TIGULLIO 2024 II Congresso Nazionale di ARITMOLOGIA

16-17 Aprile Sestri Levante (GE)

Presidente del Congresso
Guido Parodi, Lavagna

Comitato Scientifico
Paolo Donateo, Lavagna *(Responsabile Scientifico)*
Roberto Maggi, Lavagna

Sede Congressuale
Hotel Vis a Vis ****
Sestri Levante

L'imaging integrato nell'ablazione di fibrillazione atriale

Giulio Zucchelli, MD, PhD, FESC

U.O. Cardiologia 2, Azienda Ospedaliero-Universitaria Pisana

Perché l'imaging nell'ablazione di FA

- Miglioramento del workflow 
- Individuazione dei target 
- Riduzione dei rischi 

Perché l'imaging nell'ablazione di FA

- Miglioramento del workflow 
- Individuazione dei target 
- Riduzione dei rischi 

Imaging… old school

- Anatomia (numero, decorso) vene polmonari
- Auricola sinistra (trombosi?)
- Setto interatriale
- Altri reperti (vena cava sup sx, coronarie, etc.)

Journal of Interventional Cardiac Electrophysiology (2021) 60:477–484
https://doi.org/10.1007/s10840-020-00764-4

Role of pre-procedural CT imaging on catheter ablation in patients with atrial fibrillation: procedural outcomes and radiological exposure

Andrea Di Cori[1] · Giulio Zucchelli[1] · Lorenzo Faggioni[2] · Luca Segreti[1] · Raffaele De Lucia[1] · Valentina Barletta[1] · Stefano Viani[1] · Luca Paperini[1] · Matteo Parollo[1] · Ezio Soldati[1] · Davide Caramella[2] · Maria Grazia Bongiorni[1]

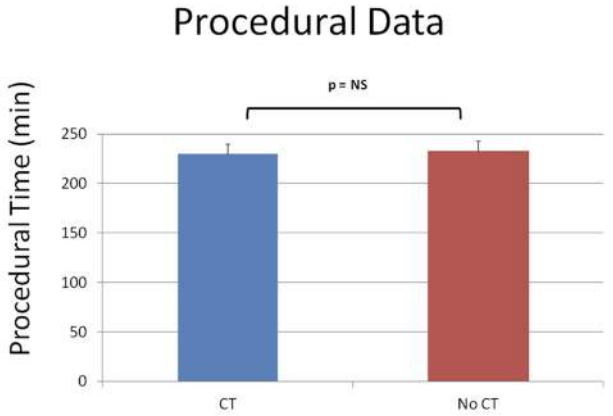


Fig. 2 Comparison of total procedural time among patients with and without CT imaging

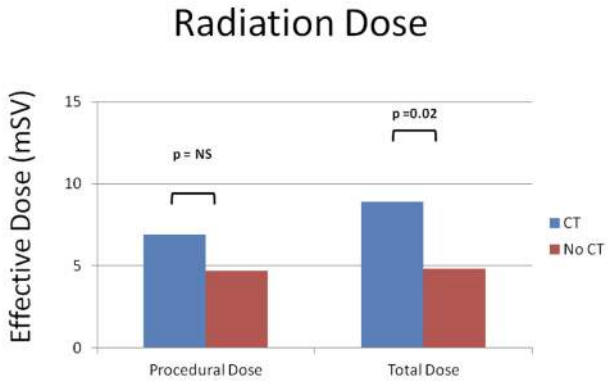
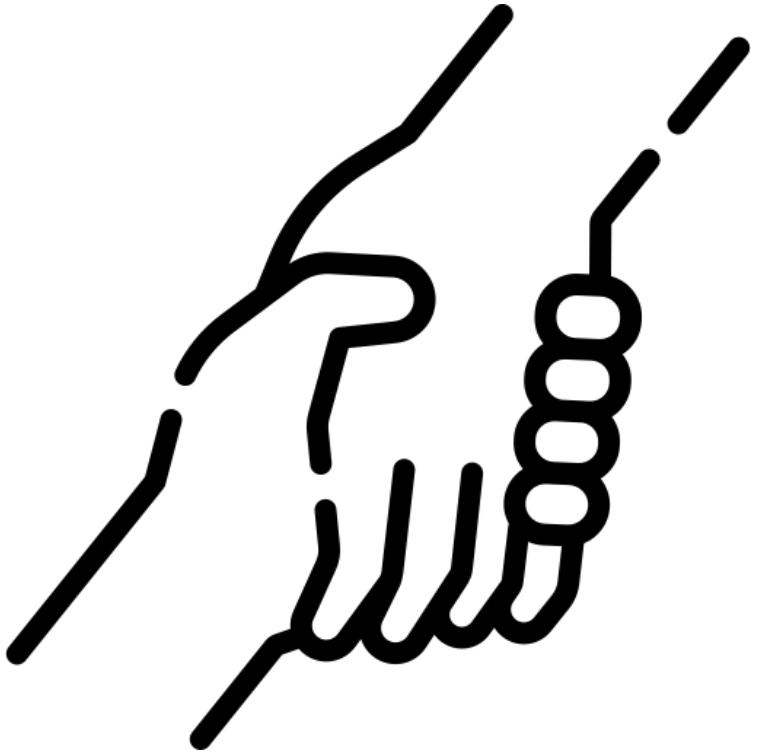


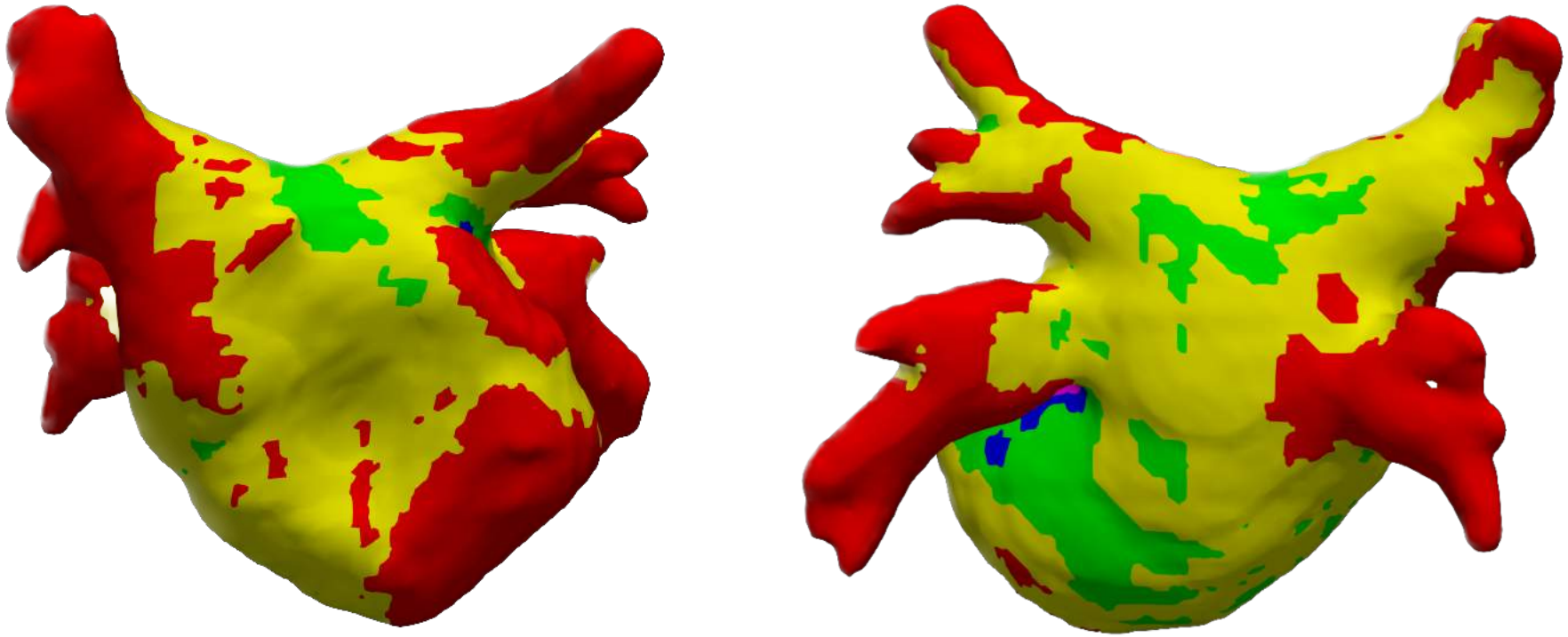
Fig. 4 Comparison of procedural and total (CT plus procedural) effective dose among patients with and without CT imaging

Come la TC può *davvero* aiutare

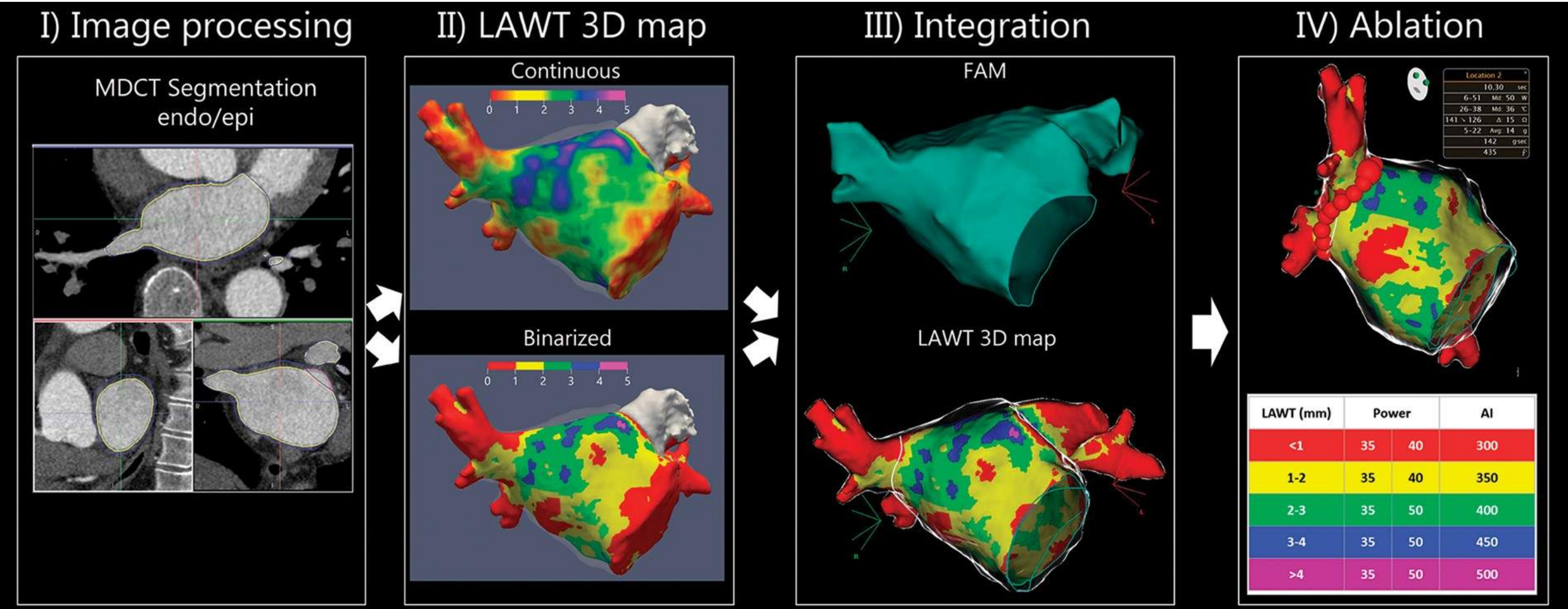
- Evitare l'overshooting
- E l'undershooting
- Rimanendo efficaci
- Nella massima sicurezza

