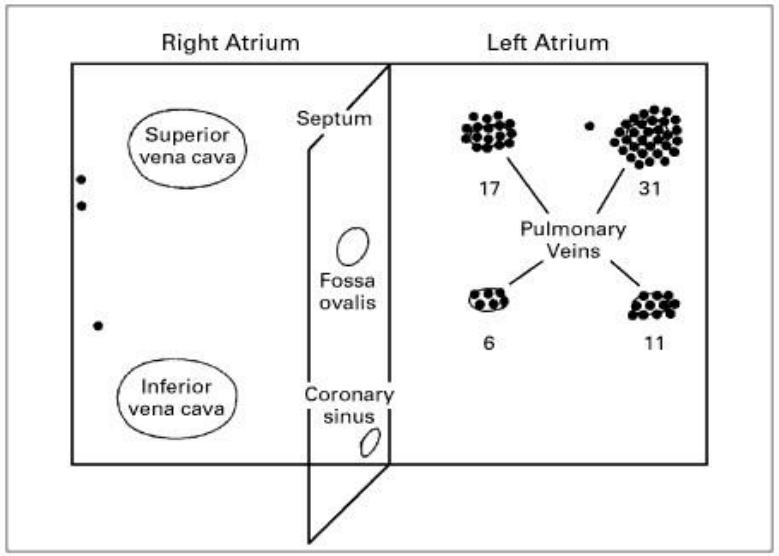
Disclosures

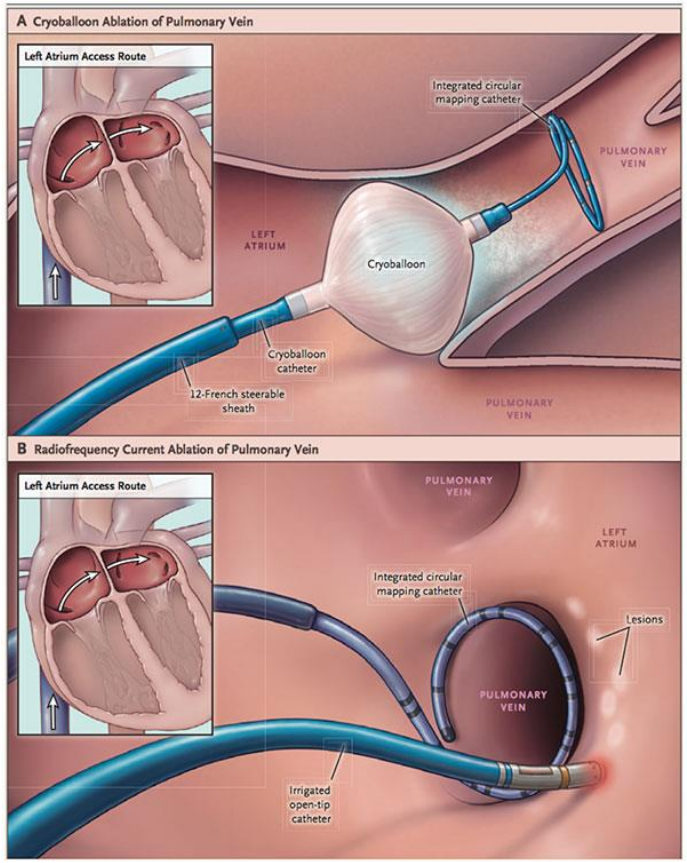
Speaker Fees: Biosense Webster, Abbott

Co-founder & shareholder of Volta Medical

Ablation de la FA paroxystique par déconnection des VPs: un gold standard





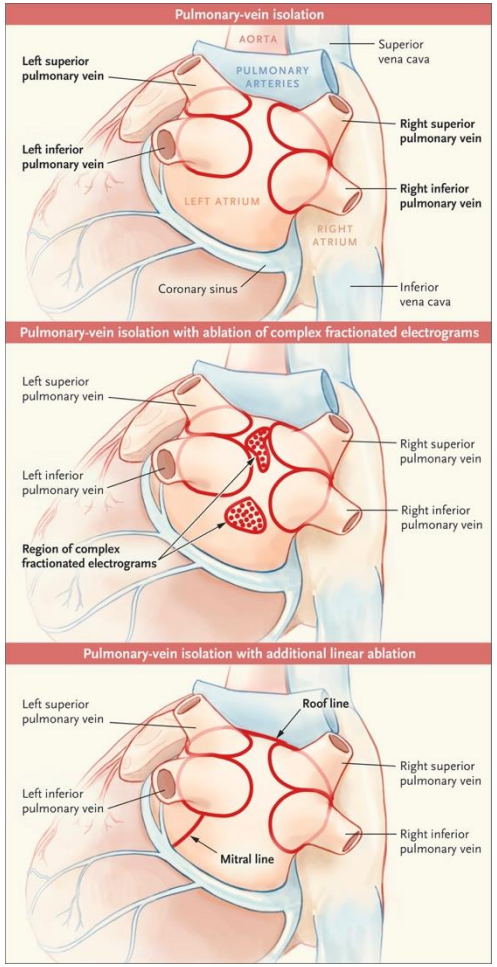


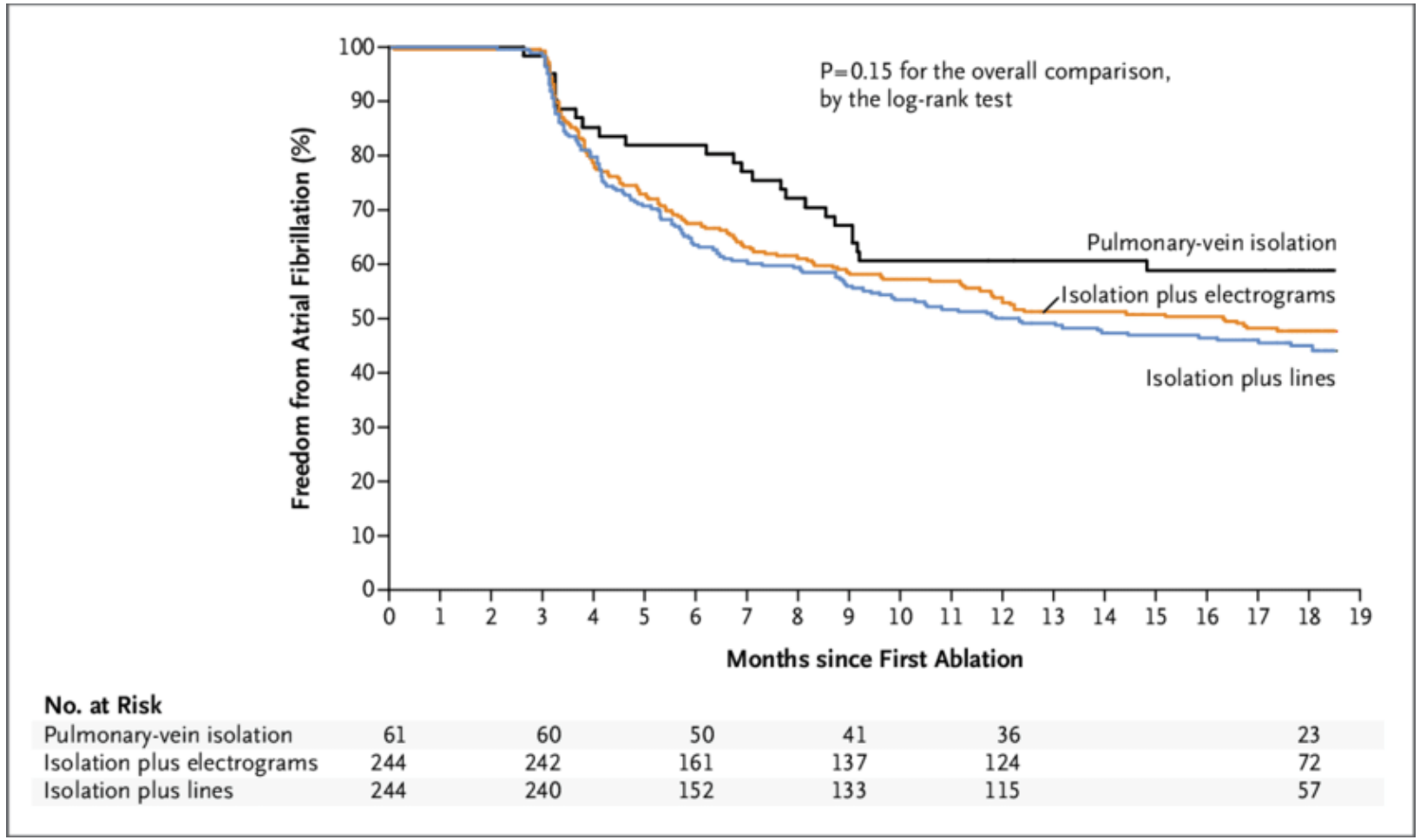
Haisssaguerre et al. N Engl J Med 1998;339:659-66

Comment doit-on ablater les FA persistantes ?

Malgré de nombreuses expériences monocentriques prometteuses avec différentes approches …

STAR AFII: Pas de bénéfice à faire plus que l'isolation des VPs ("less is more")





No. at Risk

Pulmonary-vein isolation	61	60	50	41	36	23
Isolation plus electrograms	244	242	161	137	124	72
Isolation plus lines	244	240	152	133	115	57

Verma et al. N Engl J Med 2015;372:1812-1822

Approche anatomique ?

The NEW ENGLAND JOURNAL of MEDICINE

JAMA The Journal of the American Medical Association

Approche anatomique: focus sur les grands essais randomisés internationaux

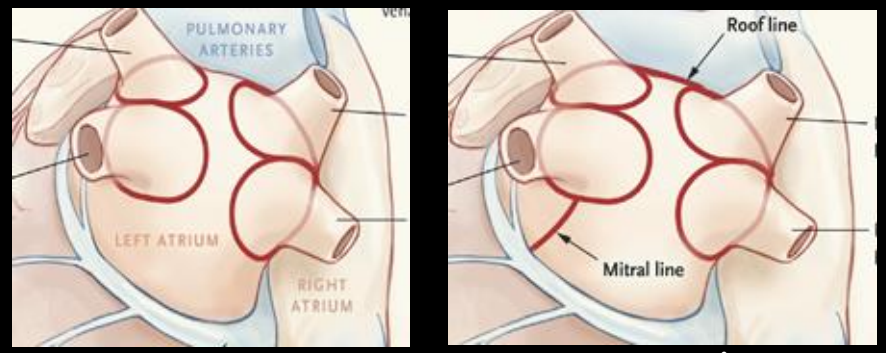
No large RCT-evidence of a superiority in comparison to standard of care

STAR AF II trial — Negative

598 patients, 12 countries, 48 centers

Persistent AF: 7 days - 3 years

PVI vs **PVI + lines**



167 min 223 min

Blind & stringent Follow up

18 mo-Freedom from AF/AT multiple procedures: 61% Vs 48% (p:ns).

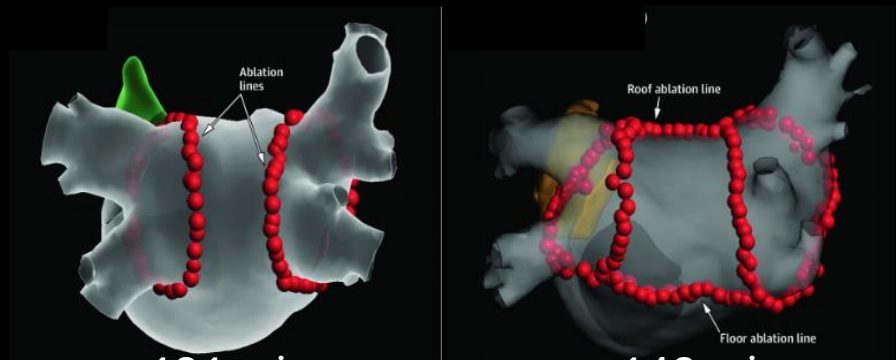
Verma et al. NEJM 2015

CAPLA trial — Negative

338 patients, 2 countries, 16 centers

Persistent AF: 7 days - 3

PVI vs **PVI + PWI**

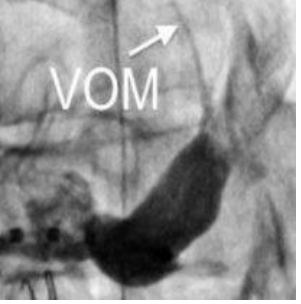


121 min 142 min

Blind & stringent Follow up

12 mo-Freedom from AF/AT multiple procedures: 62% vs 60% (p:ns).

Kistler et al. JAMA 2023



Approche anatomique – **Alcoolisation veine de Marshall: essais randomisés académiques nationaux**

Alcoolisation veine de Marshall améliore résultats de l'ablation.

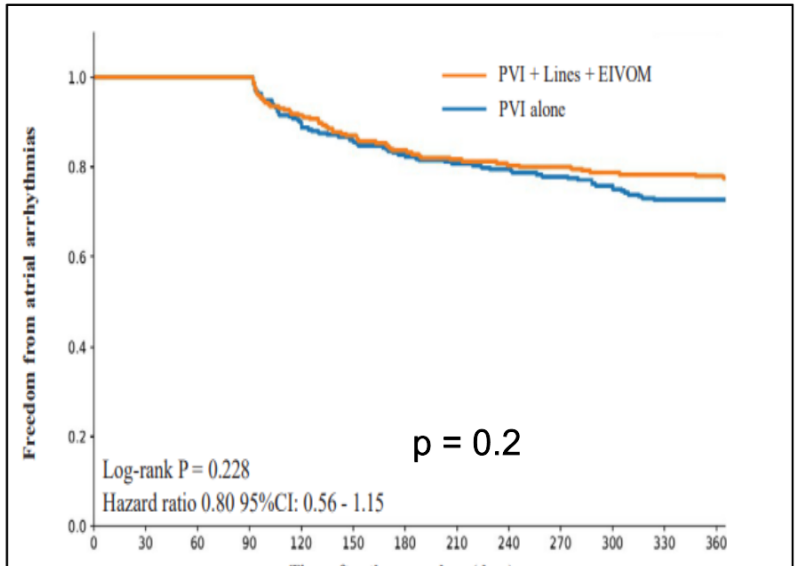
Procedures longues et extensives

Sous ou sur traitement

Bénéfice après plusieurs procedures?

Quelle stratégie en cas d'echec?

*Freedom from AF/AT, 1 or 2 procedures**



JAMA The Journal of the American Medical Association

EHRA

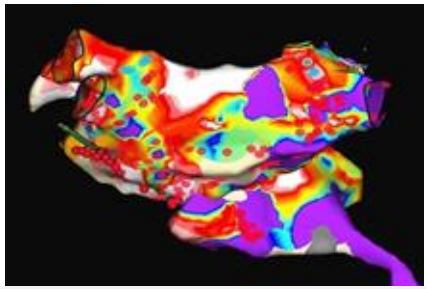
- *Valderabano et al.* JAMA 2019

** *Derval et al. EHRA 202*
Derval et al. Heart Rhyth

Approche sur mesure ?

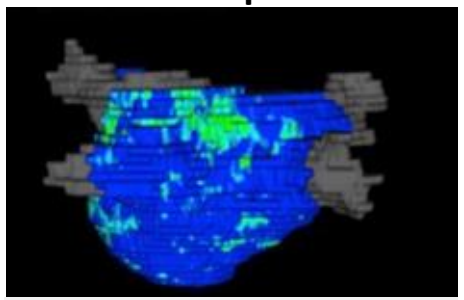
Mapping automatique des sources de la FA

CFAE Abbott/BW



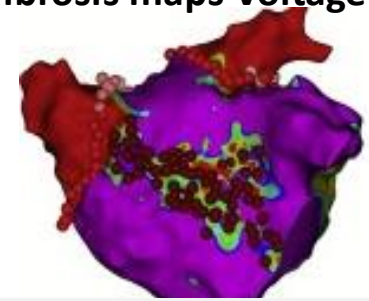
Negative RCT
(STAR AF2)

Fibrosis maps MRI



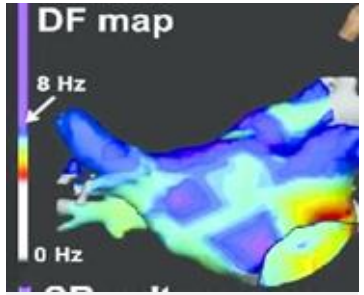
Negative RCT
(DECAAFII)

Fibrosis maps Voltage



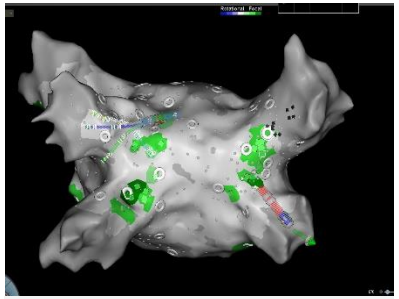
3 Negative RCT
(Stable SR2, Supres AF, SCAR AF)
1 controversial (Erase AF)

DF maps



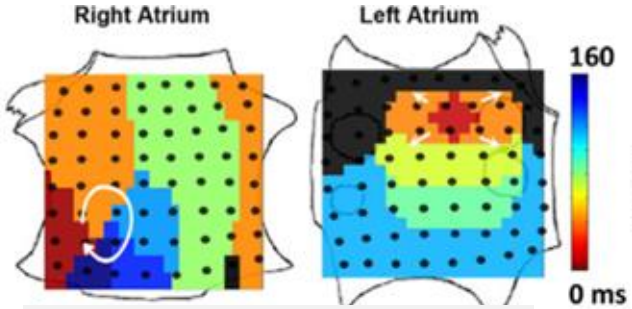
No RCT

Driver maps BW



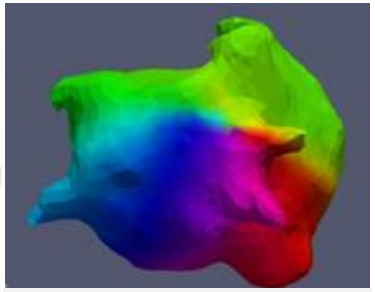
No RCT

Driver maps Topera



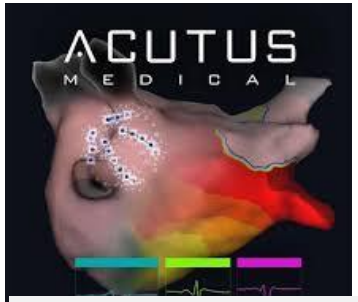
No RCT

Driver maps ECGi



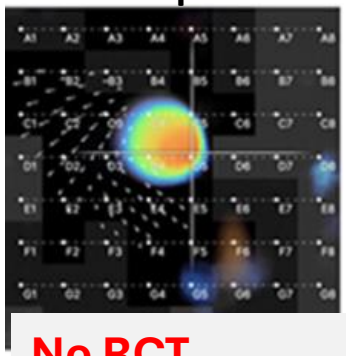
No RCT

Driver maps ACUTUS



No RCT

Driver maps ABLACON

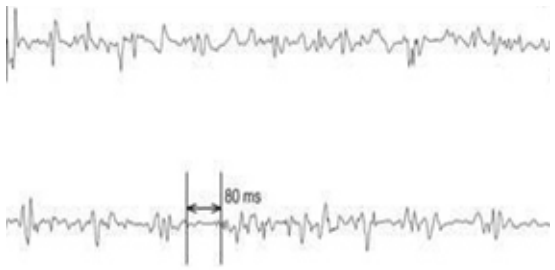


No RCT

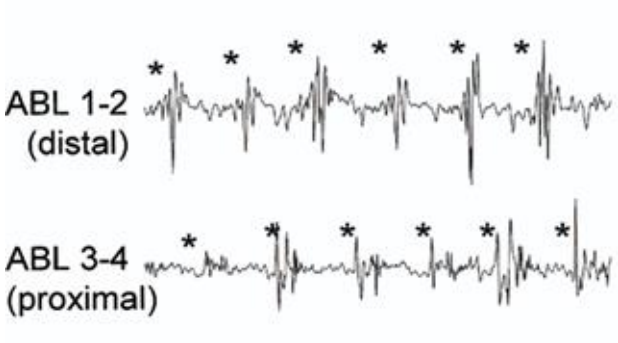
No strong evidence of a superiority in comparison to standard of care in de novo persistent AF ablation

Visual EGM-based detection of AF drivers

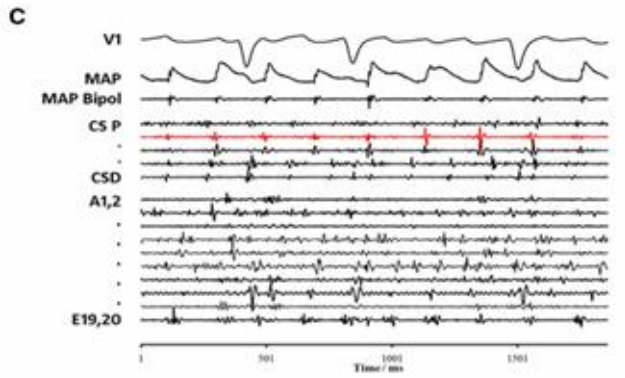
In the history of EGM-based AF ablation, several targets have been described with promising, but poorly reproducible outcomes.



Nademanee et al. JACC 2004

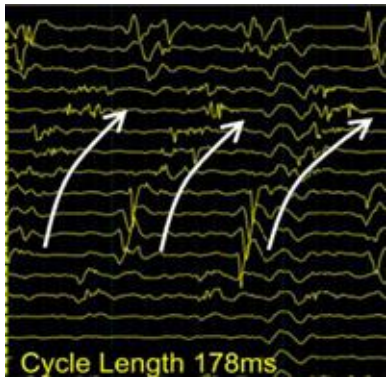


Takahashi et al. JACC. 2008

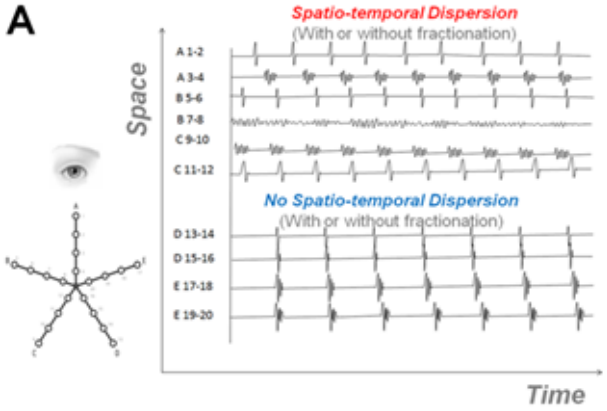


Narayan et al. Heart Rhythm 2011

Ganesan et al. Heart Rhythm 2013



Jadidi et al.Circ. EP 2016



Seitz et al. JACC 2017

Spatio-temporal Dispersion

Spatiotemporal dispersion as a strategy for the assessment of AFib

4500 + AF PATIENTS

> 85% PERSISTENT AF PATIENTS

50+ CENTERS IN THE WORLD

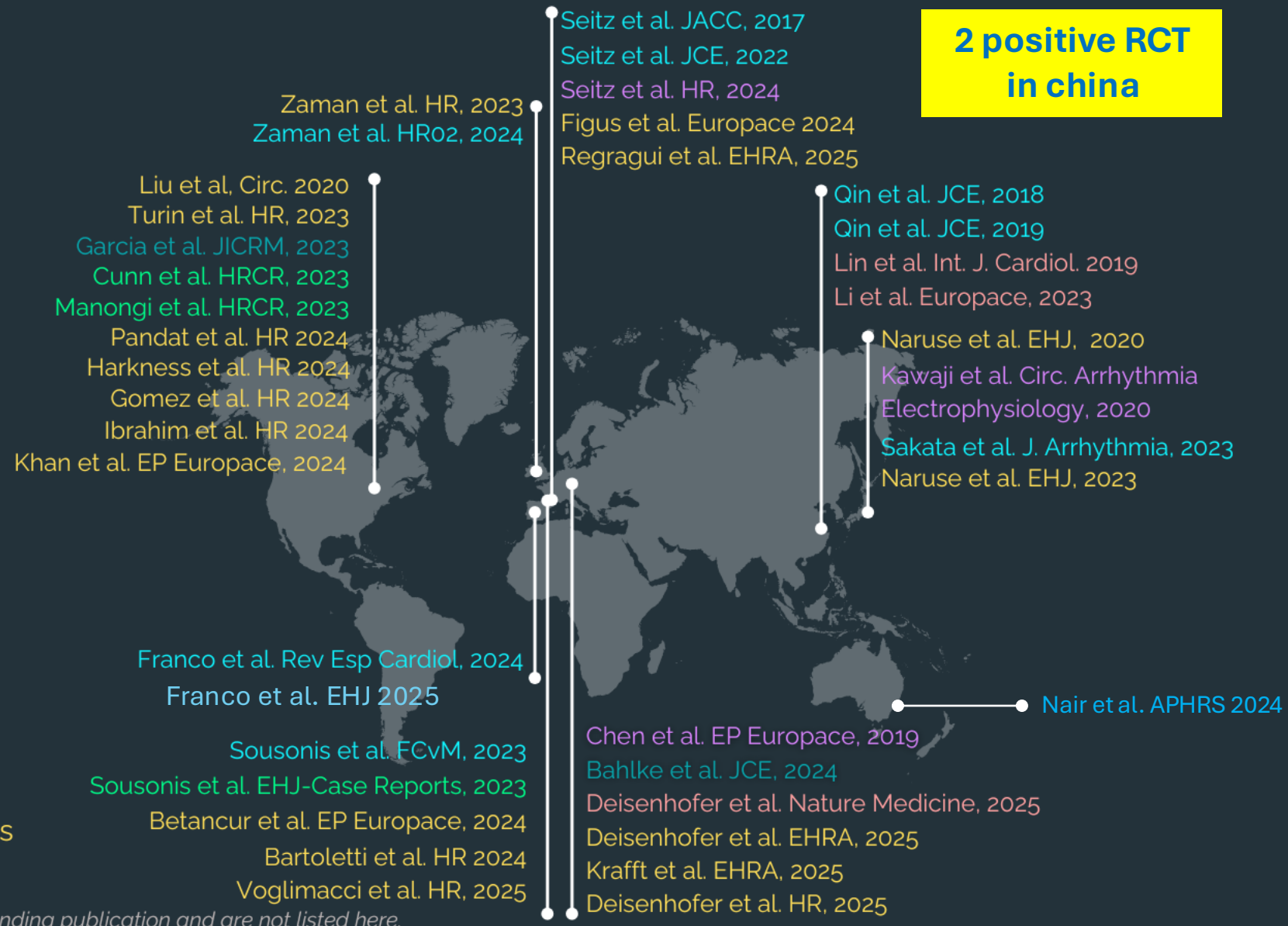
2 positive RCT in china

DISPERSION STUDIES ANALYSED

37 Scientific publications

- **3** Randomized trials
- **8** Prospective studies
- **2** Retrospective studies
- **3** Studies on dispersion characteristics
- **3** Case reviews

18 Abstracts



This list is not exhaustive. Some studies are ongoing or pending publication and are not listed here.