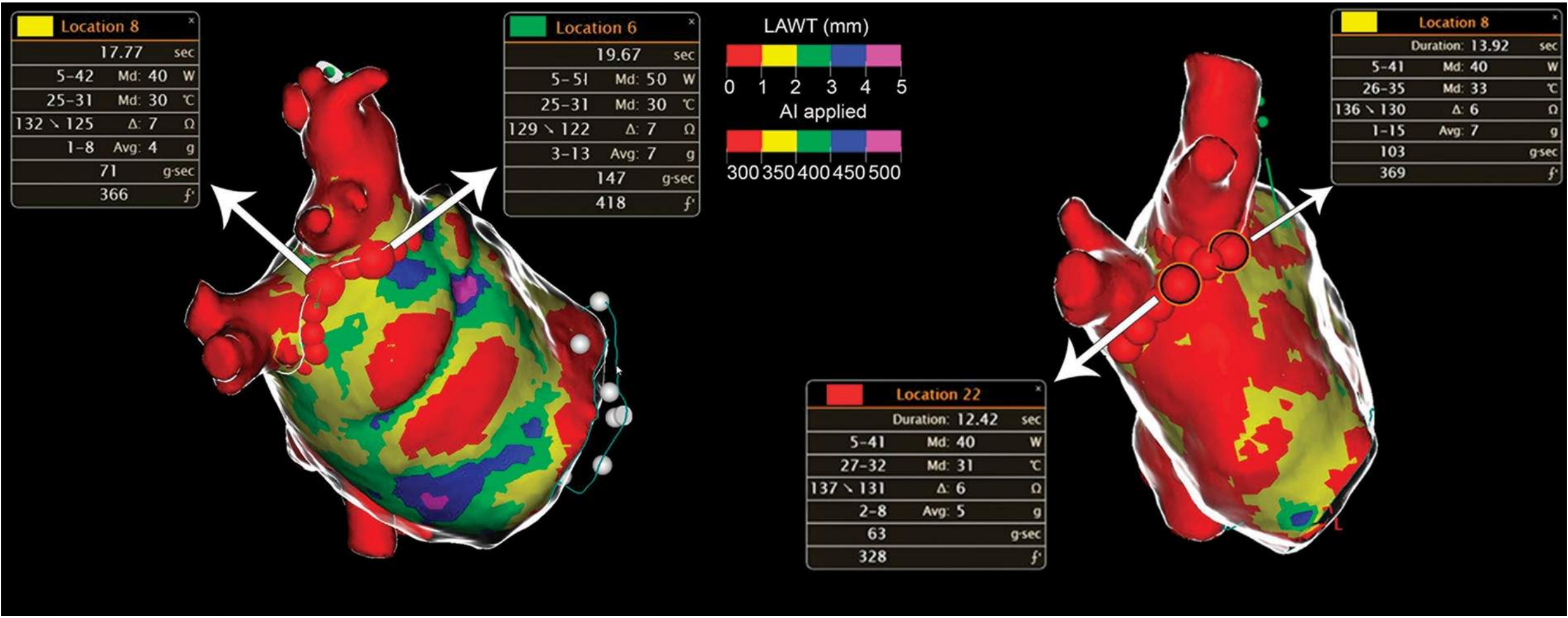


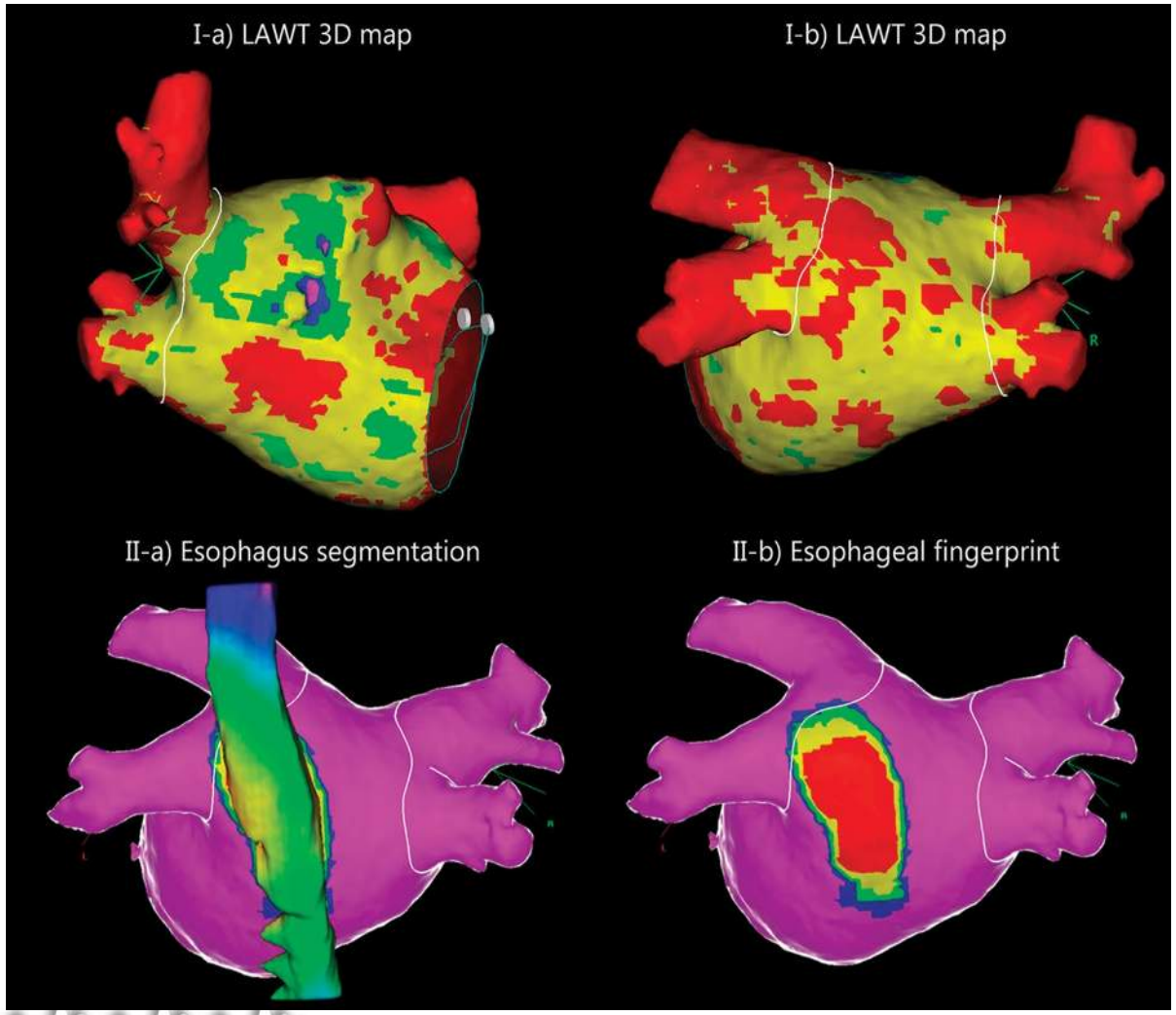
LA Wall Thickness Map

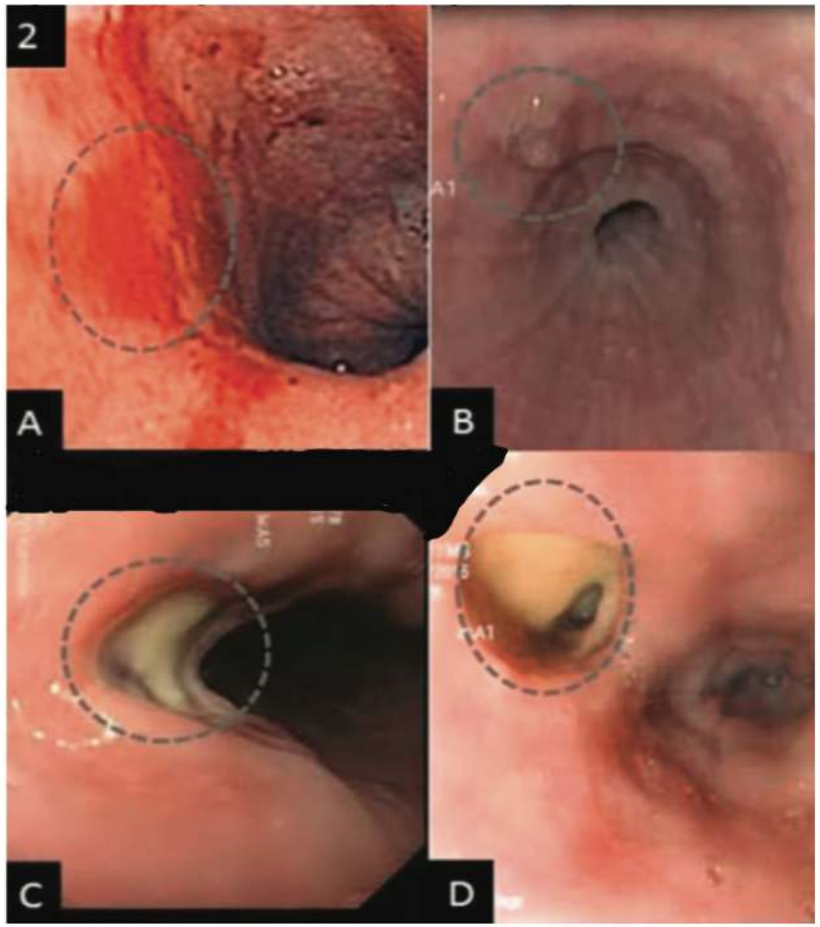


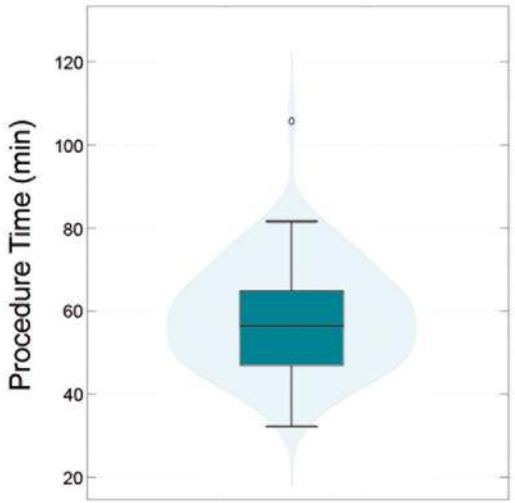
Ablate-by-LAW Protocol

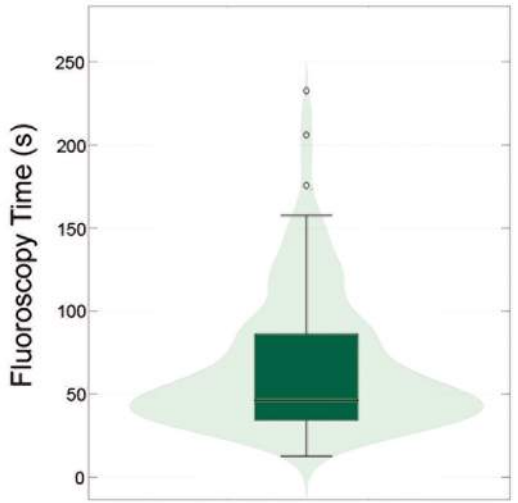


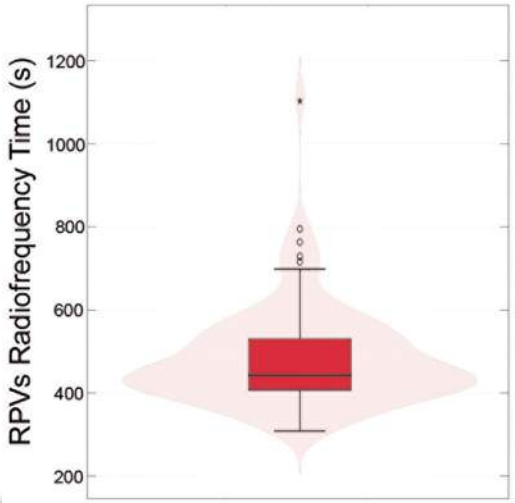

Location 8
17.77 sec
5–42 Md: 40 W
25–31 Md: 30 ℃
132 \ 125 Δ: 7 Ω
1–8 Avg: 4 g
71 g·sec
366 f
Location 6
19.67 sec
5–51 Md: 50 W
25–31 Md: 30 ℃
129 \ 122 Δ: 7 Ω
3–13 Avg: 7 g
147 g·sec
418 f
LAWT (mm)
0 1 2 3 4 5
AI applied
300 350 400 450 500
Location 8
Duration: 13.92 sec
5–41 Md: 40 W
26–35 Md: 33 ℃
136 \ 130 Δ: 6 Ω
1–15 Avg: 7 g
103 g·sec
369 f
Location 22
Duration: 12.42 sec
5–41 Md: 40 W
27–32 Md: 31 ℃
137 \ 131 Δ: 6 Ω
2–8 Avg: 5 g
63 g·sec
328 f

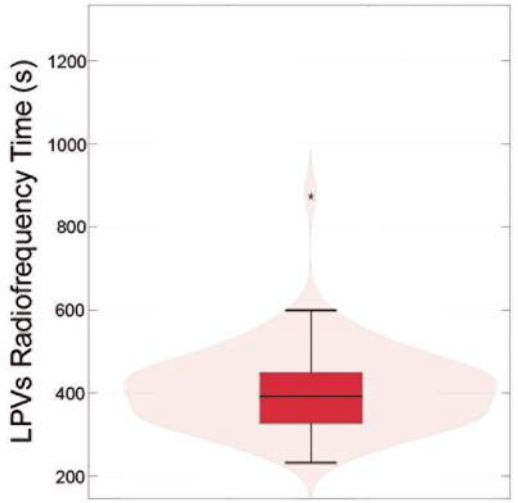

I-a) LAWT 3D map
I-b) LAWT 3D map
II-a) Esophagus segmentation
II-b) Esophageal fingerprint

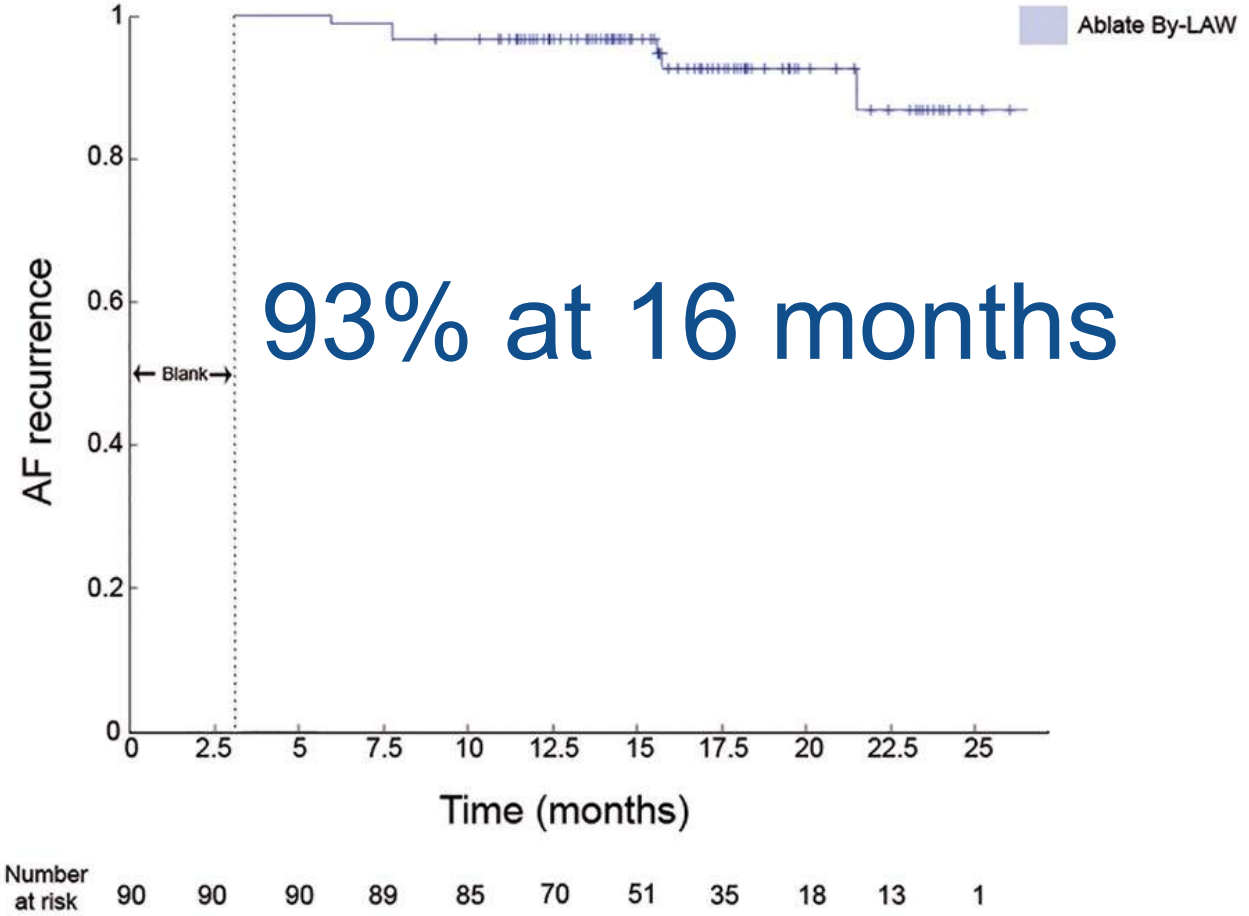

2
A
B
C
D











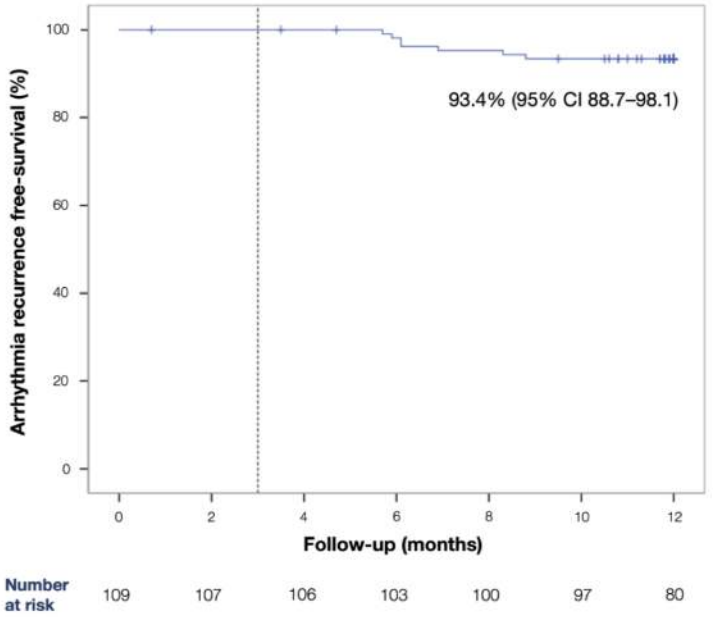
93% at 16 months

The multicenter Ablate-by-LAW study:

Personalized paroxysmal atrial fibrillation ablation according to the local left atrial wall thickness

José Alderete[1], Diego Penela[1], Giulio Falasconi[1], David Soto-Iglesias[1], Lorenzo Mazzocchetti[2], Etel Silva[3], Beatriz Jáuregui[1], Saman Nazarian[4], Philipp Sommer[5], Giulio Zucchelli[2], Juan Fernández-Armenta[3], Antonio Berruezo[1].