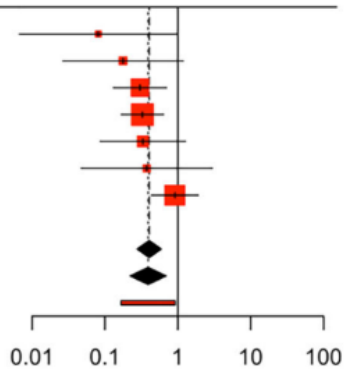
Dispersion-guided Tailored ablation Vs PVI only

In favor of Dispersion In favor of PVI

A) AF Recurrence

Study	logOR	SE	Weight (common)	Weight (random)	Odds Ratio IV, Fixed + Random, 95% CI
Melby et al. 2019	-2.5154	1.2740	2.4%	3.2%	0.08 [0.01; 0.98]
Lin et al. 2019	-1.7327	0.9728	4.1%	5.4%	0.18 [0.03; 1.19]
Garcia et al. 2023	-1.1978	0.4283	21.2%	21.6%	0.30 [0.13; 0.70]
Deisenhofer et al. 2025	-1.1216	0.3436	33.0%	29.2%	0.33 [0.17; 0.64]
Hu et al. 2020	-1.1067	0.6873	8.2%	10.1%	0.33 [0.09; 1.27]
Qin et al. 2018	-0.9822	1.0564	3.5%	4.6%	0.37 [0.05; 2.97]
Sakata et al. 2023	-0.0939	0.3754	27.6%	26.0%	0.91 [0.44; 1.90]
Total (common effect, 95% CI)			**100.0%**	.	**0.40 [0.27; 0.59]**
Total (random effect, 95% CI)			.	**100.0%**	**0.39 [0.22; 0.69]**
Prediction interval					**[0.17; 0.92]**

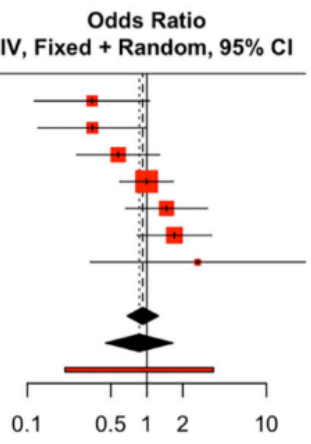
Heterogeneity: $Tau^2 = 0.0684$; $Chi^2 = 7.94$, df = 6 (P = 0.2422); $I^2 = 24.5\%$



C) ATa Recurrence

Study	logOR	SE	Weight (common)	Weight (random)	Odds Ratio IV, Fixed + Random, 95% CI
Lin et al. 2019	-1.0569	0.5649	7.6%	11.9%	0.35 [0.11; 1.05]
Hu et al. 2020	-1.0508	0.5334	8.5%	12.7%	0.35 [0.12; 0.99]
Melby et al. 2019	-0.5507	0.4069	14.6%	16.1%	0.58 [0.26; 1.28]
Deisenhofer et al. 2025	-0.0047	0.2646	34.5%	20.6%	1.00 [0.59; 1.67]
Garcia et al. 2023	0.3797	0.4031	14.8%	16.2%	1.46 [0.66; 3.22]
Sakata et al. 2023	0.5322	0.3669	17.9%	17.3%	1.70 [0.83; 3.50]
Qin et al. 2018	0.9822	1.0564	2.2%	5.1%	2.67 [0.34; 21.17]
Total (common effect, 95% CI)			**100.0%**	.	**0.93 [0.68; 1.25]**
Total (random effect, 95% CI)			.	**100.0%**	**0.86 [0.45; 1.66]**
Prediction interval					**[0.21; 3.62]**

Heterogeneity: $Tau^2 = 0.2712$; $Chi^2 = 12.82$, df = 6 (P = 0.0460); $I^2 = 53.2\%$



Pajareya et al. JCE 2025

European Heart Journal

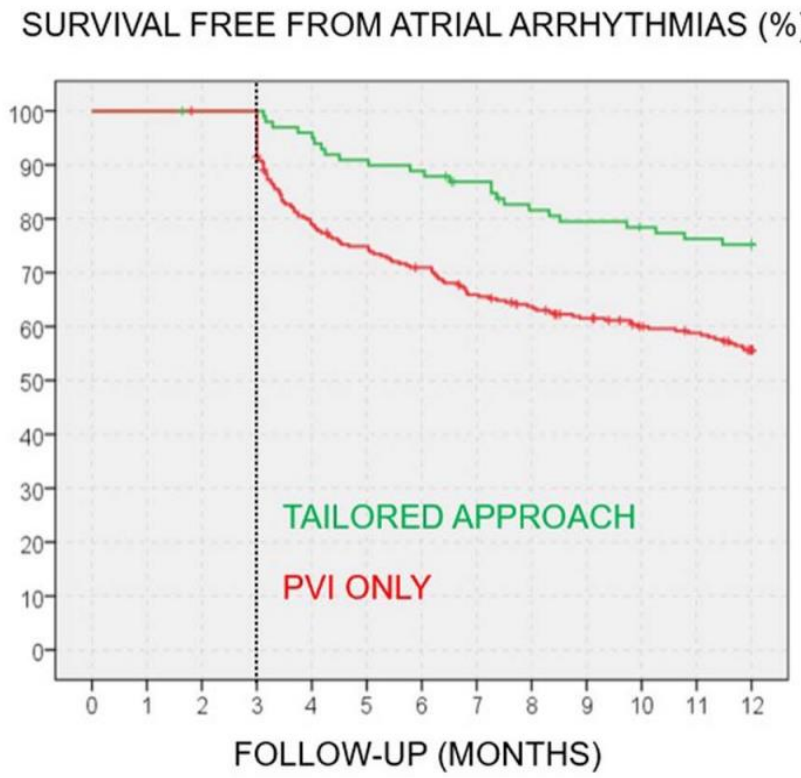
Ablation of visual spatiotemporal dispersion added to pulmonary vein isolation in persistent atrial fibrillation FREE

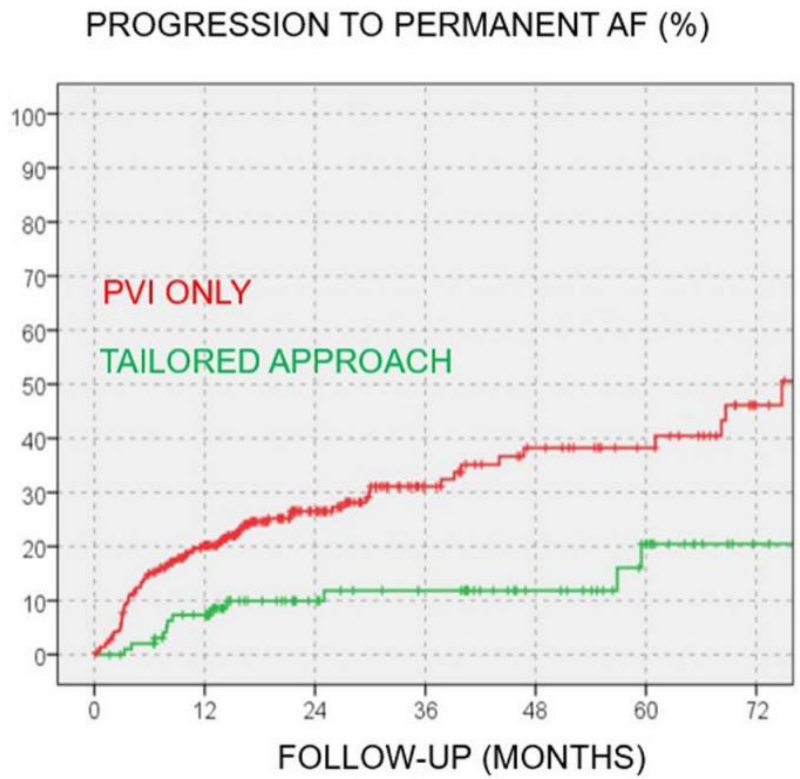
E Franco, C Lozano-Granero, M C Amores Luque, R Matia Frances, A Hernandez-Madrid, J L Zamorano, J Moreno Author Notes

European Heart Journal, Volume 46, Issue Supplement_1, November 2025, ehaf784.489, https://doi.org/10.1093/eurheartj/ehaf784.489

Published: 05 November 2025

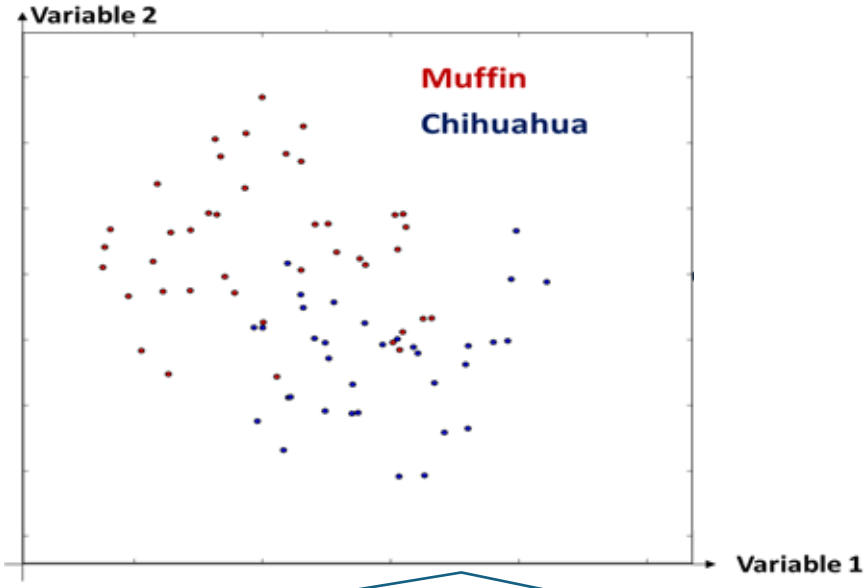
385 patients with persistent AF
LS persistent =11%
Structural heart disease =38%
Classical FU (ECG/holters)



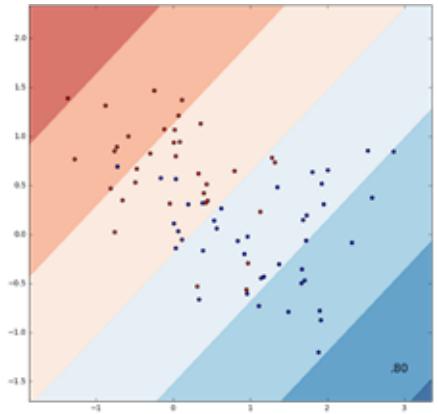


Mais ablation guidée par analyse visuelle des EGM
complexe et peu reproductible

How to automatize complex multiparametric analysis?

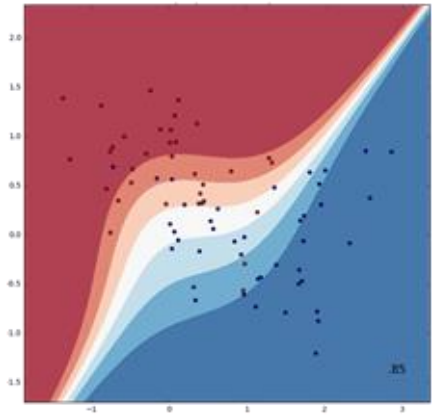


Conventional algorithm:



(Few) Features & Thresholds are decided by engineers. **Rough boundaries.**

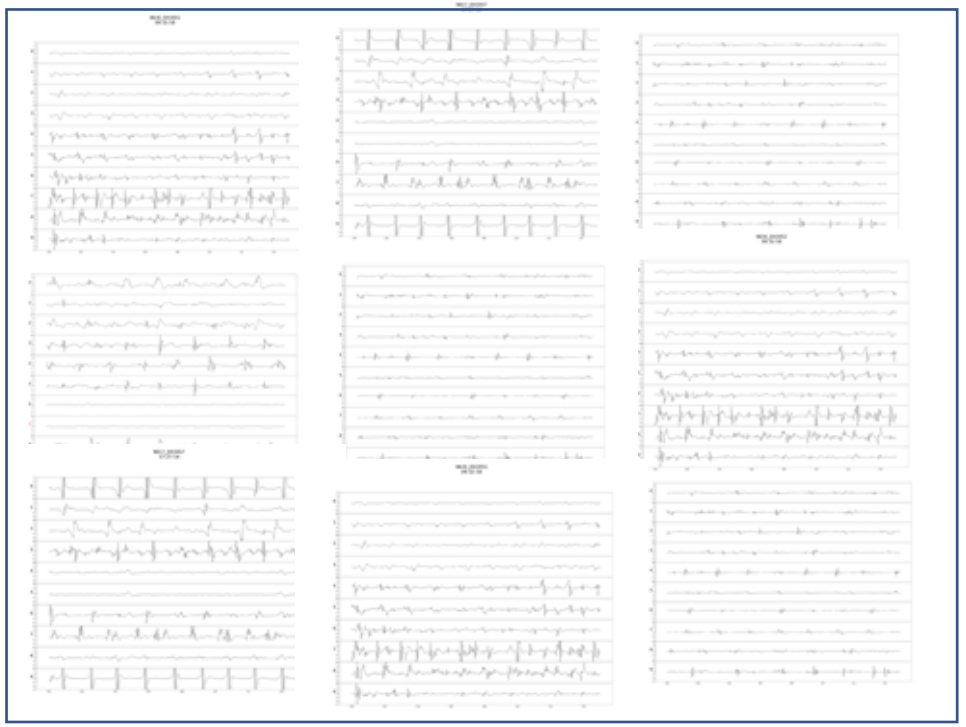
Machine learning algorithm:



Thresholds and a potentially high number of features are automatically extracted from data during training. **Accurate boundaries.**

How to automatize complex multiparametric analysis?

Facial recognition



Intra cardiac EGM analysis

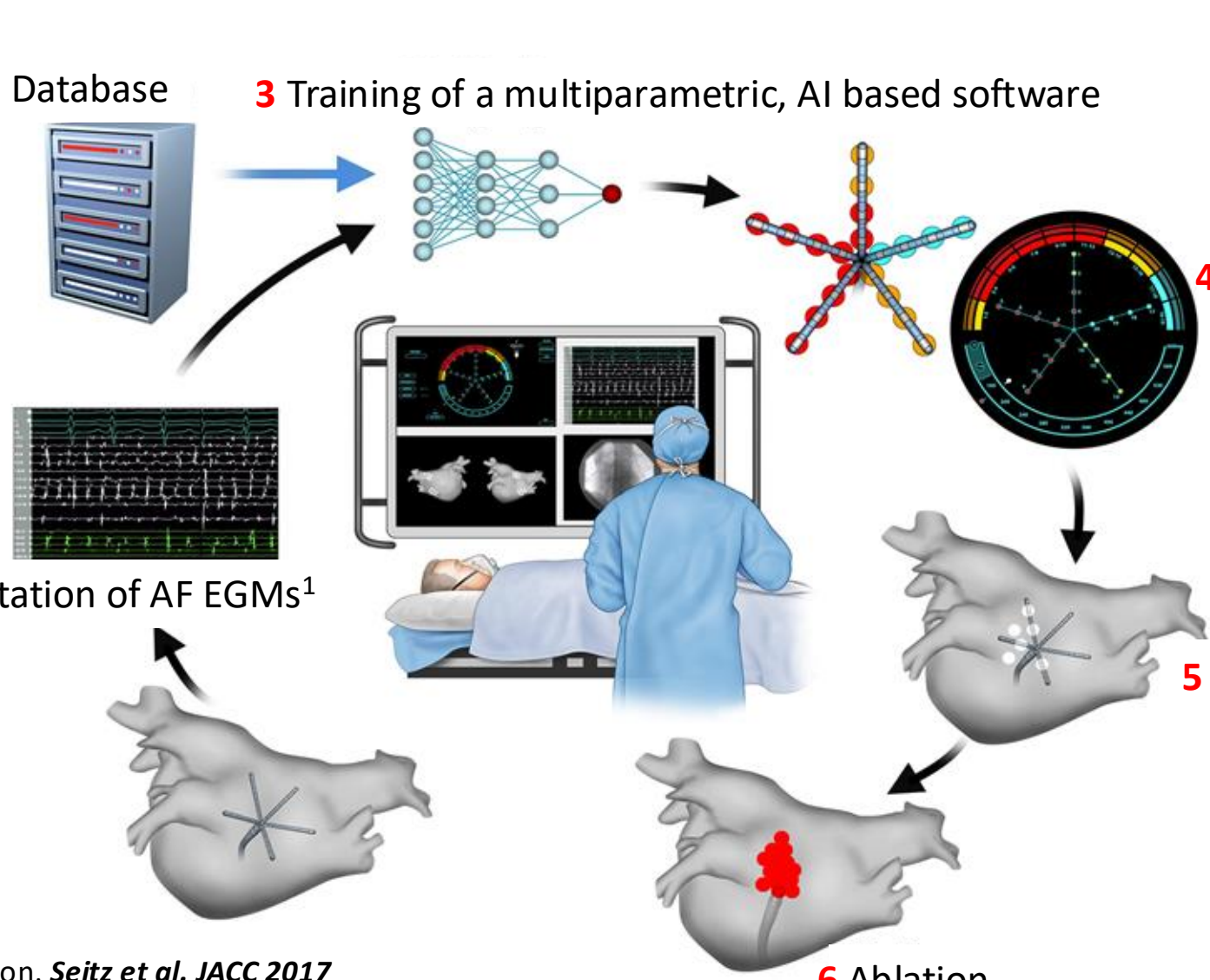
A well trained human brain is very powerful to perform complex multiparametric analysis but it is difficult for conventional algorithms.

VX1 (Volta) is an AI-based software that allows for the reproducible detection and ablation of AF drivers

FDA approval

CE Mark

PRIX GALIEN USA
2023
Best start up



1. Based on the concept of Dispersion. ***Seitz et al. JACC 2017***

Journal of Cardiovascular Electrophysiology

Seitz et al. JCE 2022

nature medicine

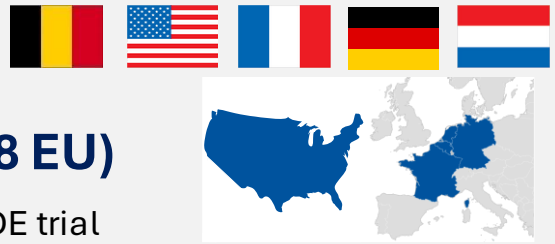
Article

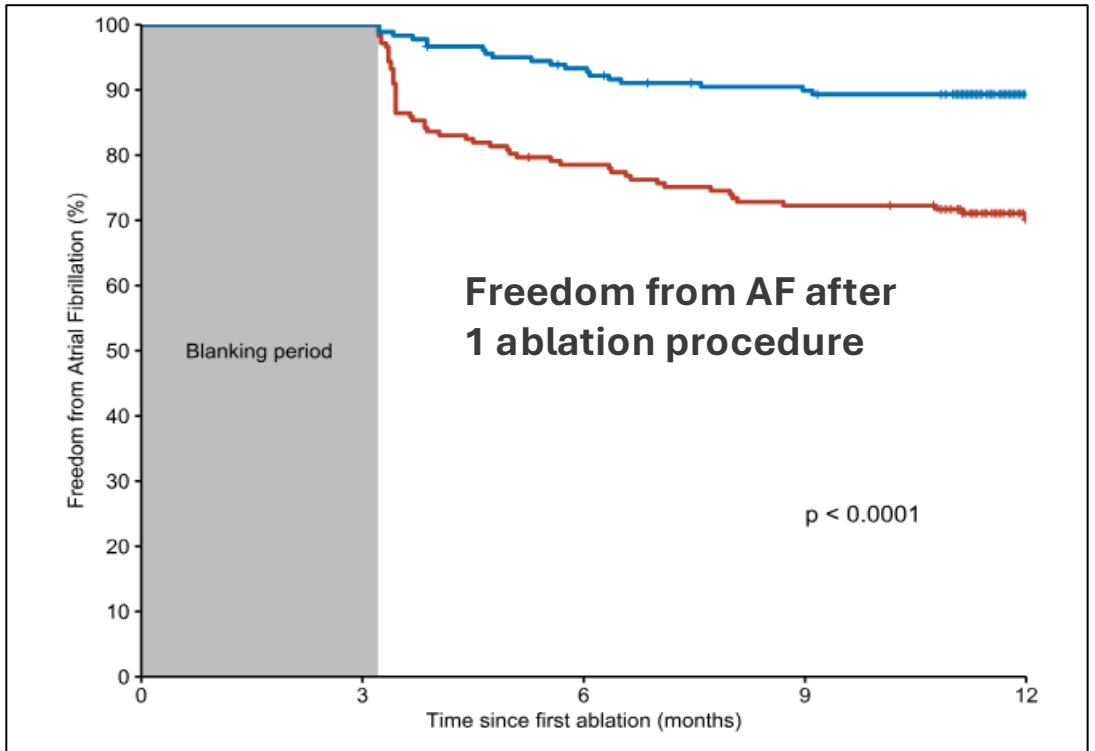
https://doi.org/10.1038/s41591-025-03517-w

Artificial intelligence for individualized treatment of persistent atrial fibrillation: a randomized controlled trial

Deisenhofer et al. Nature medicine 2025

- 374 patients
- 51 investigators
- 26 sites (8 US, 18 EU)
- 5 countries FDA IDE trial



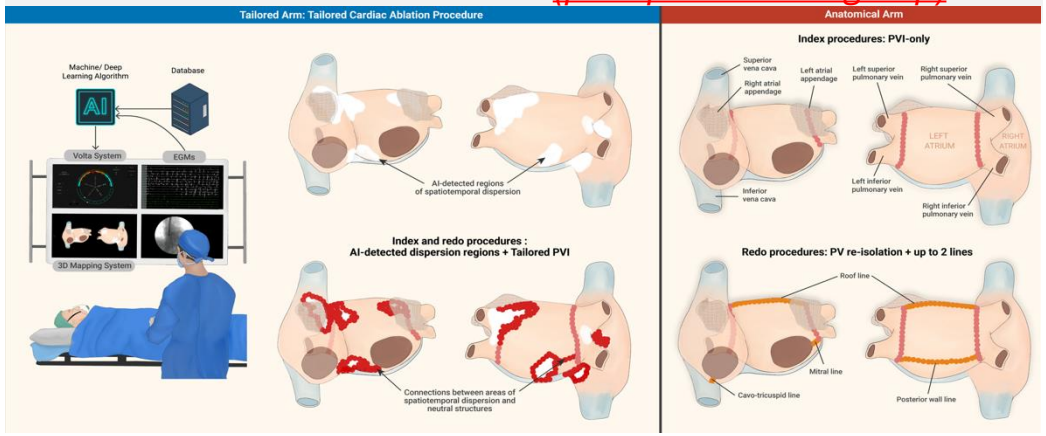


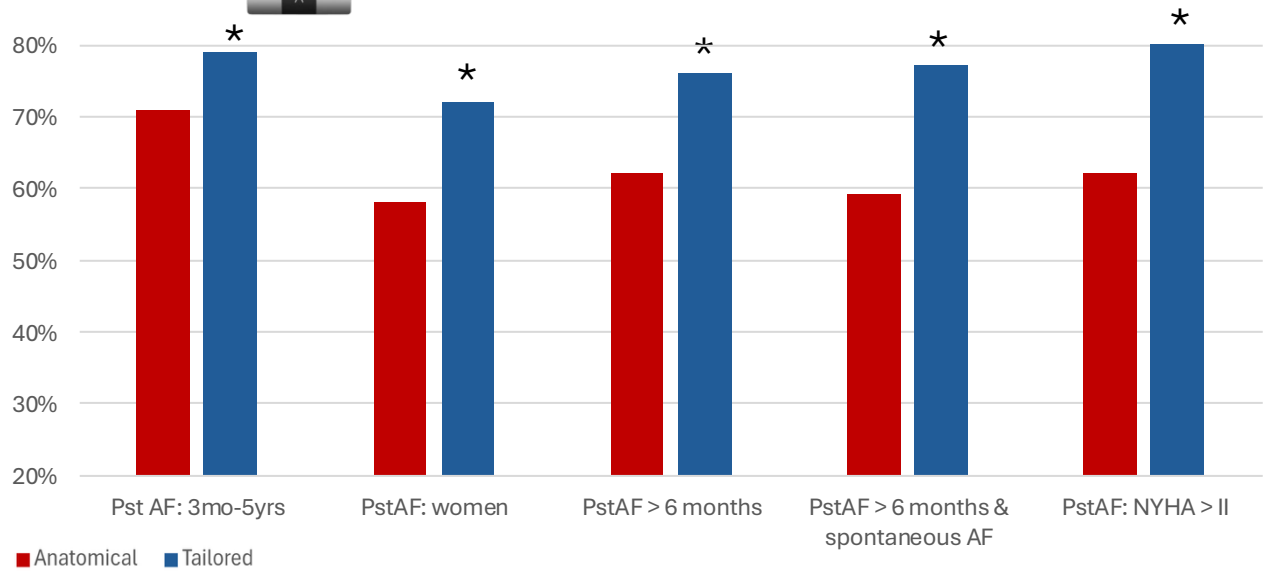
Patient population:

Denovo Persistent AF: 3 months - 5 years

Female = 21% *(pre-specified subgroup)*

Pst AF ≥ 6 months = 55% *(pre-specified subgroup)*





*: p<0.04

Freedom from AF/AT 1 or 2 procedures

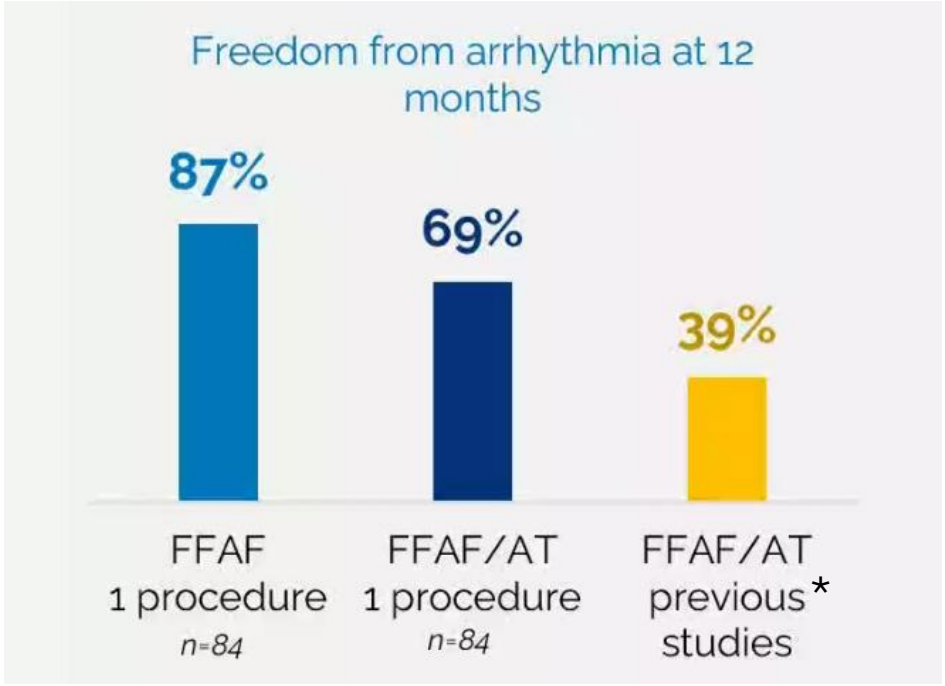
Tailored AF Perspectives

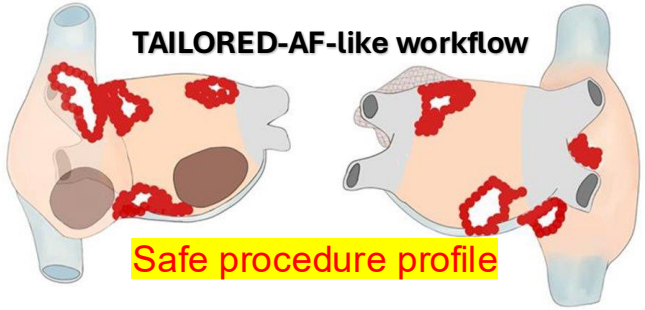
AI-guided ablation for redo ablations: *The Restart trial*