Results



	Single-centre Ablate-By LAW n= 90	Multicenter Ablate-By-LAW n=109
Procedure time skin-to-skin (min)	59 (49–66)	61.7 (48.4 – 83.8)
Fluoroscopy time (min)	0.75 (0.5–1.4)	1 (0.4 – 3.3)
Total RF time (min)	14 (12.5–16)	13.9 (12.3 – 16.8)
Mean follow-up (months)	16 ± 4	13.4 ± 4.7
12-month AT/AF/AFL free-survival	93.3%	93.4%
Serious acute procedure-related complications, *n* (%)	0 (0%)	1 (0.9%)*

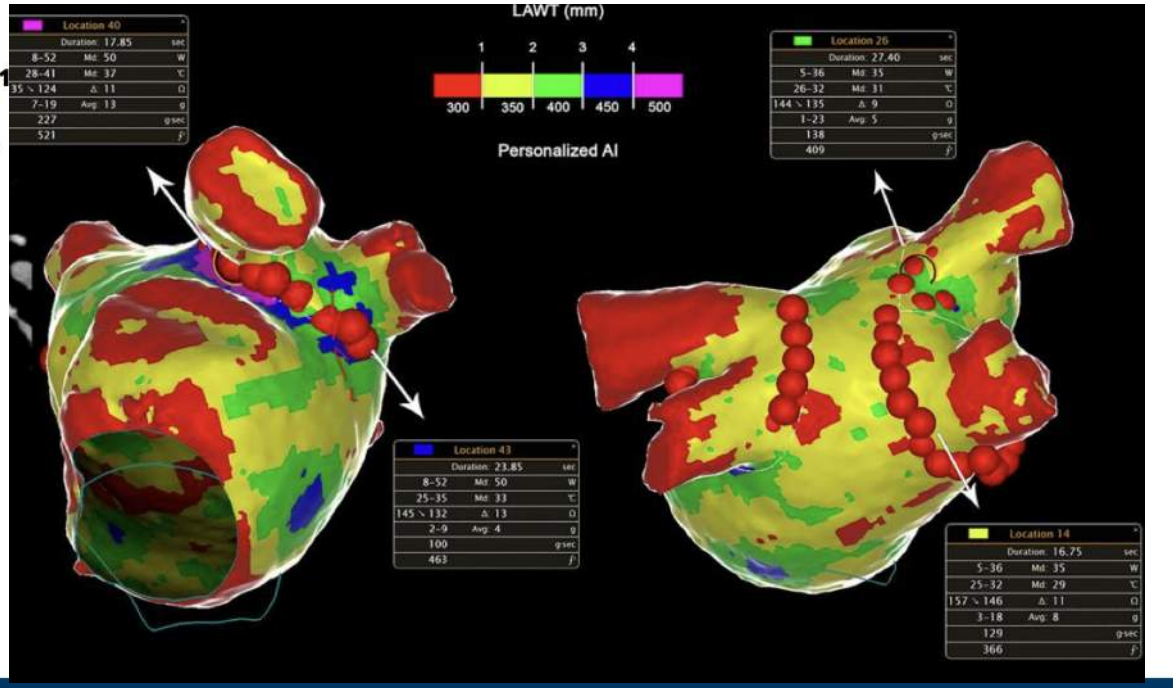
**femoral artery pseudoaneurism*

ESC European Society of Cardiology
Europace (2023) **25**, 1–15
https://doi.org/10.1093/europace/euad118

CLINICAL RESEARCH

Personalized pulmonary vein antrum isolation guided by left atrial wall thickness for persistent atrial fibrillation

Giulio Falasconi [1,2†], Diego Penela[1†], David Soto-Iglesias [1], Pietro Francia [1], Cheryl Teres[1], Andrea Saglietto [1,4], Beatriz Jauregui [1], Daniel Viveros [1,2], Aldo Bellido[1], Jose Alderete [1,2], Julia Meca-Santamaria[1], Paula Franco [1], Carlo Gaspardone[1], Rodolfo San Antonio [1], Marina Huguet [1], Óscar Cámara [5], José-Tomás Ortiz-Pérez [1], Julio Martí-Almor [1], and Antonio Berruezo [1*]

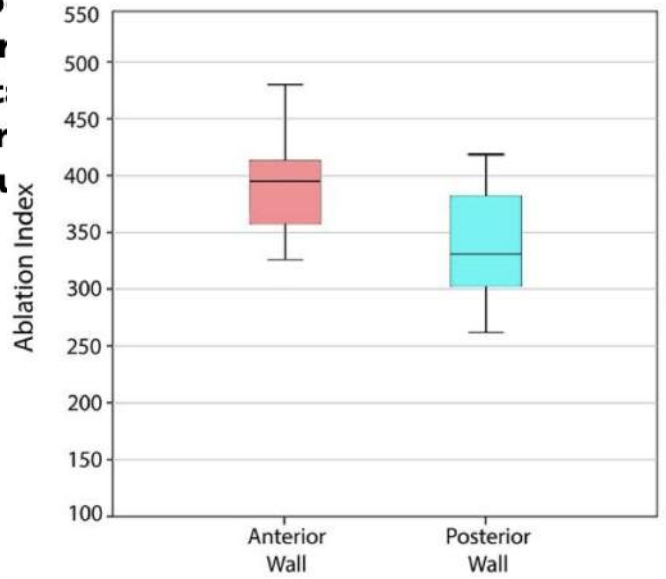


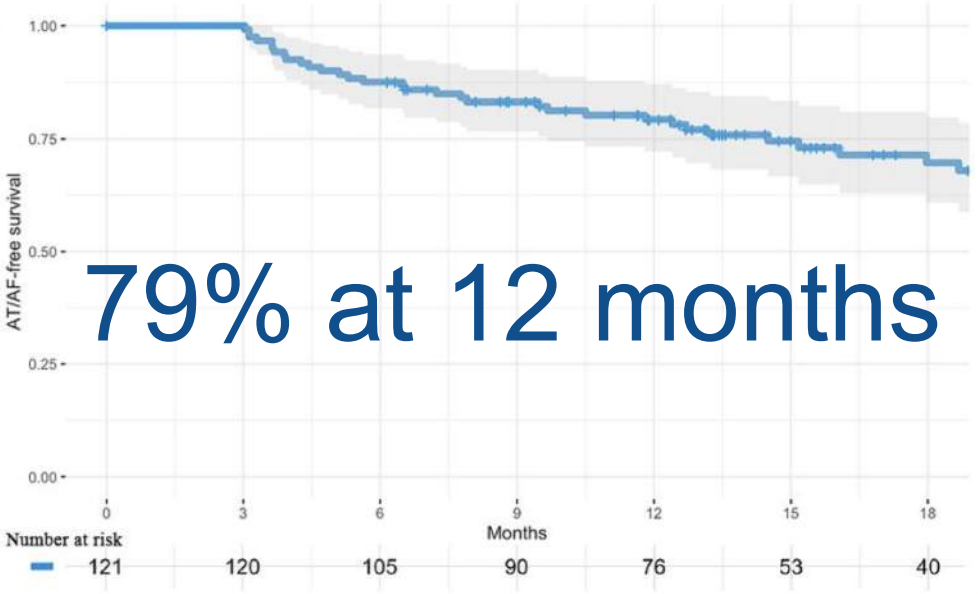
ESC European Society of Cardiology
Europace (2023) **25**, 1–15
https://doi.org/10.1093/europace/euad118

CLINICAL RESEARCH

Personalized pulmonary vein antrum isolation guided by left atrial wall thickness for persistent atrial fibrillation

Giulio Falasconi [1,2†], Diego Penela[1†], David Soto Cheryl Teres[1], Andrea Saglietto [1,4], Beatriz Jaur Aldo Bellido[1], Jose Alderete [1,2], Julia Meca-Sant Carlo Gaspardone[1], Rodolfo San Antonio [1], Mar Óscar Cámara [5], José-Tomás Ortiz-Pérez [1], Ju and Antonio Berruezo [1*]





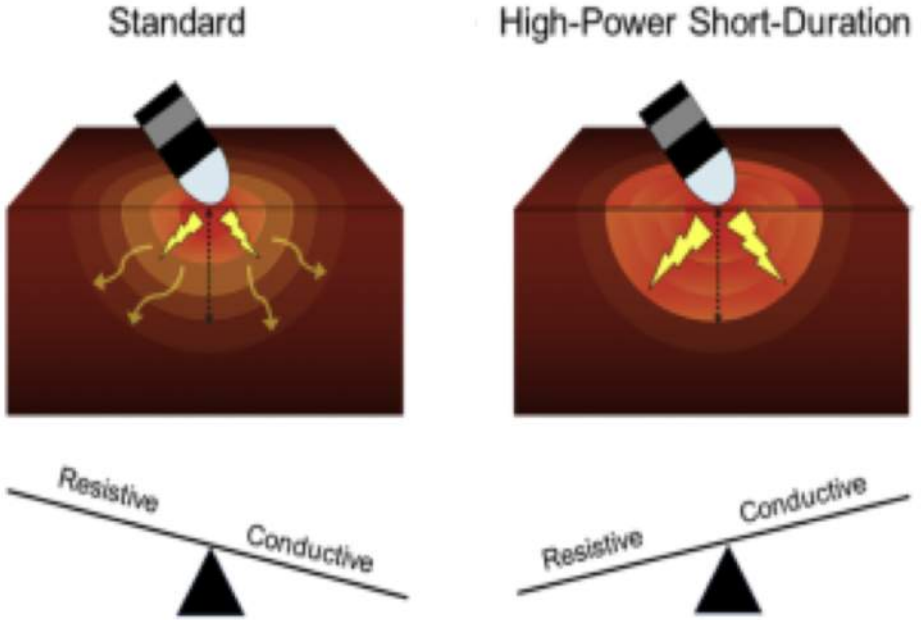
79% at 12 months

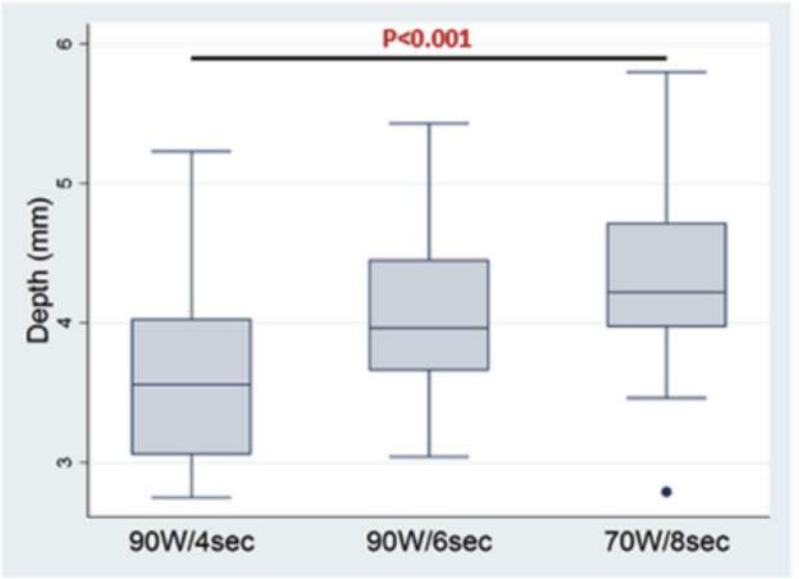
Personalized Pulmonary Vein Isolation with Very High-Power Short-Duration Lesions guided by Left Atrial Wall Thickness: the QDOT-by-LAWT Randomized Trial

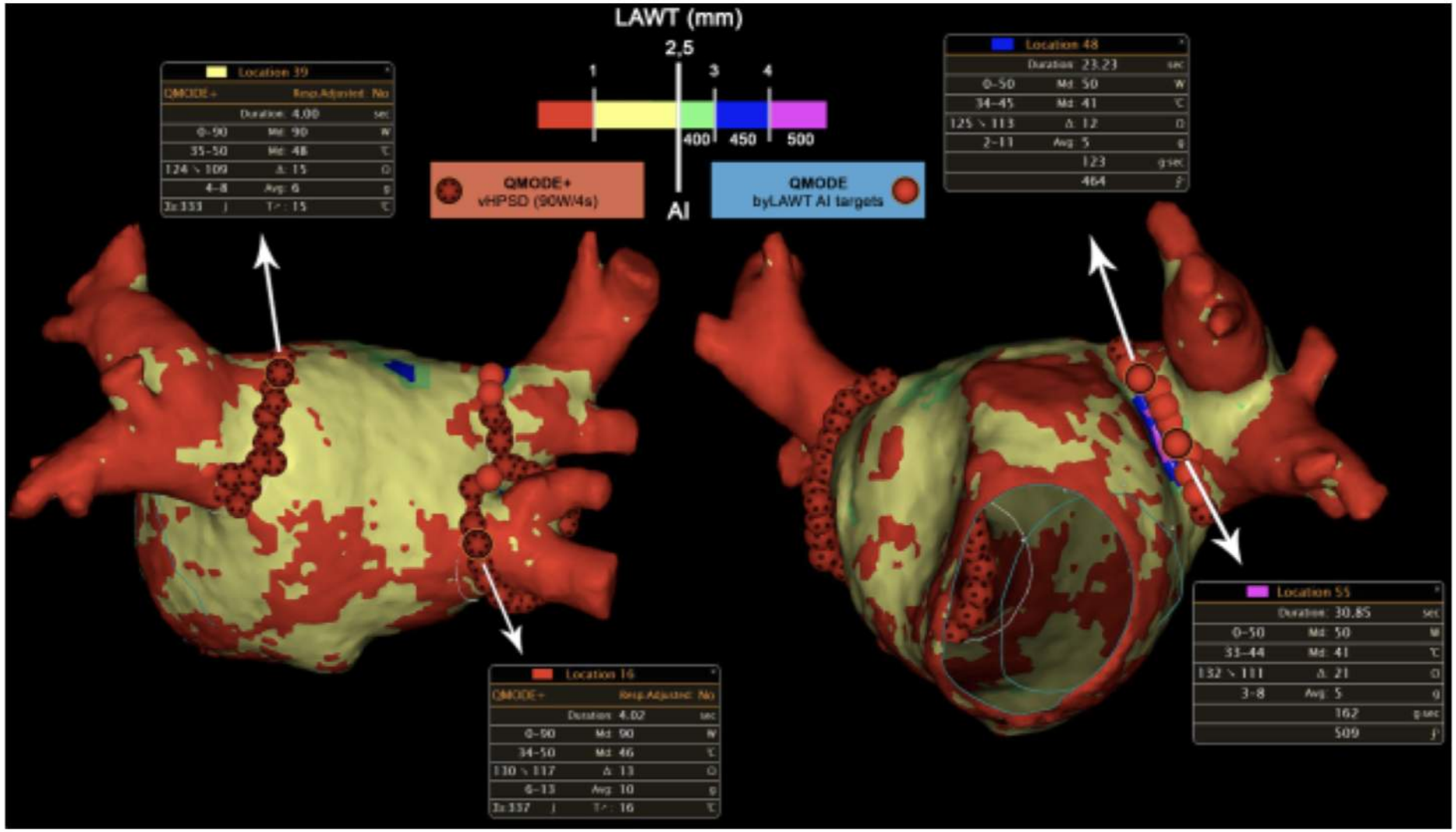
Clinical Trials: NCT04298177
IIS Biosense Webster