PVI/PVI+ failure despite isolated PVs: no consensus on ablation strategy*

92 patients, 29 investigators, 20 sites

82%

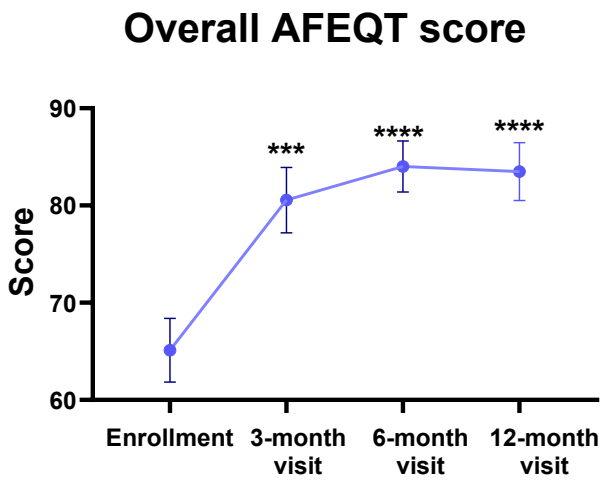


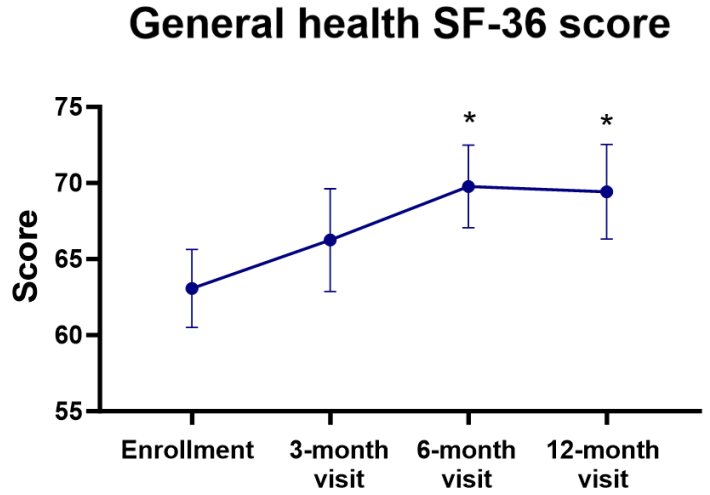


12-month follow-up:

ECG, Holters 24-hour (24%) minimum, 2 to 7-day (25%), 14 to 30-day (16%) Holter, cardiac implantable device (26%)

Quality of Life significanly improved



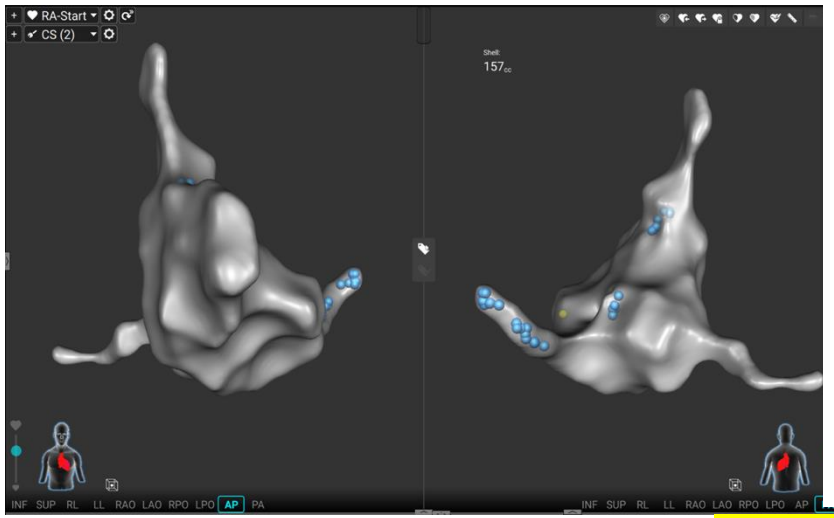


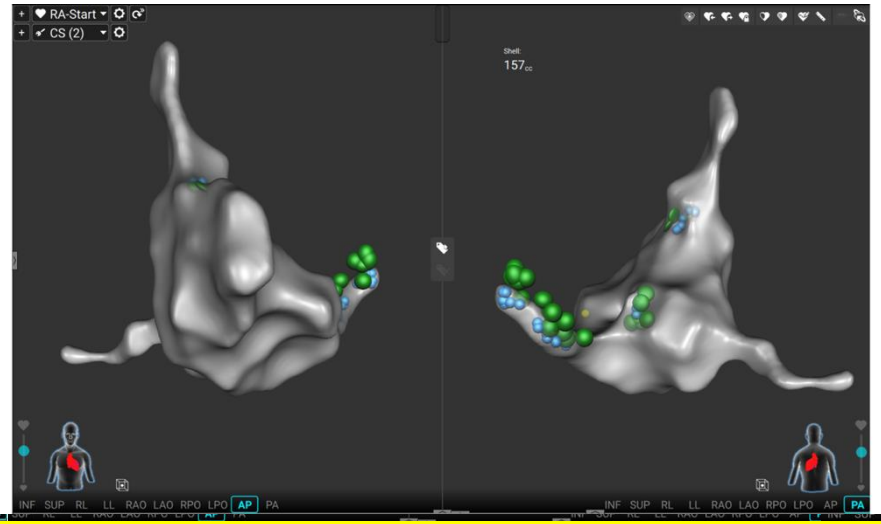
Hummel et al. Late breaking trial session HRS 2025

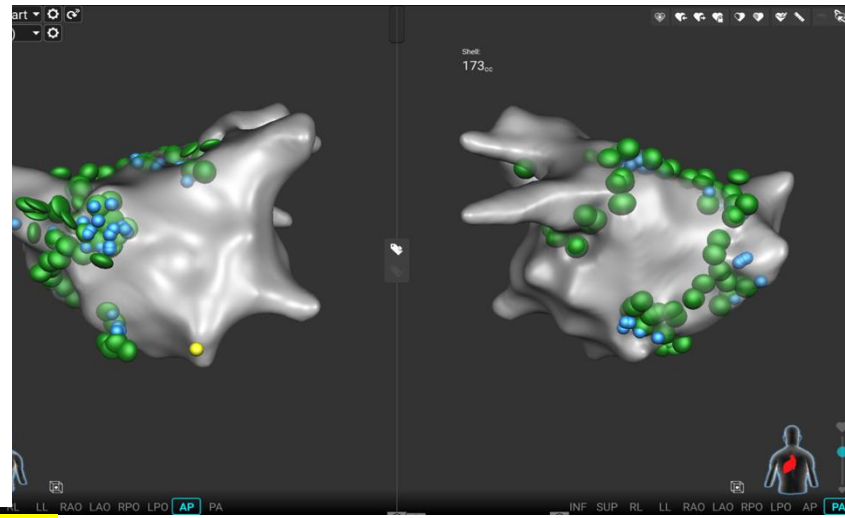
*Average results from Schmidt etal. Circ 2024, Sciacca et al. JCE 2022, Weng et al. JCE 2022

Tailored-AF workflow with PFA

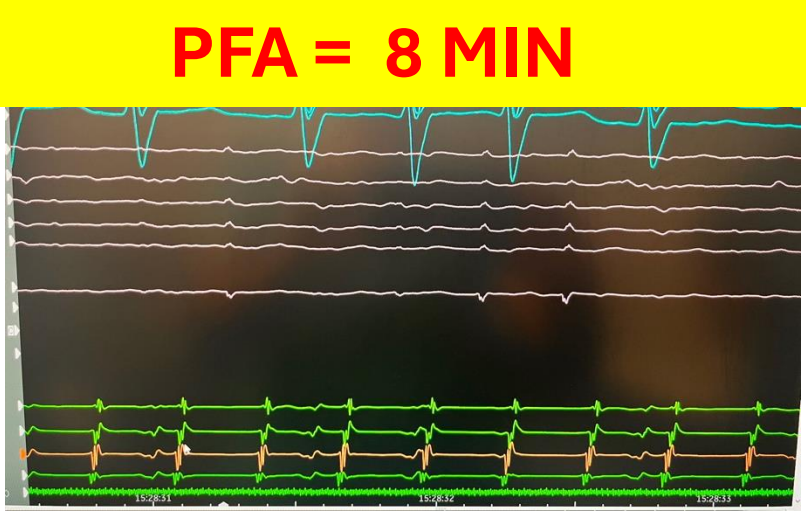
Persitent AF > 6 months. Mapping AF Xplorer (circular configuration).