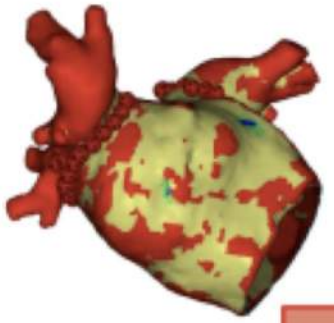
G. Falasconi[1,2], D. Penela[1,2], D. Soto-Iglesias[1], D. Turturiello[1], P. Francia[1], A. Saglietto[1], A. Bellido[1], J. Alderete[1], D. Viveros[1], P. Franco-Ocaña[1], F. Zaraket[1], O. Camara[1], J.T. Ortiz-Pérez[1], J. Marti-Almor[1], A. Berruezo[1]

[1] Heart Institute, Teknon Medical Center, Barcelona, Spain
[2] Arrhythmia Department, IRCCS Humanitas Research Hospital, Milan, Italy


Standard
High-Power Short-Duration
Resistive
Conductive
Resistive
Conductive


P<0.001
Depth (mm)
3
4
5
6
90W/4sec
90W/6sec
70W/8sec


LAWT (mm)
2,5
1
3
4
400
450
500
AI
QMODE+
vHPSD (90W/4s)
QMODE
byLAWT AI targets
Location 39
Location 48
Location 16
Location 55



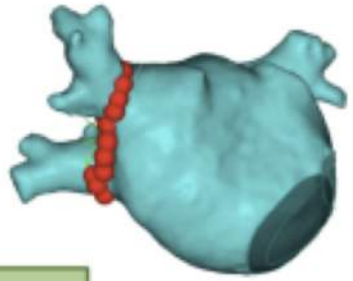
Paroxysmal Atrial Fibrillation

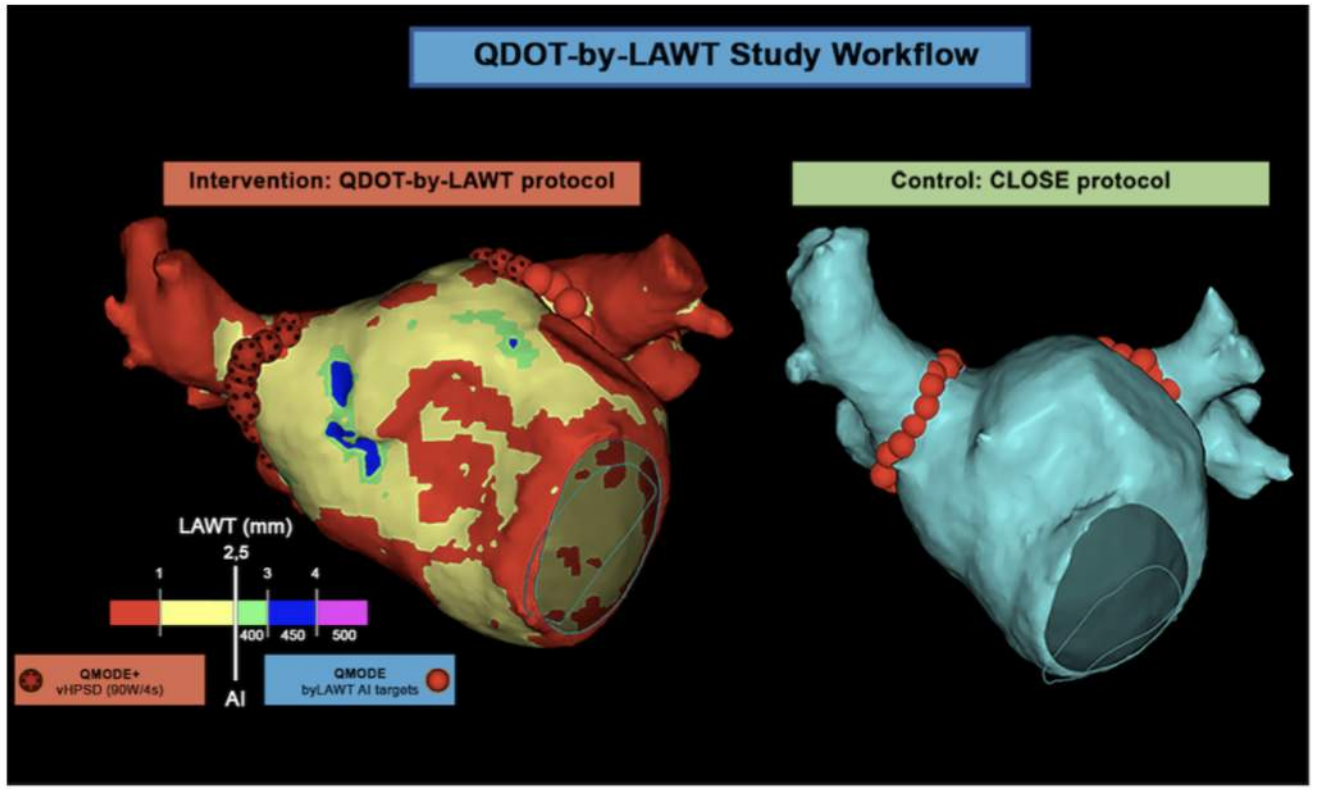
Inclusion Criteria	Exclusion Criteria
• Age > 18 years • Indication for paroxysmal AF ablation	• Previous AF ablation procedure • Contraindication to preprocedural CT scan

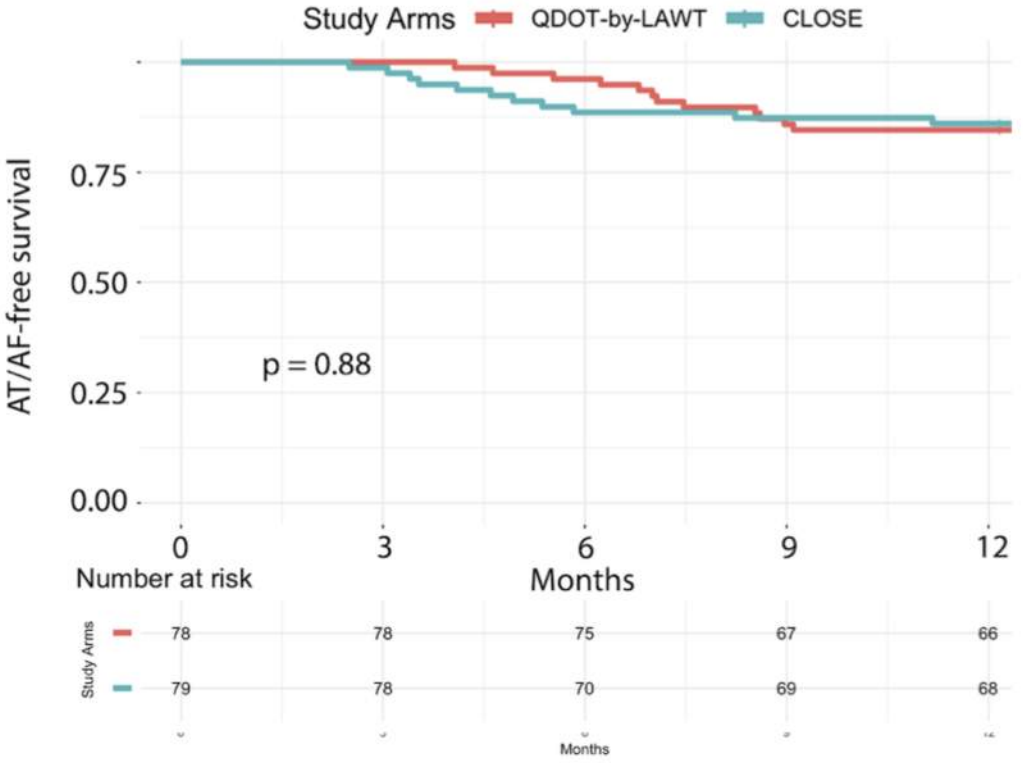
n=162, Randomization 1:1

INTERVENTION: QDOT-by-LAWT arm	CONTROL: CLOSE arm
≤ 2.5 mm LAWT : vHPSD ablation (90 W / 4 s) > 2.5 mm LAWT : QMODE ablation (byLAWT AI targets)	No LAWT information QMODE ablation with CLOSE settings

Follow-up (1 year)



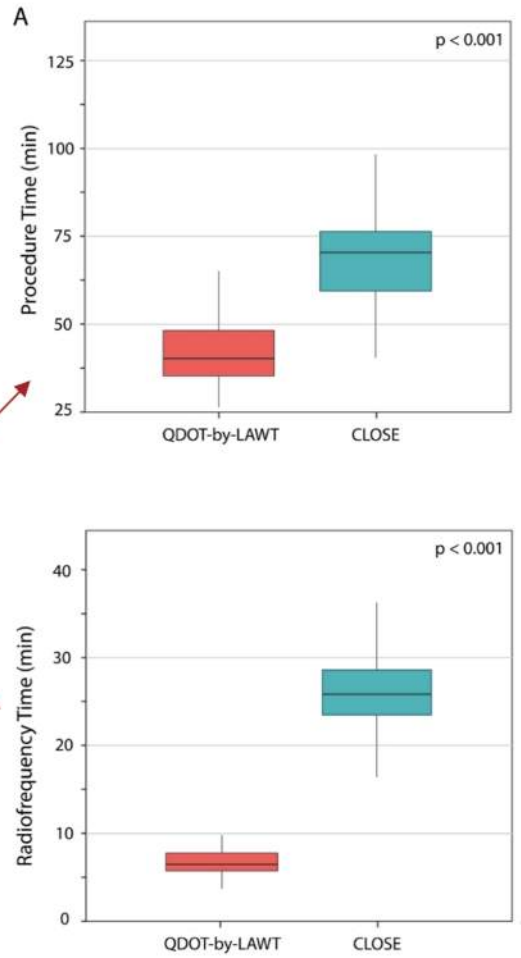

QDOT-by-LAWT Study Workflow
Intervention: QDOT-by-LAWT protocol
Control: CLOSE protocol
LAWT (mm)
2,5
1
3
4
400
450
500
AI
QMODE+
vHPSD (90W/4s)
QMODE
byLAWT AI targets


Study Arms
QDOT-by-LAWT
CLOSE
AT/AF-free survival
0.75
0.50
0.25
0.00
p = 0.88
0
3
6
9
12
Months
Number at risk
Study Arms
78
78
75
67
66
79
78
70
69
68
Months

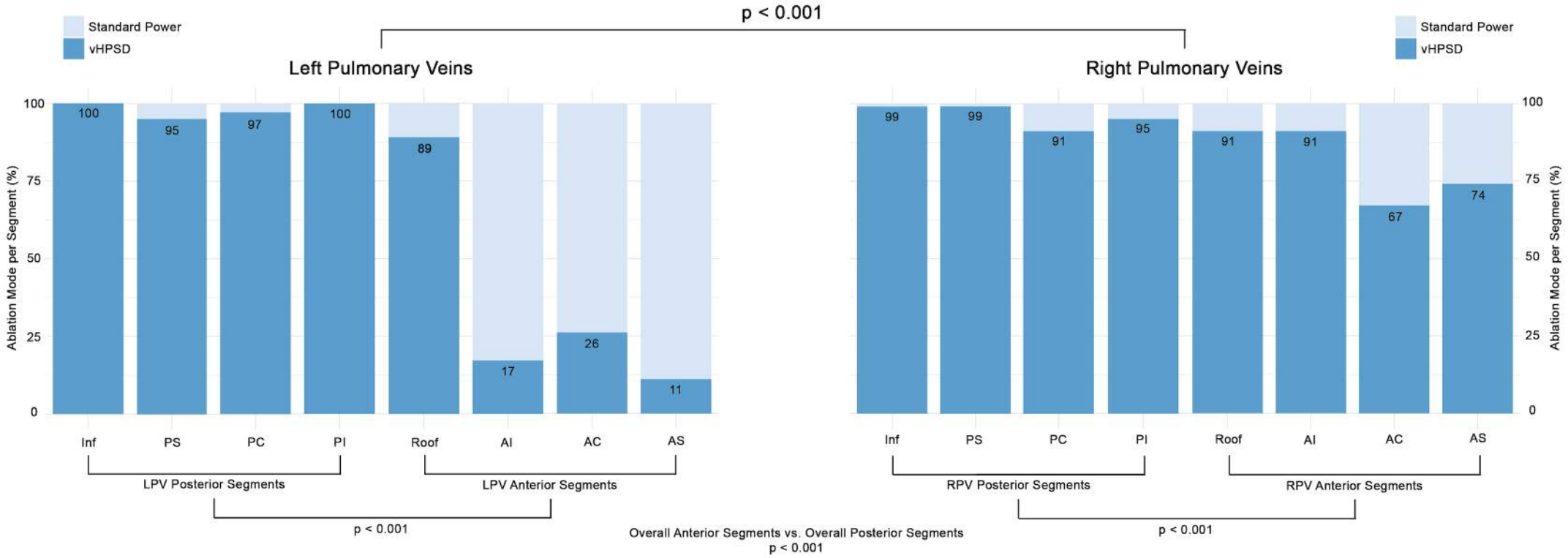
Results

LAWT-guided personalized PVI ablation proved greater efficiency compared to CLOSE protocol approach

	QDOT-by-LAWT (N=81)	CLOSE (N=81)	Total patients (N=162)	p value
Ventilation rate (breaths/min)	50.0 ± 3.9	49.7 ± 4.4	49.8 ± 4.1	0.78
Tidal Volume (ml)	237.2 ± 46.0	237.9 ± 38.2	237.6 ± 42.0	0.84
Procedure time skin-to-skin (min)	40.0 (35.0-48.0)	70.0 (60.0-76.0)	54.5 (40.0-70.0)	**<0.001**
Fluoroscopy time (s)	59 (39-94)	74 (57-134)	65.0 (48.0-114.0)	**0.01**
Fluoroscopy Dose (mGy)	3.7 (2.0-5.7)	4.7 (3.1-8.4)	4.1 (2.3-6.8)	**0.02**
Dose Area Product (Gy*cm2)	1.0 (0.6 - 1.6)	1.4 (0.9 - 2.3)	1.2 (0.7 - 2.0)	**0.01**
Total RF time (min)	6.6 (5.9-7.9)	25.7 (23.2-28.5)	9.7 (6.6-25.6)	**<0.001**

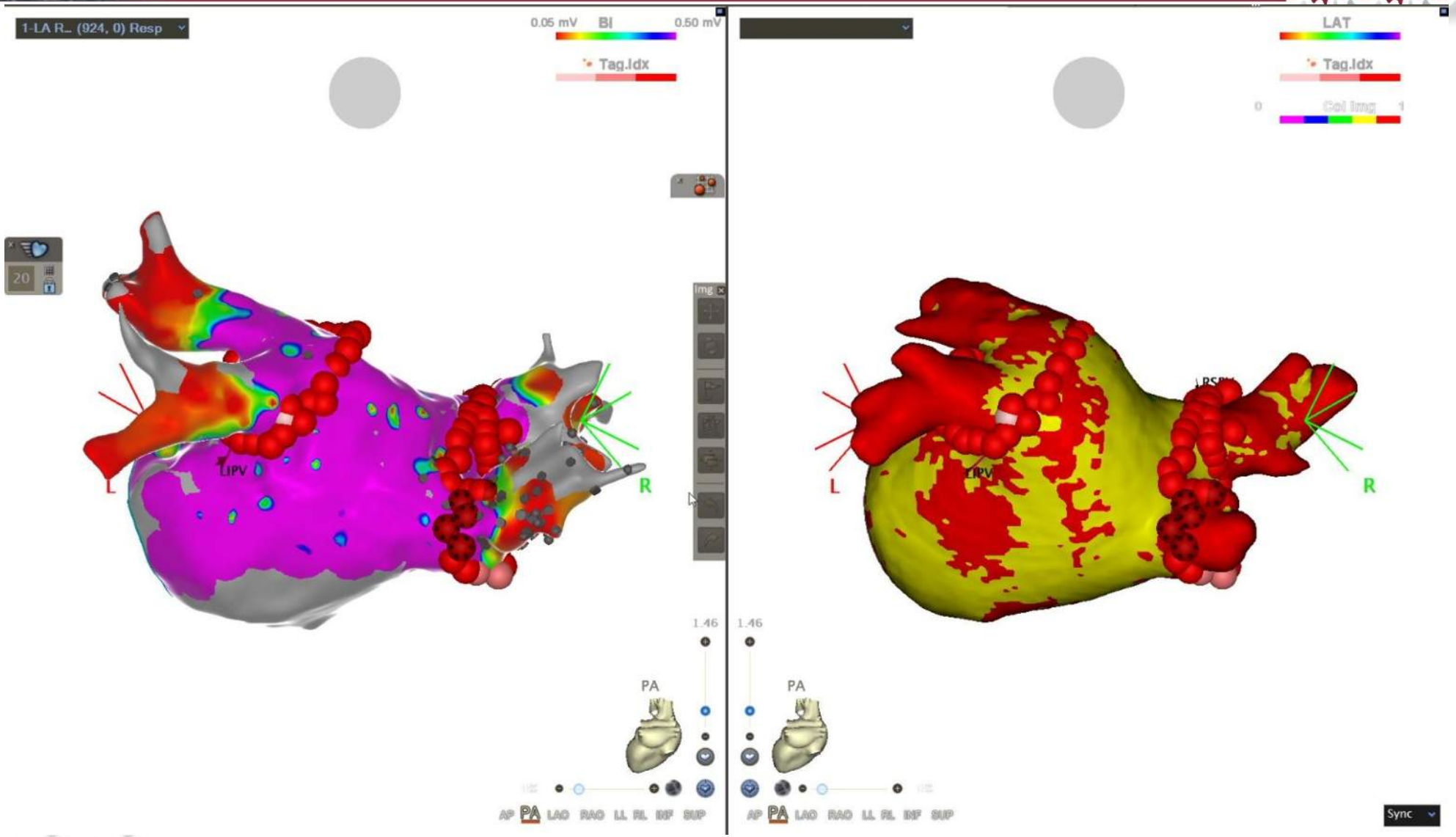


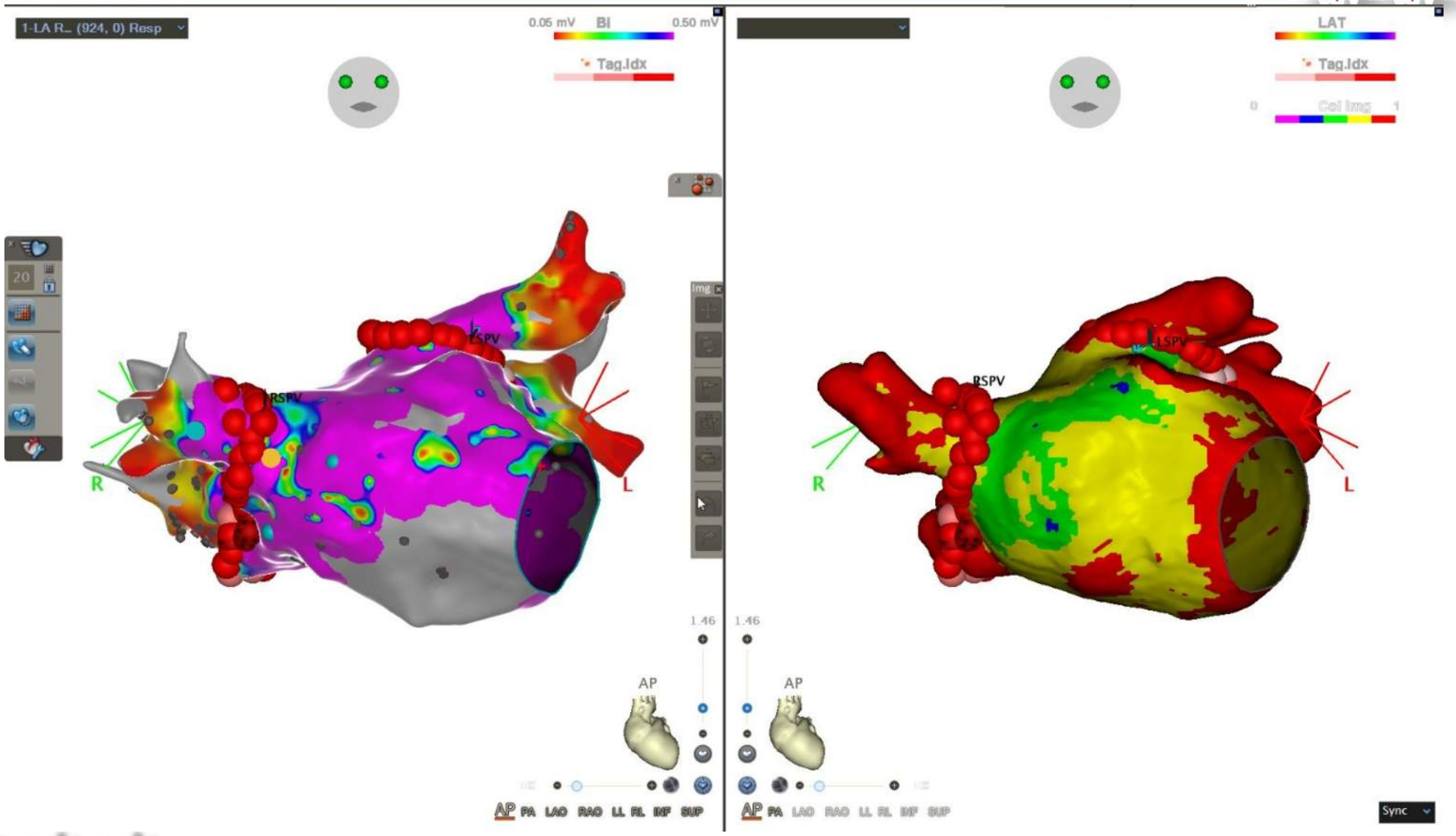
No significant differences were observed in first-pass isolation rate between the two groups for both LPVs (91.4% vs. 91.4%, p=0.99) and RPVs (92.6% vs. 93.8%, p=0.99)

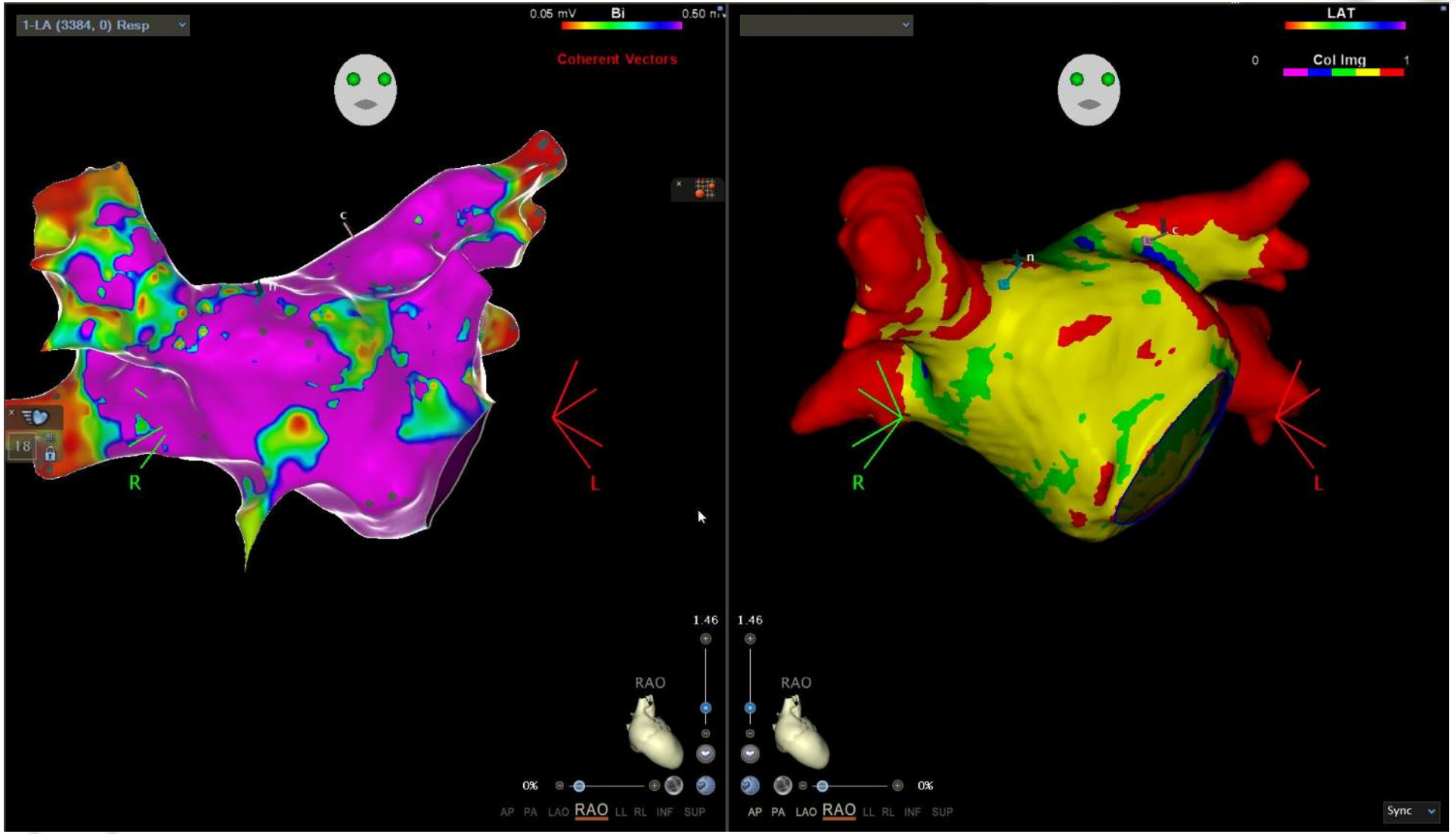


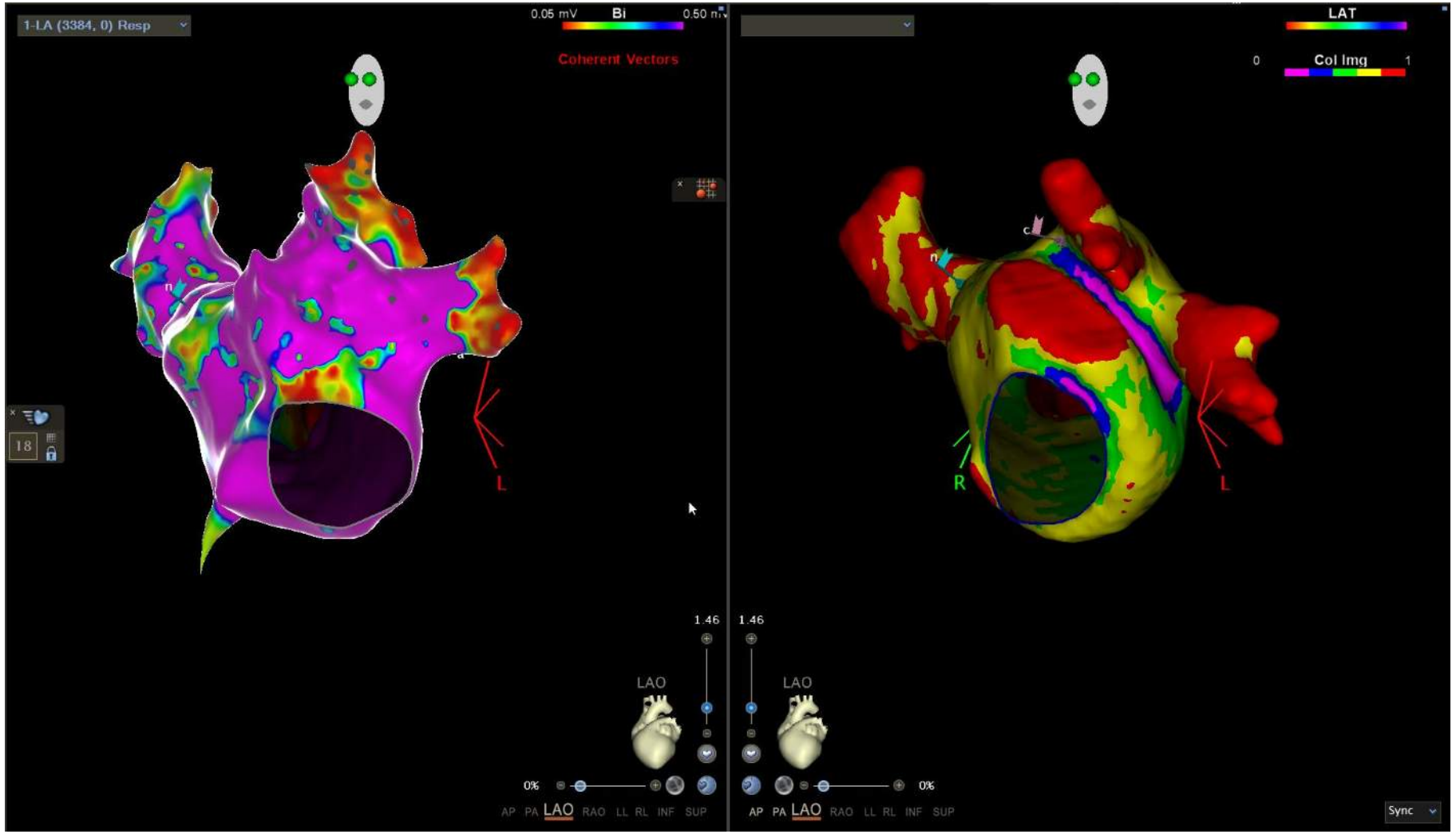
Unpublished data, courtesy of study investigators