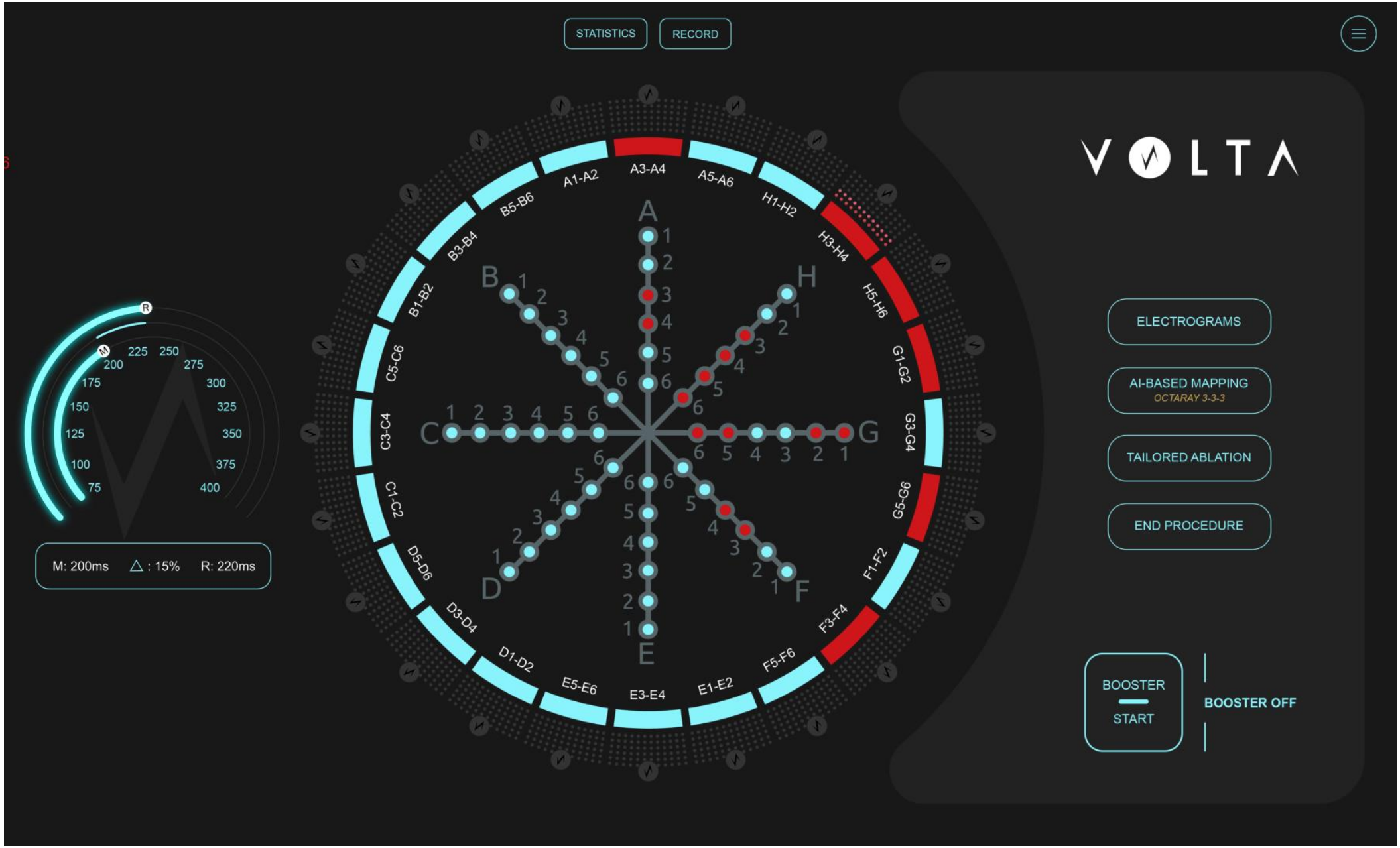




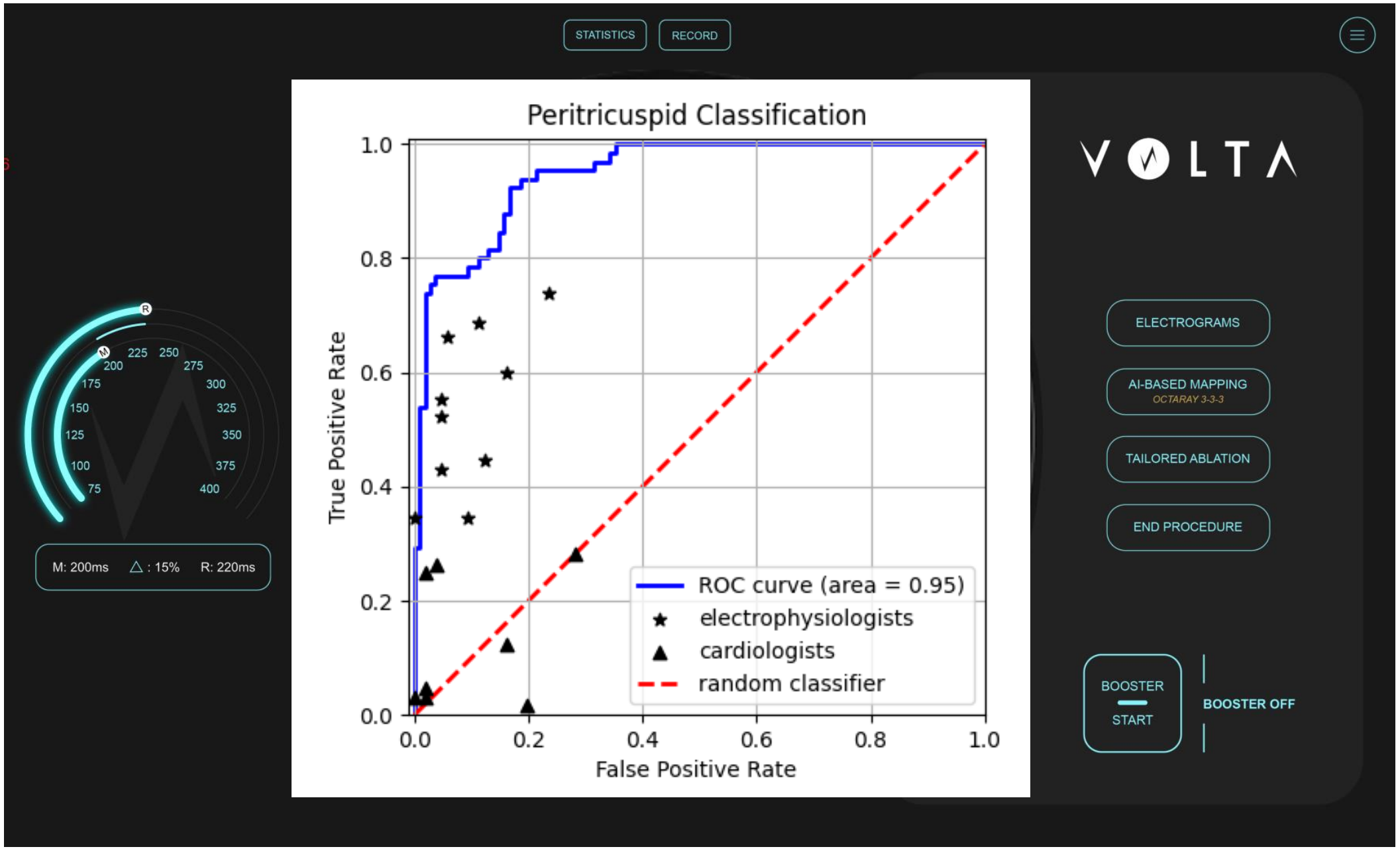
PROCEDURE= 65 MIN
PFA = 8 MIN



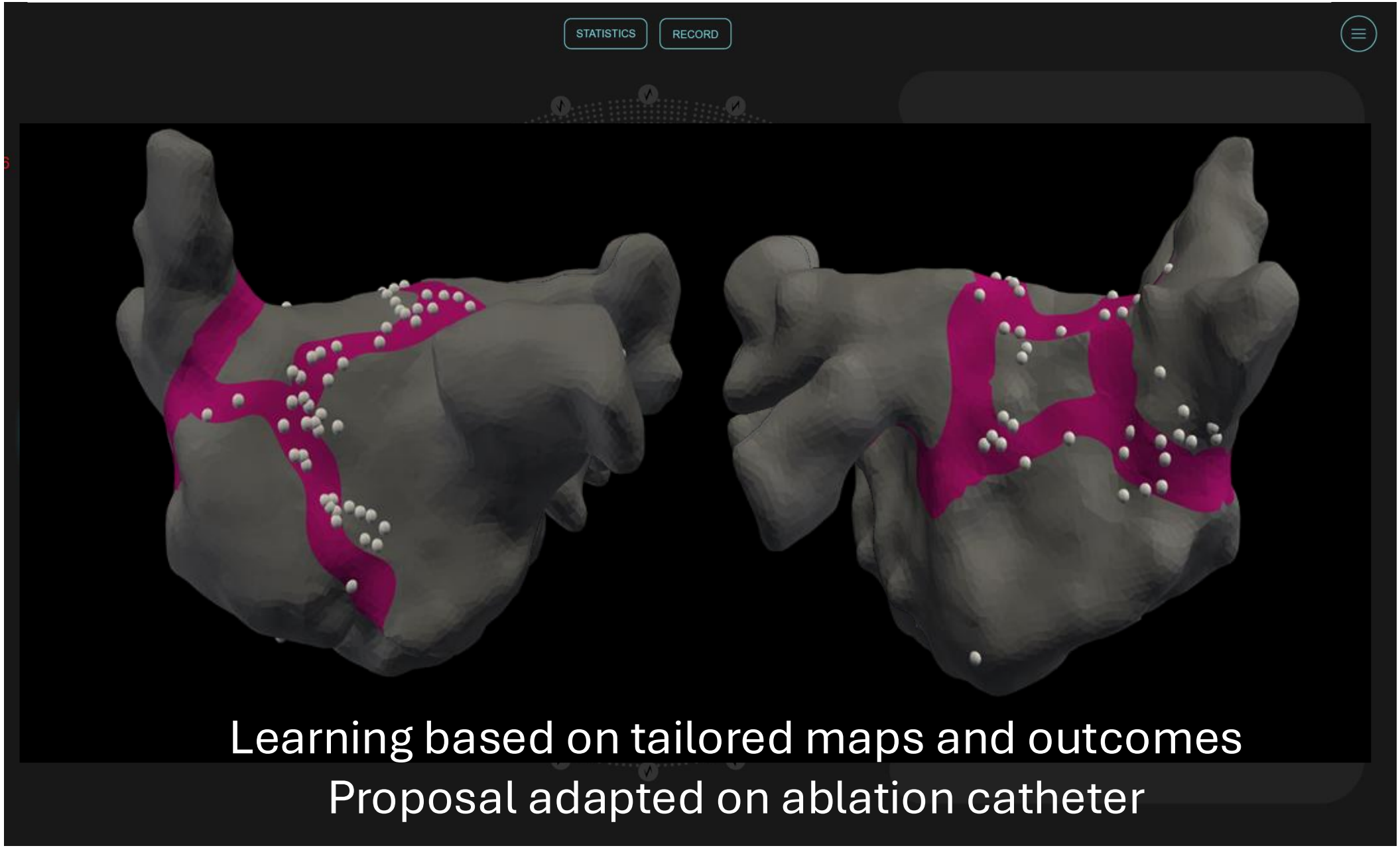
Very high density mapping



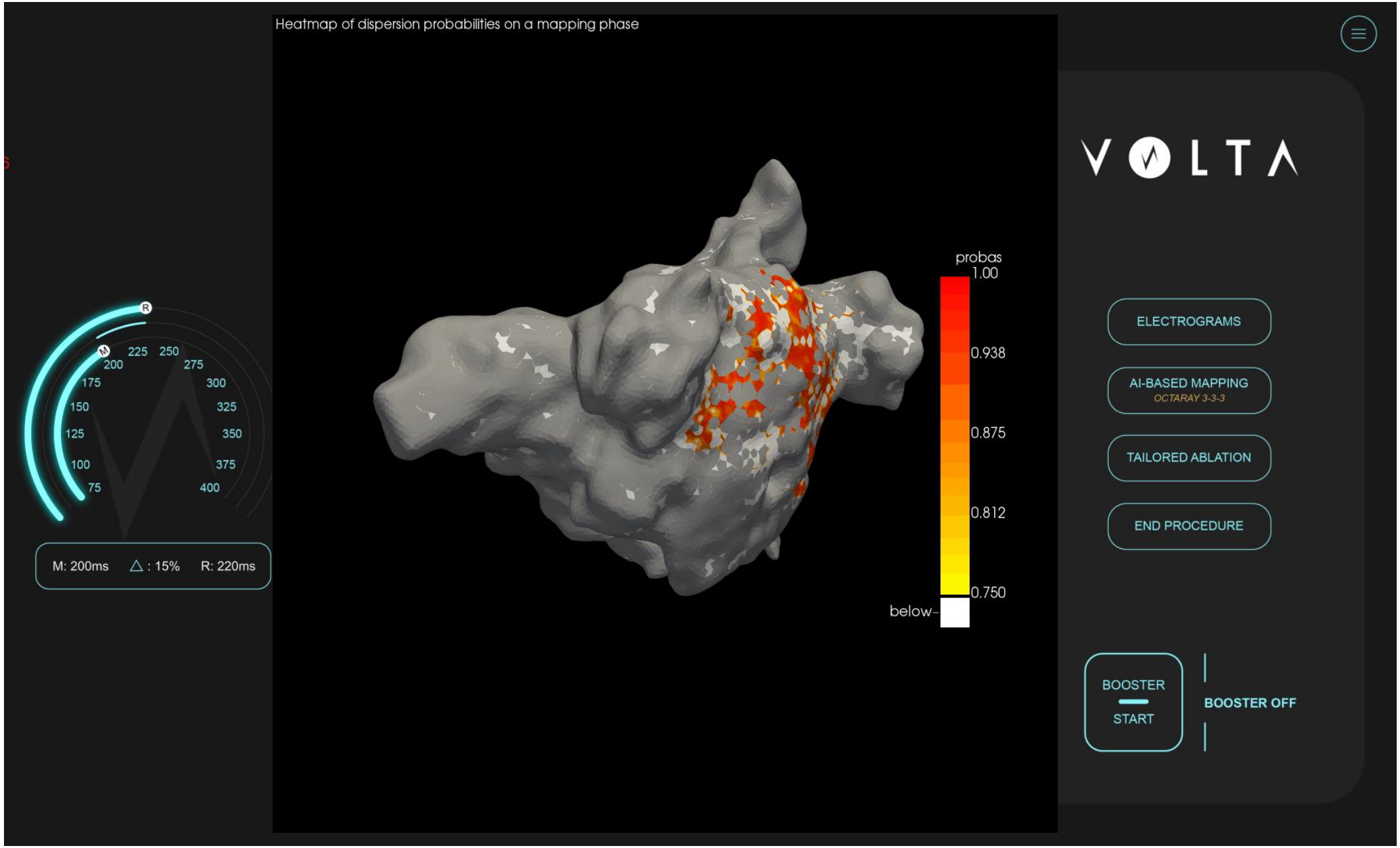
AT diagnosis prediction without mapping



Ablation set generation



Dispersion heat maps & mapping in sinus rhythm



CONCLUSIONS

TAILORED-AF: 1st Large-scale rigorous international RCT demonstrating superiority against **PVI using a patient-tailored approach**

The use of AI for the objective, reproducible and reliable identification of target EGMs seems to have been pivotal.

RESTART: Tailored-AF like approach is also very promising in redo ablations procedure in patients with isolated PVs.

7ÈME ÉDITION

SAMEDI 29 NOVEMBRE 2025

PULLMAN LYON
44 Bd Marius Vivier Merle
69003 Lyon

Merci de votre attention!

Dr Julien SEITZ

Coordinateur de l'unité de
Rythmologie interventionnelle

Hôpital Saint Joseph-Marseille

“AI could solve some of Humanity's hardest problems. It already has…”

Demis Hassabis, DEEP mind (Nobel Laureate for AlphaFold Project)

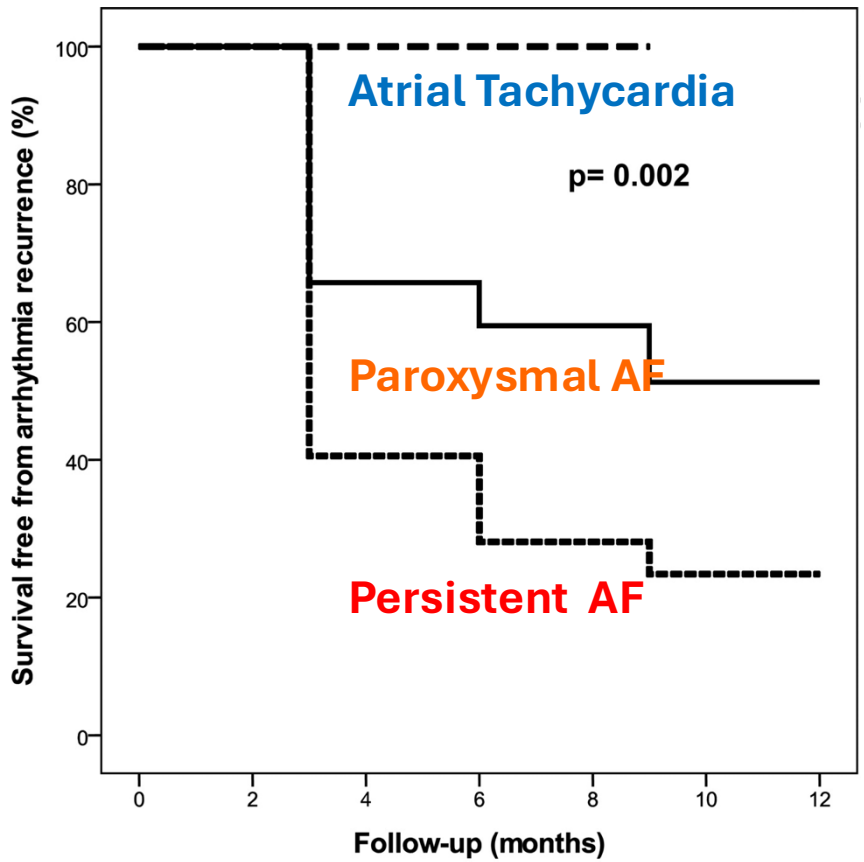
…Hopefully we are on the way to solve AFib

Tailored AF questions :

Atrial tachycardias, Dispersion extent, Atrial contraction

Arrhythmia Type After Persistent Atrial Fibrillation Ablation Predicts Success of the Repeat Procedure

Sonia Ammar, MD, Gabriele Hessling, MD, Tilko Reents, MD, Stephanie Fichtner, MD, Jinjin Wu, MD, Pinjun Zhu, MD, Susanne Kathan, Dipl Biol, Heidi Louise Estner, MD, Clemens Jilek, MD, Christof Kolb, MD, Bernhard Haller, Dipl Stat, and Isabel Deisenhofer, MD



No. of patients, entering the interval				
Group 1	36	22	18	9
Group 2	37	15	7	4
Group 3	5	5	3	0

Recurrence in AT is associated with a high success rate after repeat ablation

Circulation: Arrhythmia and Electrophysiology
Volume 4, Issue 5, October 2011; Pages 609-614
https://doi.org/10.1161/CIRCEP.111.963256

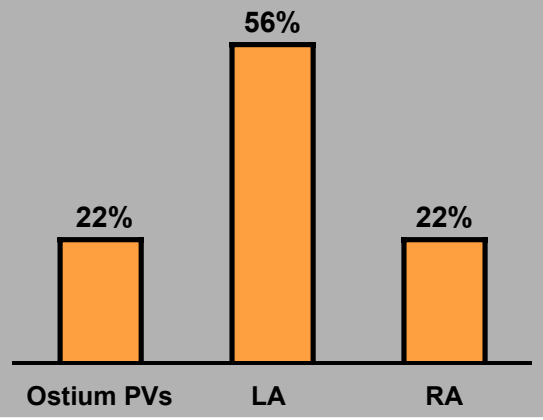
Repeat procedure: Majority of AT are typical macro reentries easy to ablate