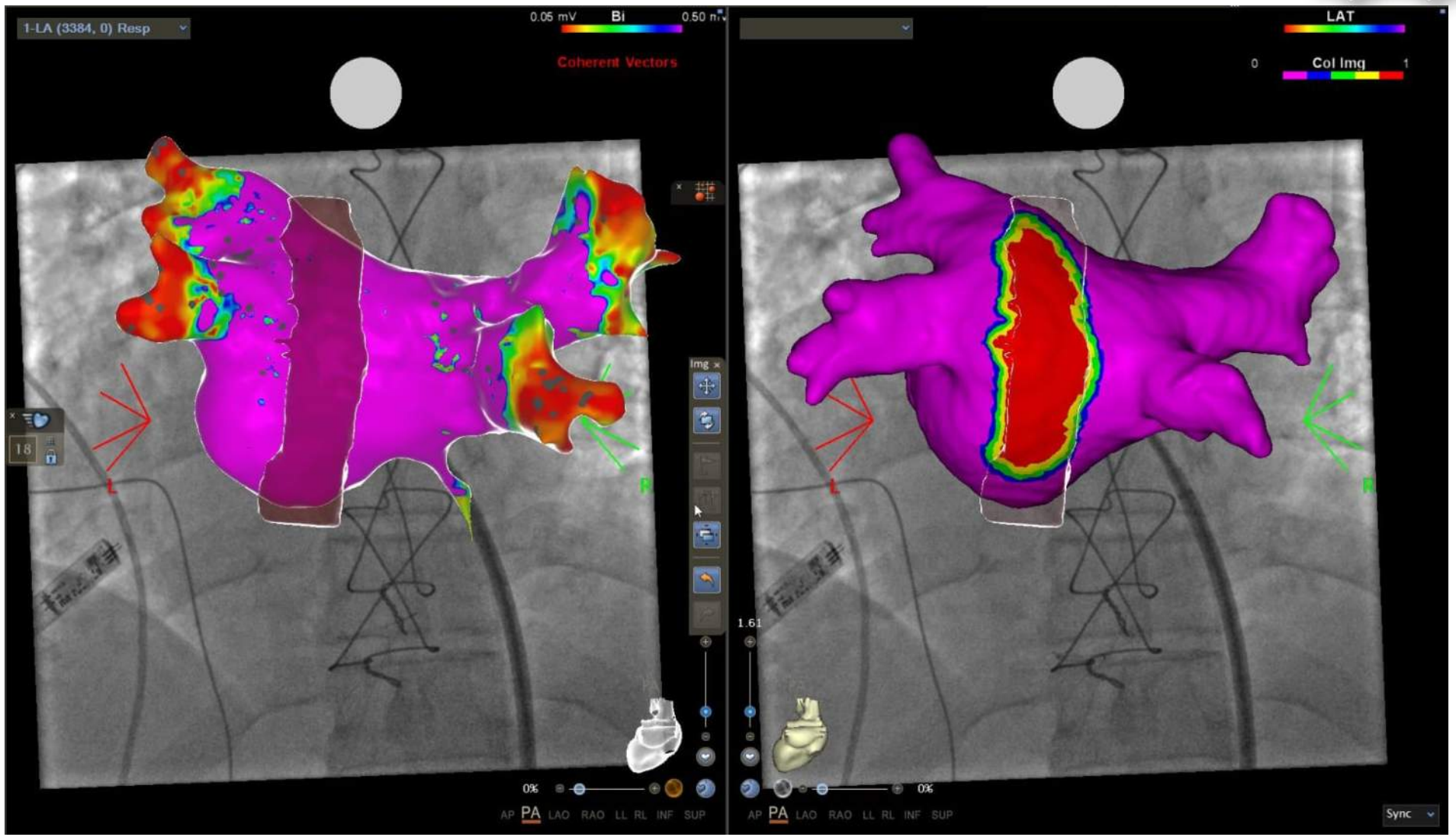
AC: Anterior Carina; AI: Antero-Inferior; AS: Antero-Superior; Inf: Inferior; LPV: Left Pulmonary Vein; PC: Posterior Carina; PI: Postero-Inferior; PS: Postero-superior;

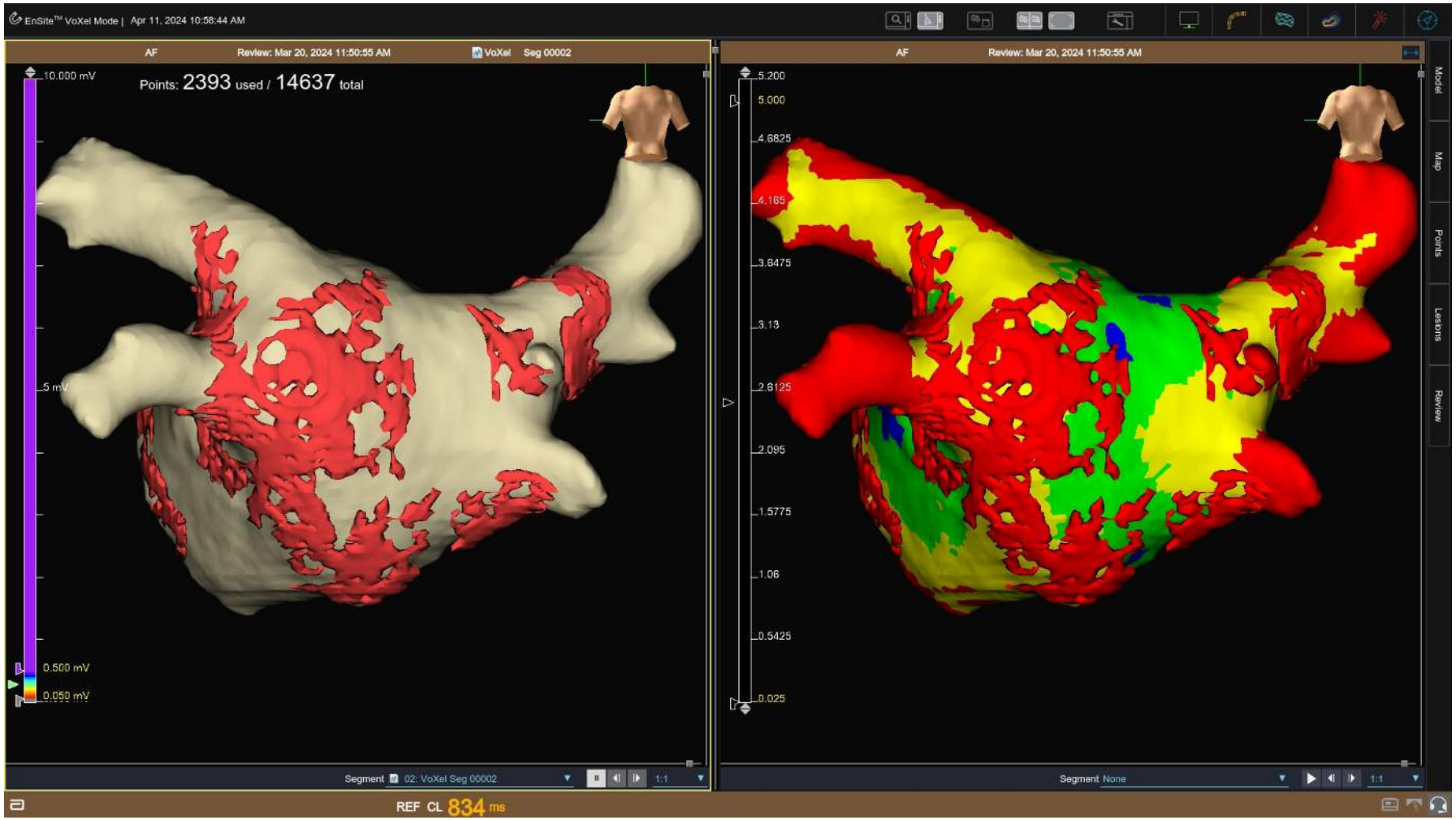

1-LA R_ (924, 0) Resp
0.05 mV
BI
0.50 mV
Tag.Idx
LAT
Tag.Idx
Cal Img
LIPV
L
R
1.46
PA
AP PA LAO RAO LL RL INF SUP
Sync

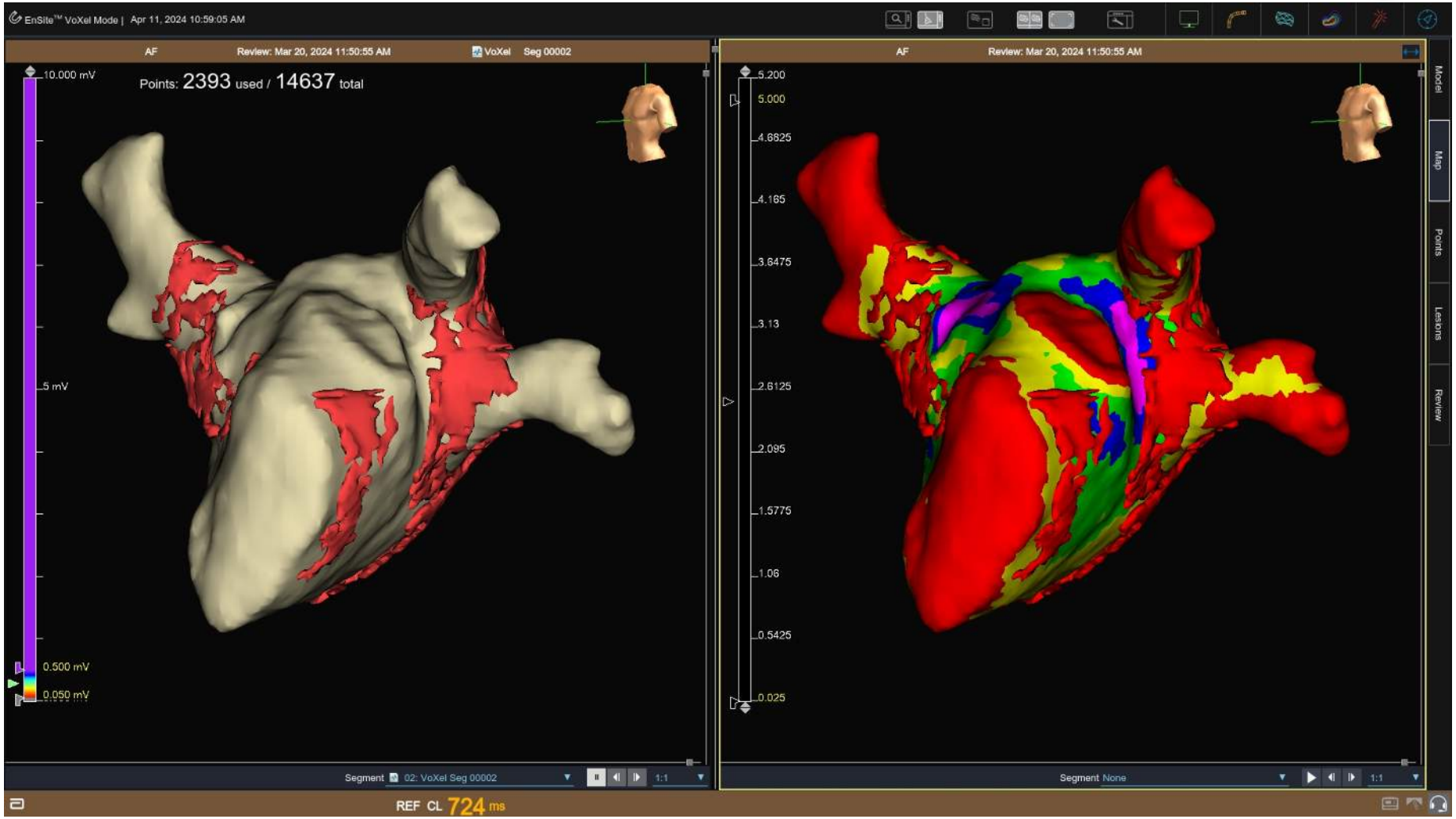

1-LA R... (924, 0) Resp
0.05 mV
Bi
0.50 mV
Tag.Idx
LAT
Tag.Idx
Col Img
LSPV
RSPV
R
L
AP
PA
LAO
RAO
LL
RL
INF
SUP
Sync

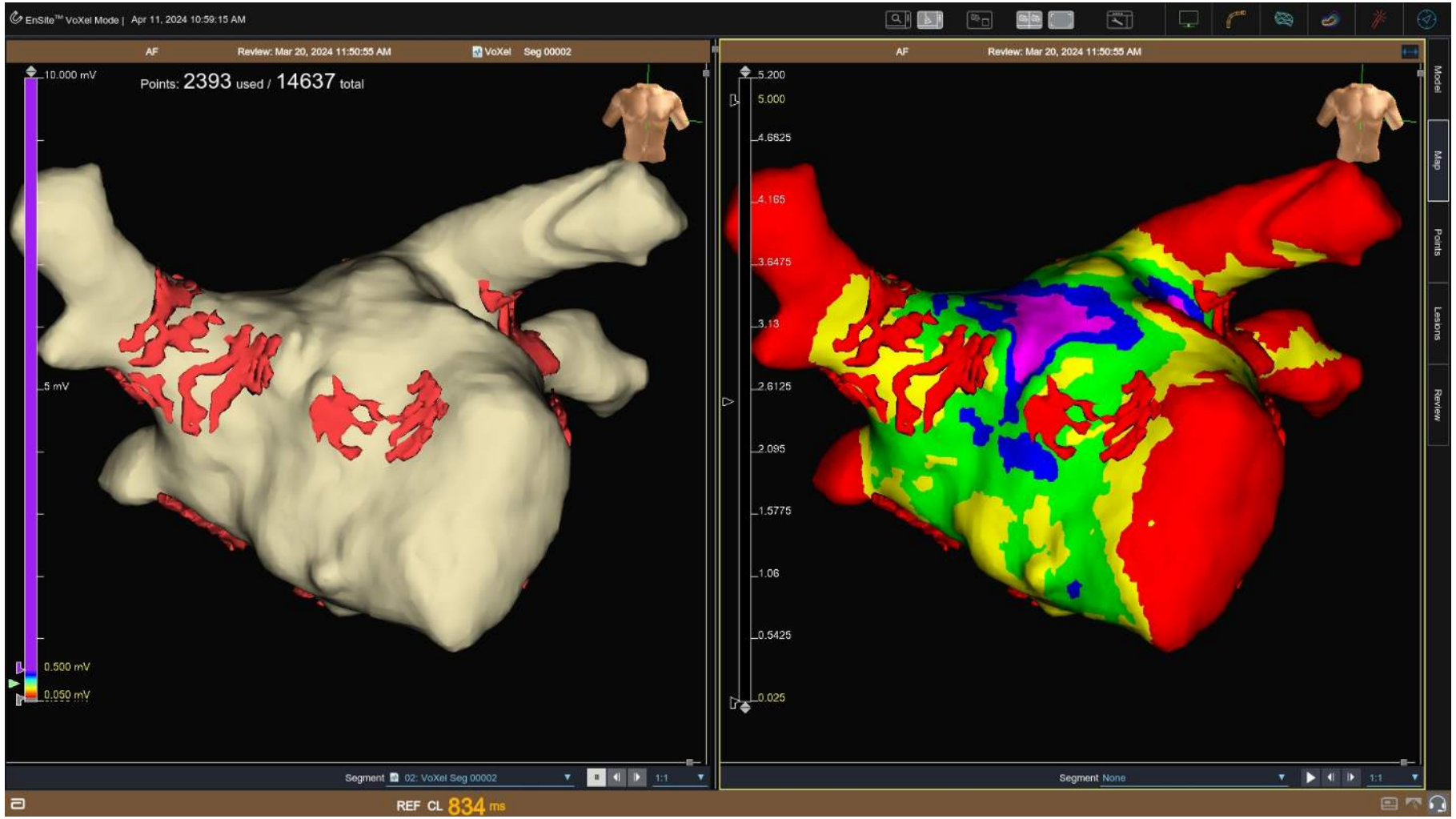

1-LA (3384, 0) Resp
0.05 mV
Bi
0.50 mV
Coherent Vectors
R
L
1.46
RAO
0%
AP PA LAO RAO LL RL INF SUP
LAT
0
Col Img
1
R
L
1.46
RAO
0%
AP PA LAO RAO LL RL INF SUP
Sync

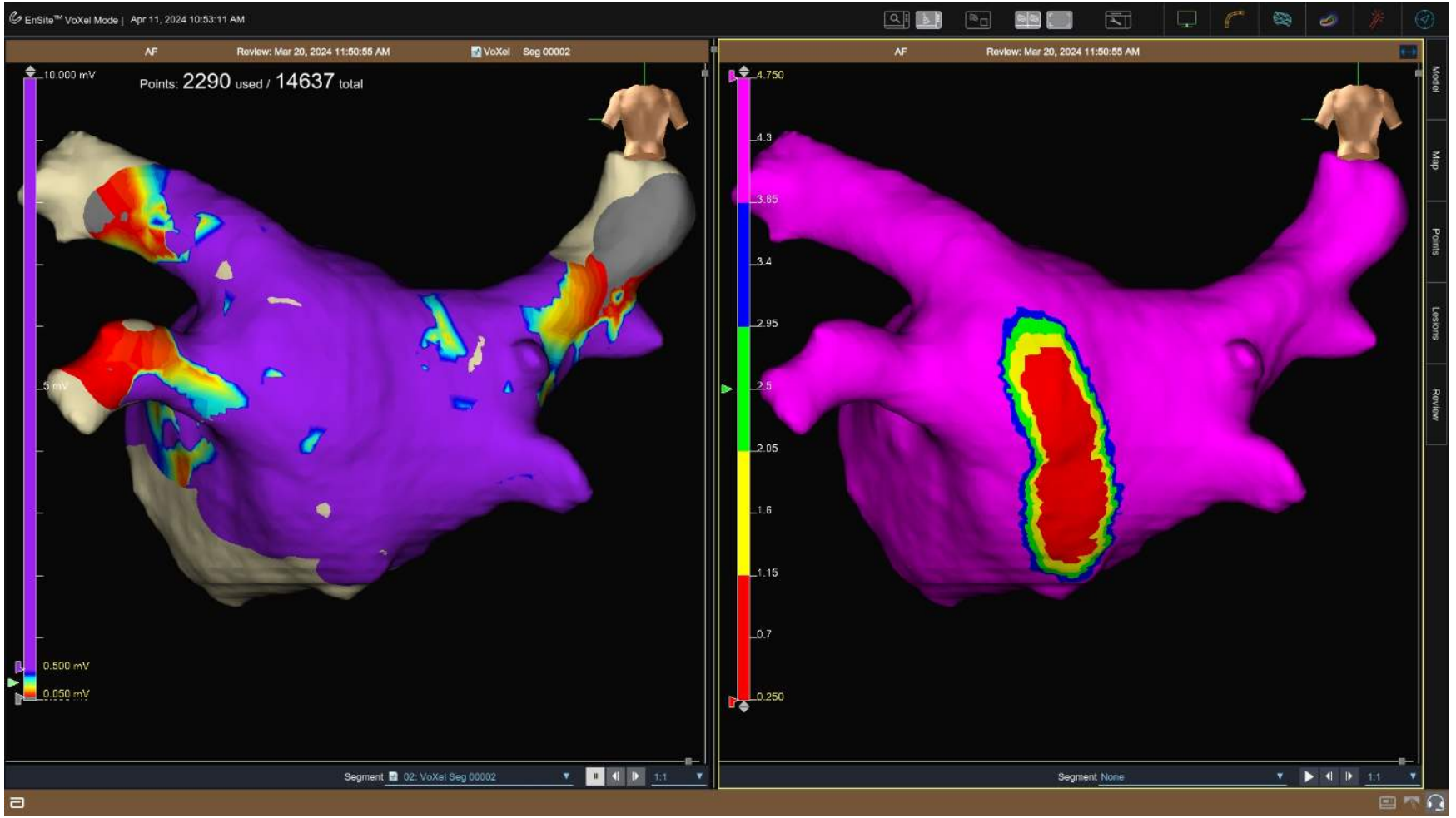

1-LA (3384, 0) Resp
0.05 mV
Bi
0.50 mV
Coherent Vectors
LAT
0
Col Img
1
L
R
1.46
LAO
0%
AP PA LAO RAO LL RL INF SUP
Sync

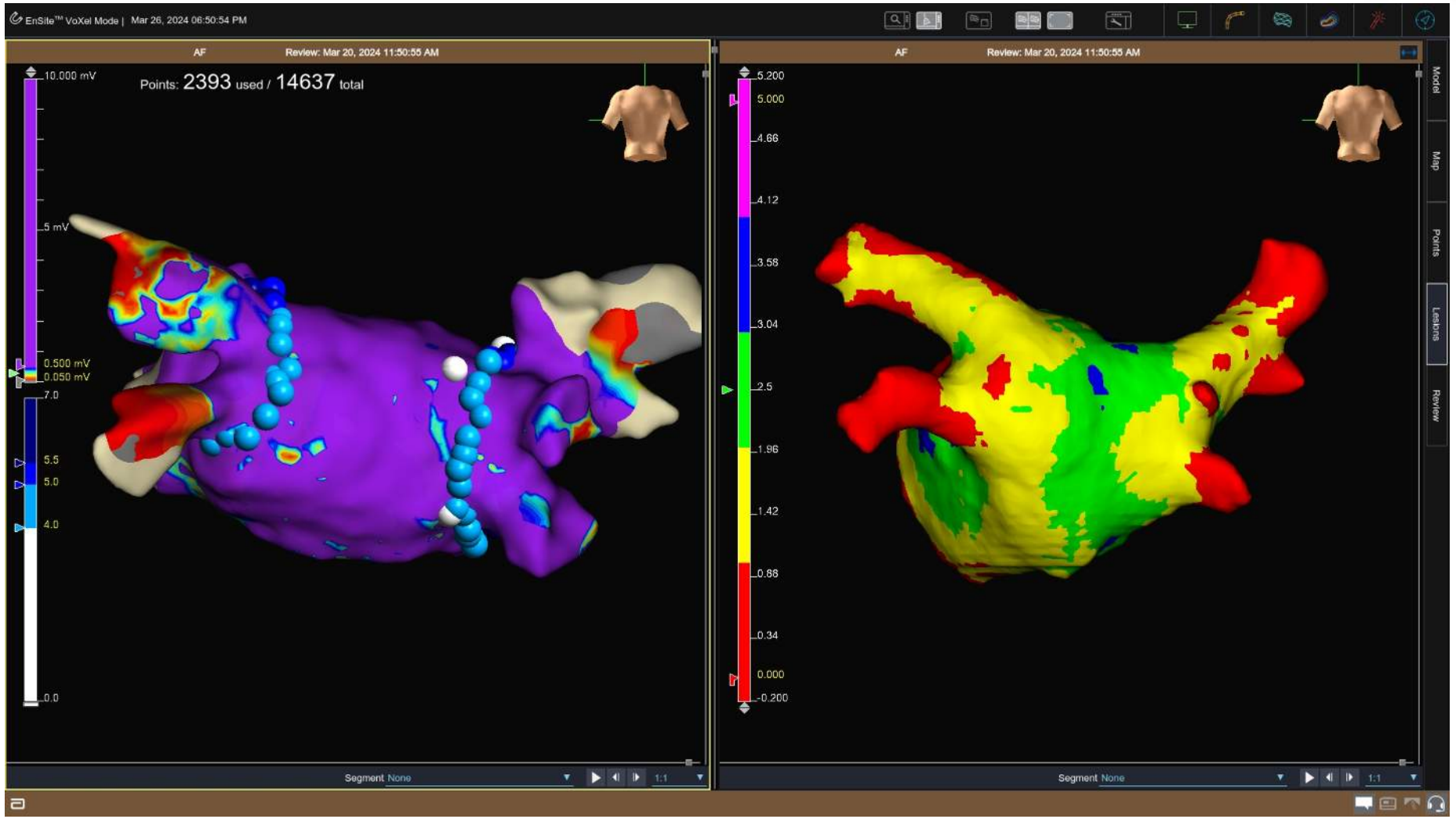

1-LA (3384, 0) Resp
0.05 mV
Bi
0.50 mV
Coherent Vectors
Img
18
L
R
0%
AP PA LAO RAO LL RL INF SUP
LAT
0
Col Img
1
1.61
0%
AP PA LAO RAO LL RL INF SUP
Sync

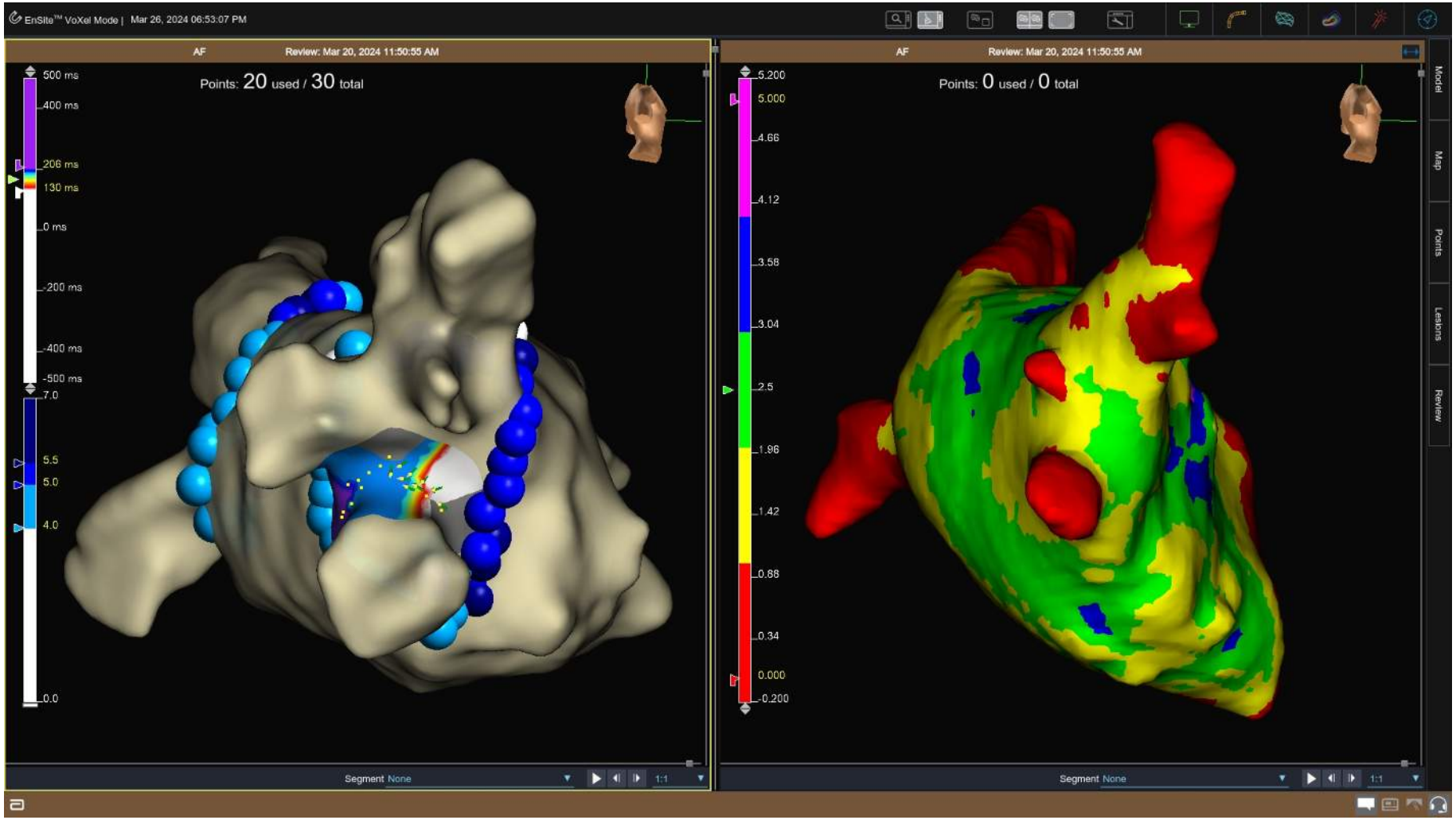

EnSite™ VoXel Mode | Apr 11, 2024 10:58:44 AM
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel Seg 00002
10.000 mV
Points: 2393 used / 14637 total
5 mV
0.500 mV
0.050 mV
Segment 02: VoXel Seg 00002
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
5.200
5.000
4.6825
4.165
3.6475
3.13
2.6125
2.095
1.5775
1.06
0.5425
0.025
Segment None
1:1
Model
Map
Points
Lesions
Review
REF CL 834 ms