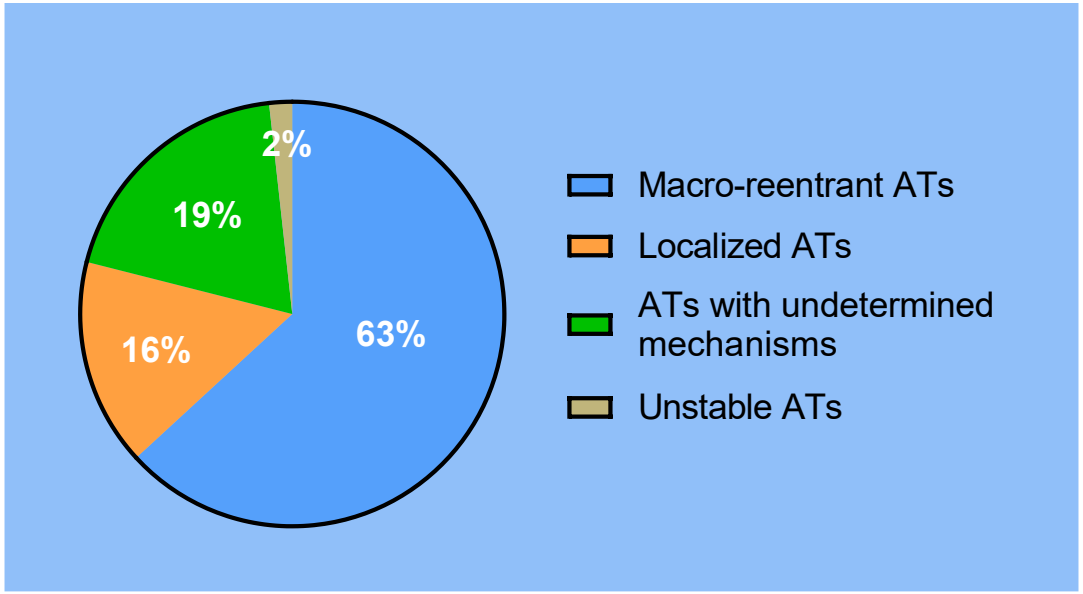
AT termination by ablation = 100%

The 43 Tailored patients re-ablated for AT

N= 8 pts

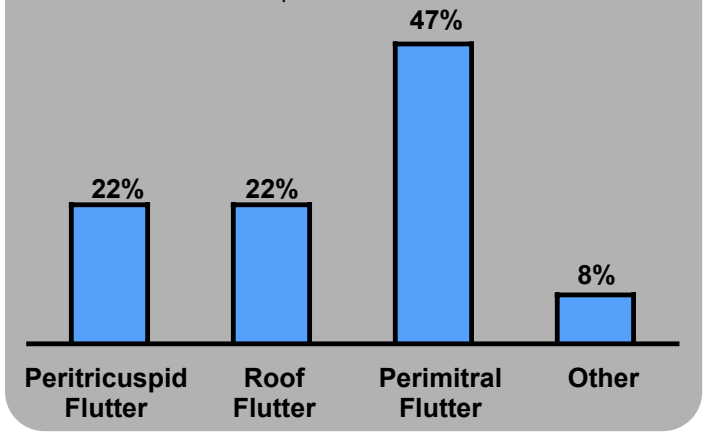
100% of Localized AT were diagnosed in regions where **dispersion had previously been detected** and **partially ablated** during the index procedure.





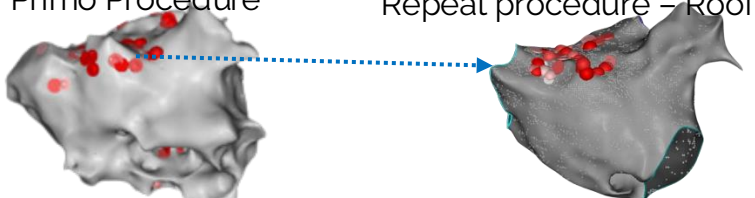
N=31 pts

93% of Macroreentries were due to **permeable** (60%) or **incomplete** (33%) **connection lines** made during the index procedure.



Primo Procedure

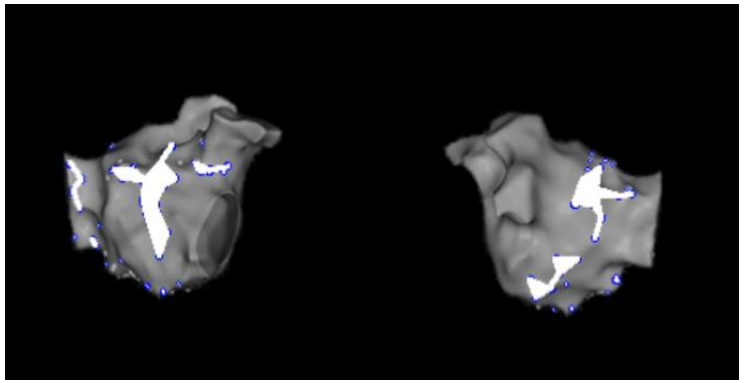
Repeat procedure – Roof Flutter

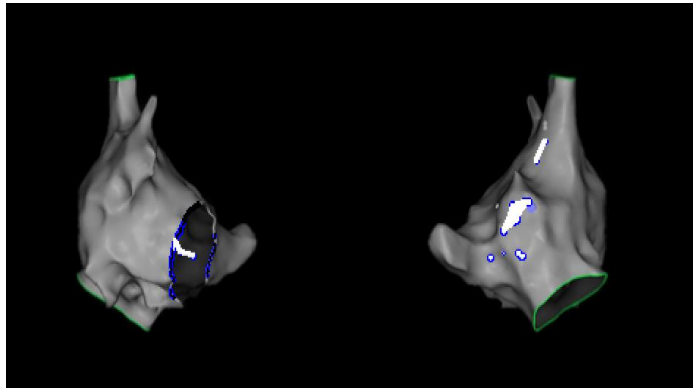


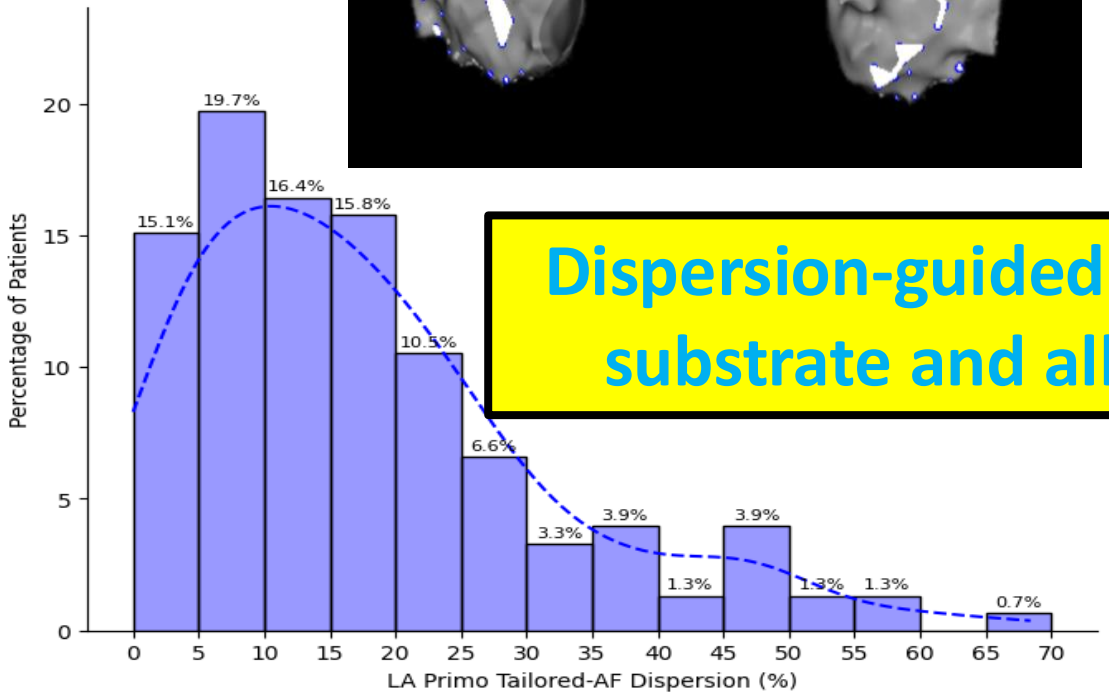
Dispersion extent in Tailored AF procedures*

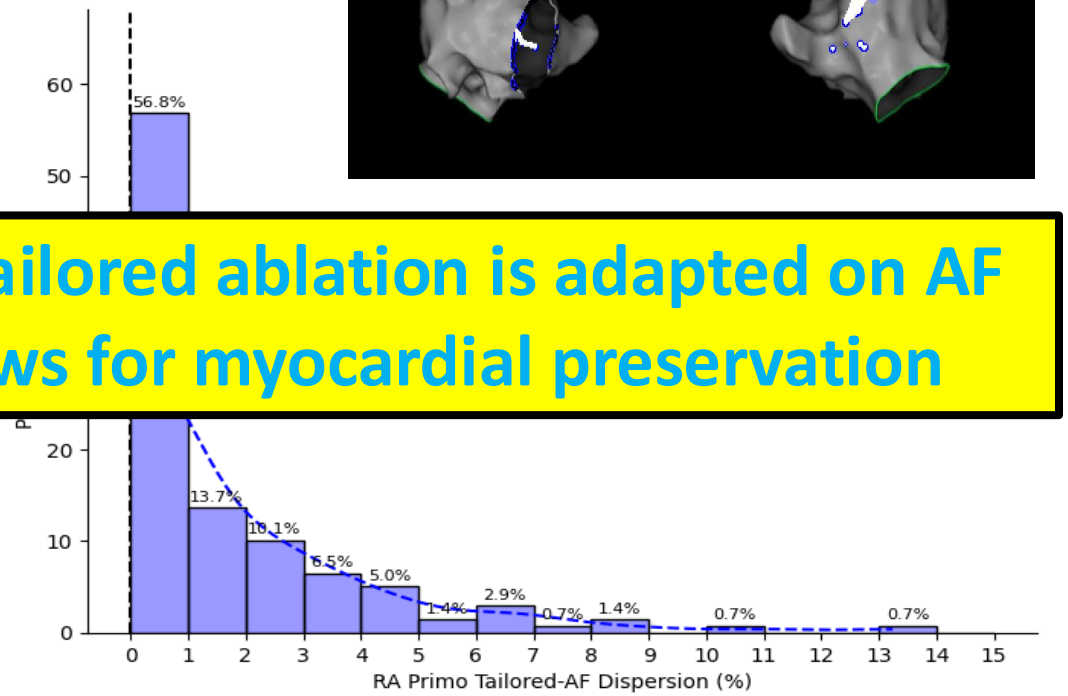
LA : 18 ± 13.5%

RA : 2 ± 4.8%







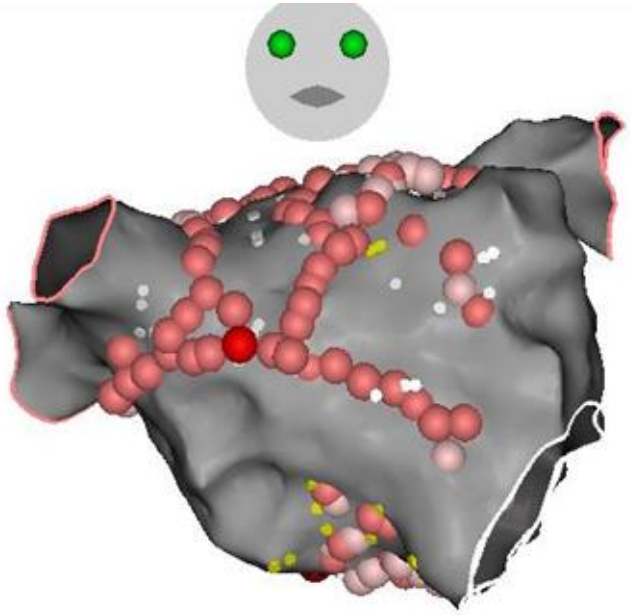


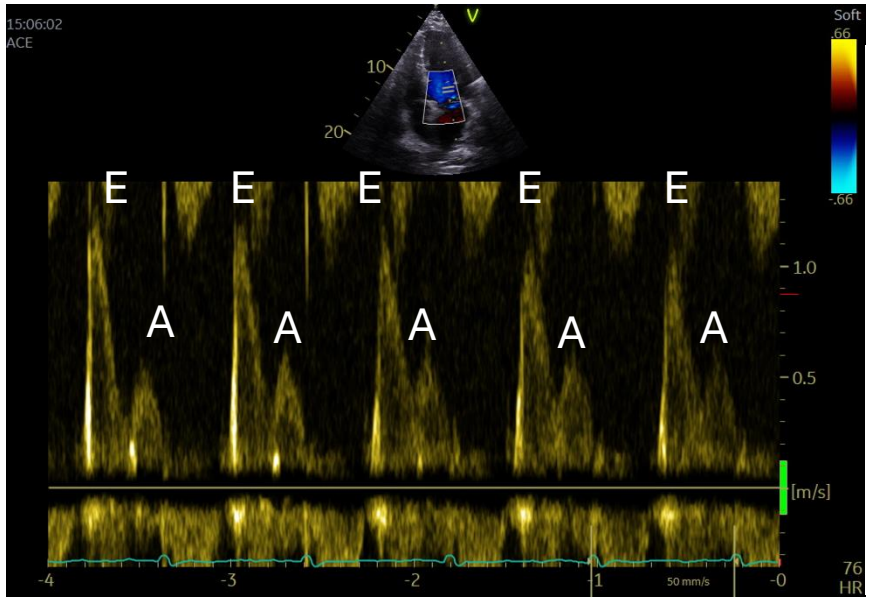
Dispersion-guided Tailored ablation is adapted on AF substrate and allows for myocardial preservation

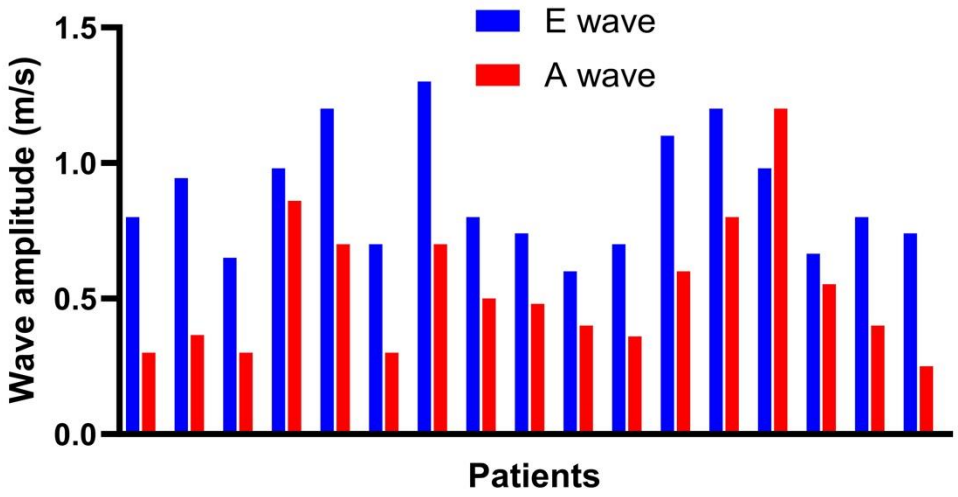
*: automated measurments on 3D shells

What about atrial contraction after a "Tailored" workflow?

Transmitral flow in 24 persitent AF patients with "tailored" workflow (abl. ant wall* =100%) in stable SR at 22 ± 10 months.







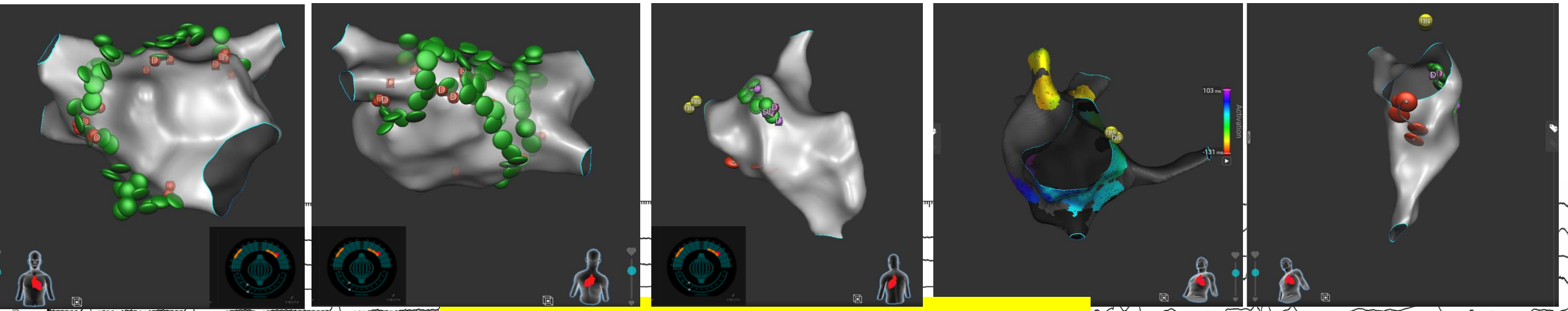
A wave recovery in 100% of patients (no symptoms)

*Extensive = 47% with ant line = 37%

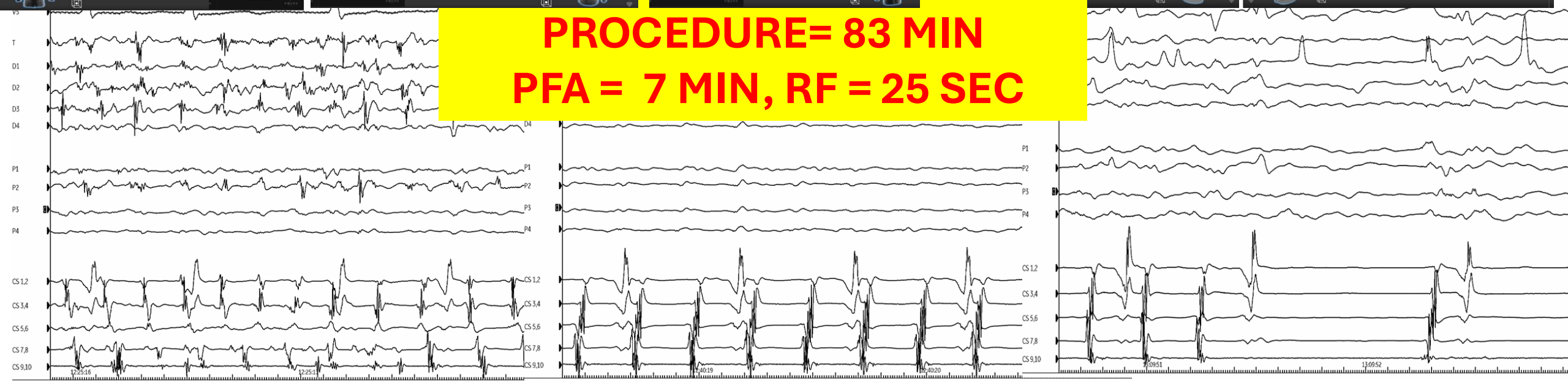
Regragui, Seitz et al. Accepted abstract HF

Tailored-AF workflow with PFA

Persitent AF > 4 months. Mapping AF Xplorer (circular configuration).



PROCEDURE= 83 MIN
PFA = 7 MIN, RF = 25 SEC



Low voltage-guided ablation: focus on RCT data

PVI vs PVI + low voltage areas ablation

JACC Clinical Electrophysiology

HeartRhythm

nature medicine

- ***STABLE SR II*** *(Yang et al. 2022)*: multicenter RCT (n=300 pst AF) -> **negative**
- ***SCAR AF*** *(Lepillier et al. 2025)*: multicenter RCT (n=210 pst AF) ->**negative**
- ***SUPRESS AF*** *(Masuda et al. 2025)*: multicenter RCT (n=343 pst AF) ->**negative**

NEJM Evidence

- ***ERASE AF:*** multicenter RCT (n=324 pst AF) -> positive

*Strong limitation: **(70%) without low voltage areas in both arms treated by PVI only.***

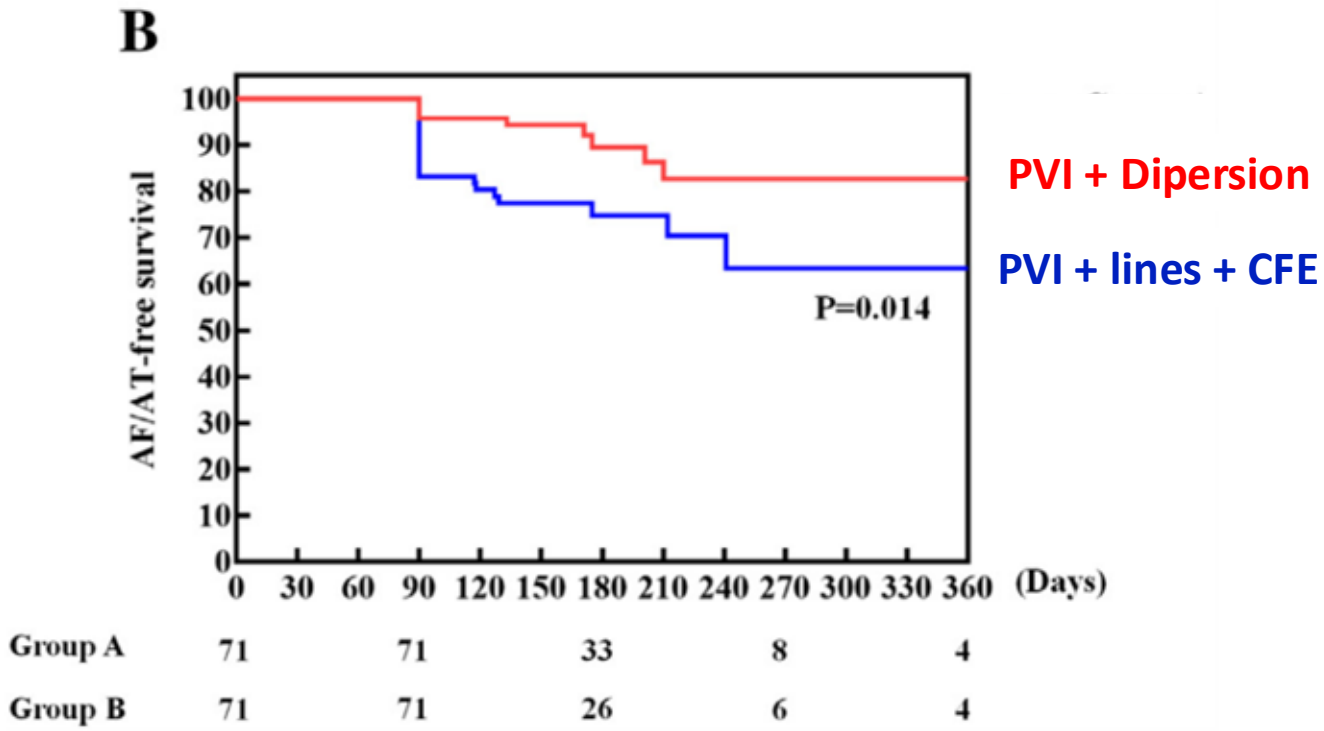
The jury is still out about low voltage-guided ablation

Dispersion-guided ablation Vs Stepwise ablation

Monocentric national academic positive RCT

142 pts with persistent AF, LS-Pst AF: 25%, LA 43 mm, LVEF: 61%, CHAD2DS2-VASc: 2

AF termination : 70.4% vs 10.5%



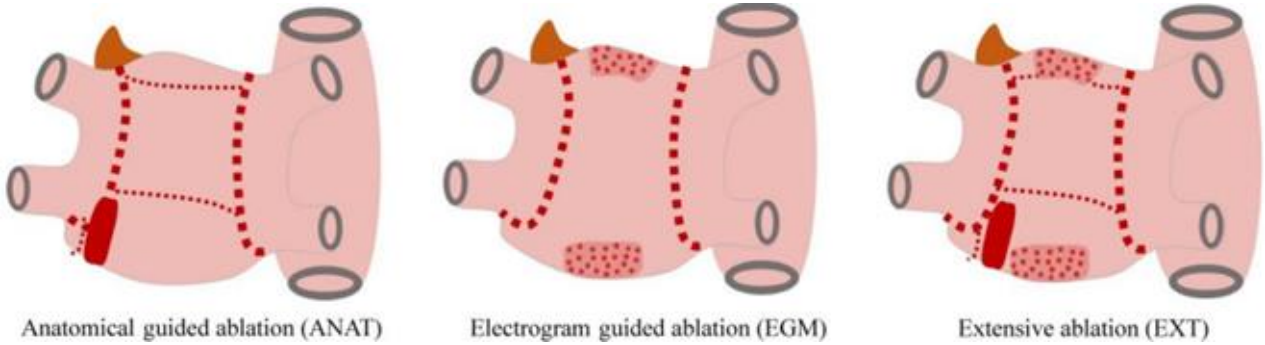
R. Lin et al. / International Journal of Cardiology 278 (2019) 97–103

ESC European Society of Cardiology
Europace (2023) 00, 1–11
https://doi.org/10.1093/europace/euad090

Positive RCT

Multi-centre, prospective randomized comparison of three different substrate ablation strategies for persistent atrial fibrillation

Kaige Li [1†], Changhao Xu [1†], Xiyao Zhu [2], Xinhua Wang [3], Ping Ye[4], Weifeng Jiang[1], Shaohui Wu[1], Kai Xu[1], Xiangting Li [5], Ying Wang [6], Qidong Zheng[7], Yanzhe Wang [8], Lihua Leng [9], Zengtang Zhang[10], Bing Han [11], Yu Zhang [1], Mu Qin[1]*, and Xu Liu [1]*



Anatomical guided ablation (ANAT)

Electrogram guided ablation (EGM)

Extensive ablation (EXT)

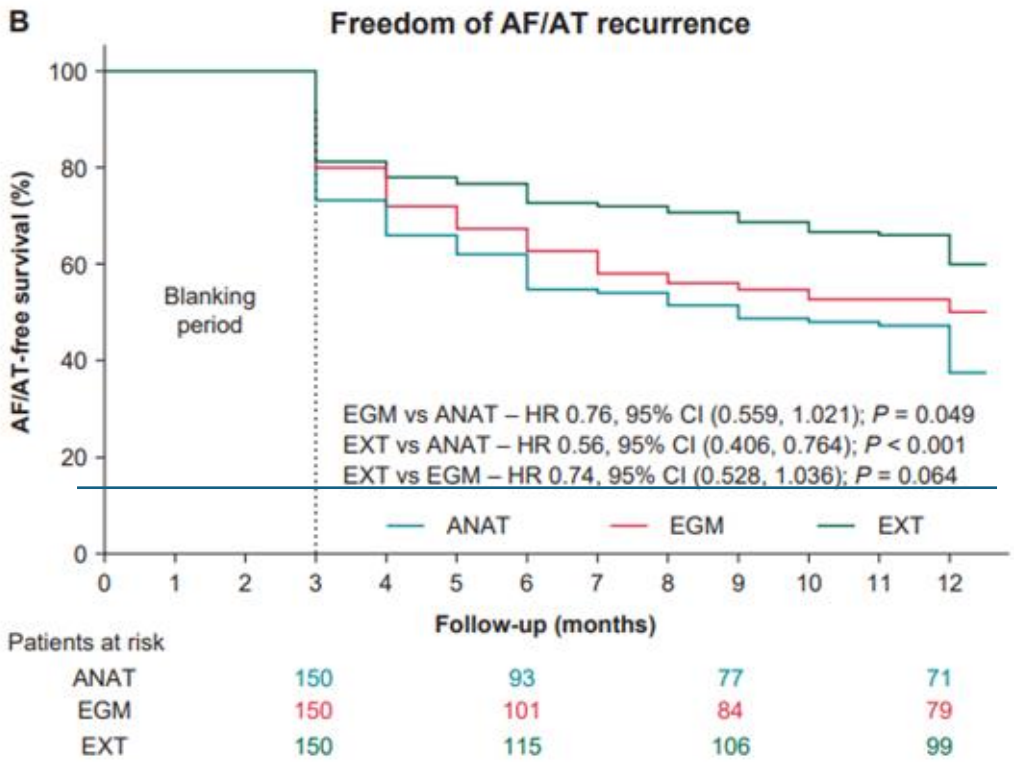
PVI+PWI+Mitral/Marshall*

PVI+Dispersion

PVI+Dispersion+ PWI+Mitral/Marshall*

450 persistent AF patients (LS-pst AF = 50%)

Follow up: ECG/ 48-hrs Holters (M3-6-9-12), 7-days holters if symptoms



* Marshall = 43%