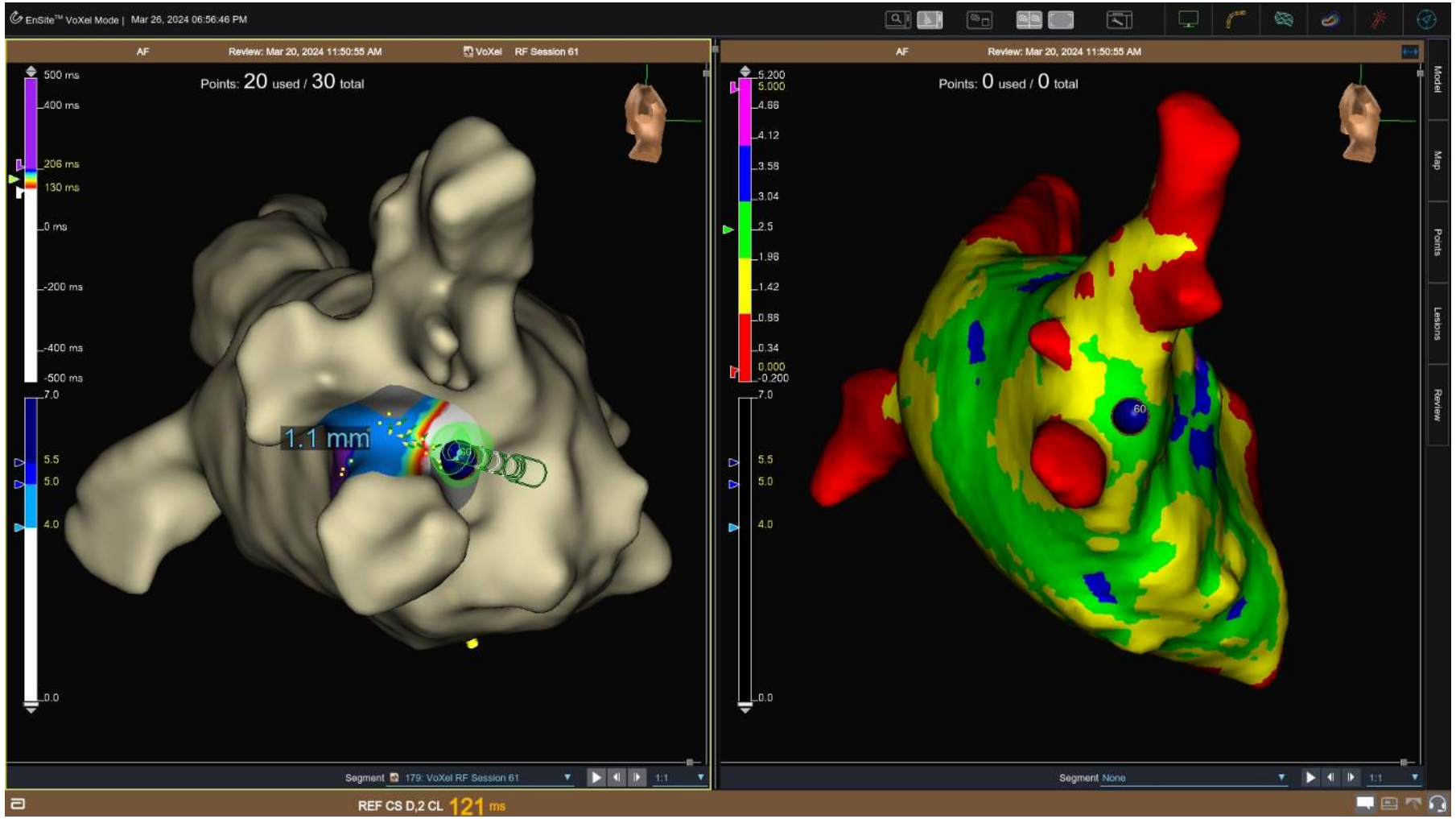

EnSite™ VoXel Mode | Apr 11, 2024 10:59:05 AM
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel Seg 00002
Points: 2393 used / 14637 total
10.000 mV
5 mV
0.500 mV
0.050 mV
Segment 02: VoXel Seg 00002
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
5.200
5.000
4.6825
4.165
3.6475
3.13
2.6125
2.095
1.5775
1.06
0.5425
0.025
Segment None
1:1
Model
Map
Points
Lesions
Review
REF CL 724 ms

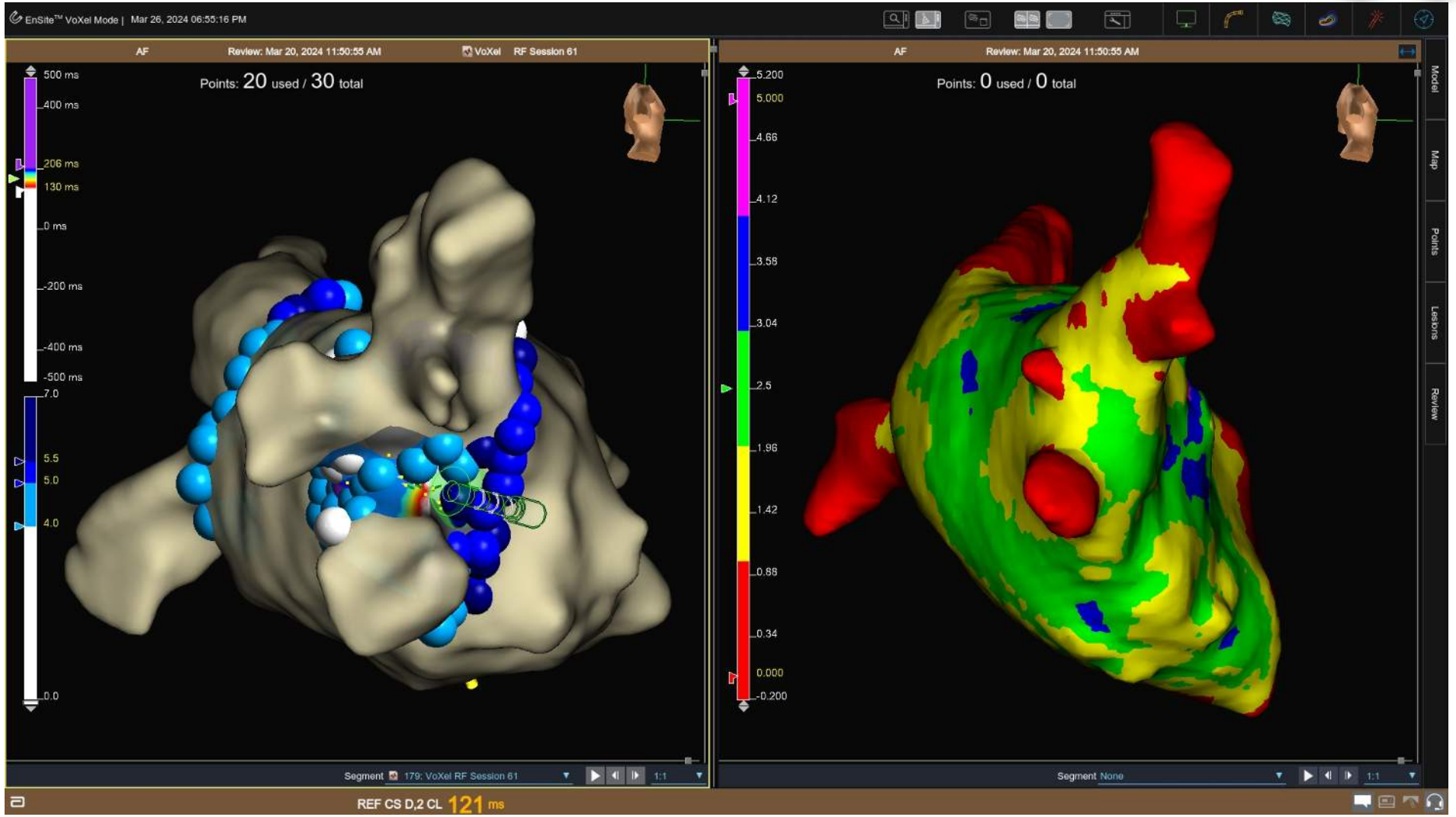

EnSite™ VoXel Mode | Apr 11, 2024 10:59:15 AM
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel Seg 00002
10.000 mV
Points: 2393 used / 14637 total
5 mV
0.500 mV
0.050 mV
Segment 02: VoXel Seg 00002
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
5.200
5.000
4.6825
4.165
3.6475
3.13
2.6125
2.095
1.5775
1.06
0.5425
0.025
Segment None
1:1
Model
Map
Points
Lesions
Review
REF CL 834 ms


EnSite™ VoXel Mode | Apr 11, 2024 10:53:11 AM
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel Seg 00002
10.000 mV
Points: 2290 used / 14637 total
.5 mV
0.500 mV
0.050 mV
Segment 02: VoXel Seg 00002
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
4.750
4.3
3.85
3.4
2.95
2.5
2.05
1.6
1.15
0.7
0.250
Segment None
1:1
Model
Map
Points
Lesions
Review


EnSite™ VoXel Mode | Mar 26, 2024 06:50:54 PM
AF
Review: Mar 20, 2024 11:50:55 AM
Points: 2393 used / 14637 total
10.000 mV
5 mV
0.500 mV
0.050 mV
7.0
5.5
5.0
4.0
0.0
Segment None
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
5.200
5.000
4.66
4.12
3.58
3.04
2.5
1.96
1.42
0.88
0.34
0.000
-0.200
Segment None
1:1
Model
Map
Points
Lesions
Review


EnSite™ VoXel Mode | Mar 26, 2024 06:53:07 PM
AF
Review: Mar 20, 2024 11:50:55 AM
Points: 20 used / 30 total
500 ms
400 ms
206 ms
130 ms
0 ms
-200 ms
-400 ms
-500 ms
7.0
5.5
5.0
4.0
0.0
Segment None
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
Points: 0 used / 0 total
5.200
5.000
4.66
4.12
3.58
3.04
2.5
1.96
1.42
0.88
0.34
0.000
-0.200
Segment None
1:1
Model
Map
Points
Lesions
Review


EnSite™ VoXel Mode | Mar 26, 2024 06:56:46 PM
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel RF Session 61
Points: 20 used / 30 total
500 ms
400 ms
206 ms
130 ms
0 ms
-200 ms
-400 ms
-500 ms
1.1 mm
7.0
5.5
5.0
4.0
0.0
Segment 179: VoXel RF Session 61
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
Points: 0 used / 0 total
5.200
5.000
4.66
4.12
3.58
3.04
2.5
1.96
1.42
0.88
0.34
0.000
-0.200
60
Model
Map
Points
Lesions
Review
Segment None
REF CS D,2 CL 121 ms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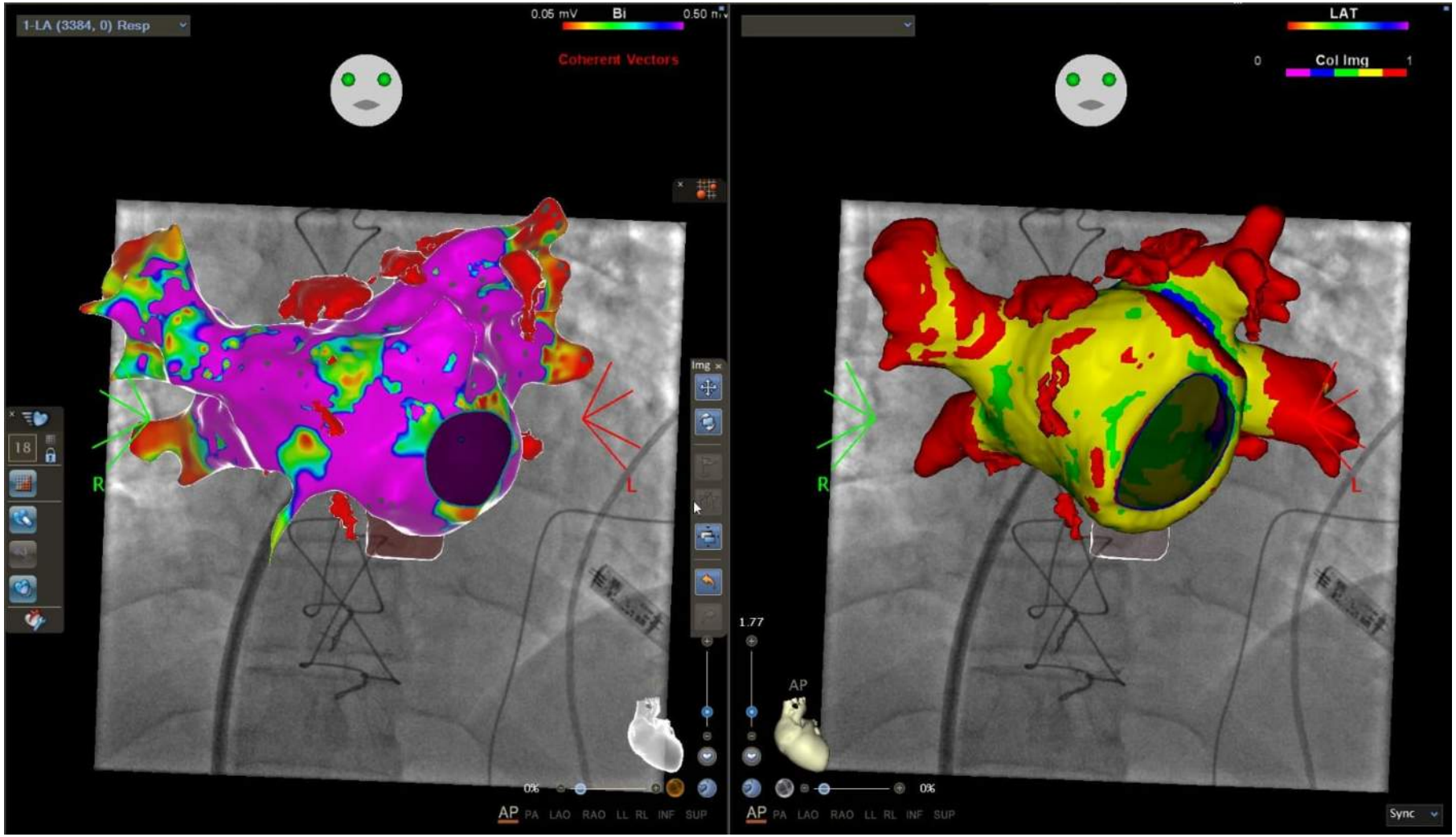
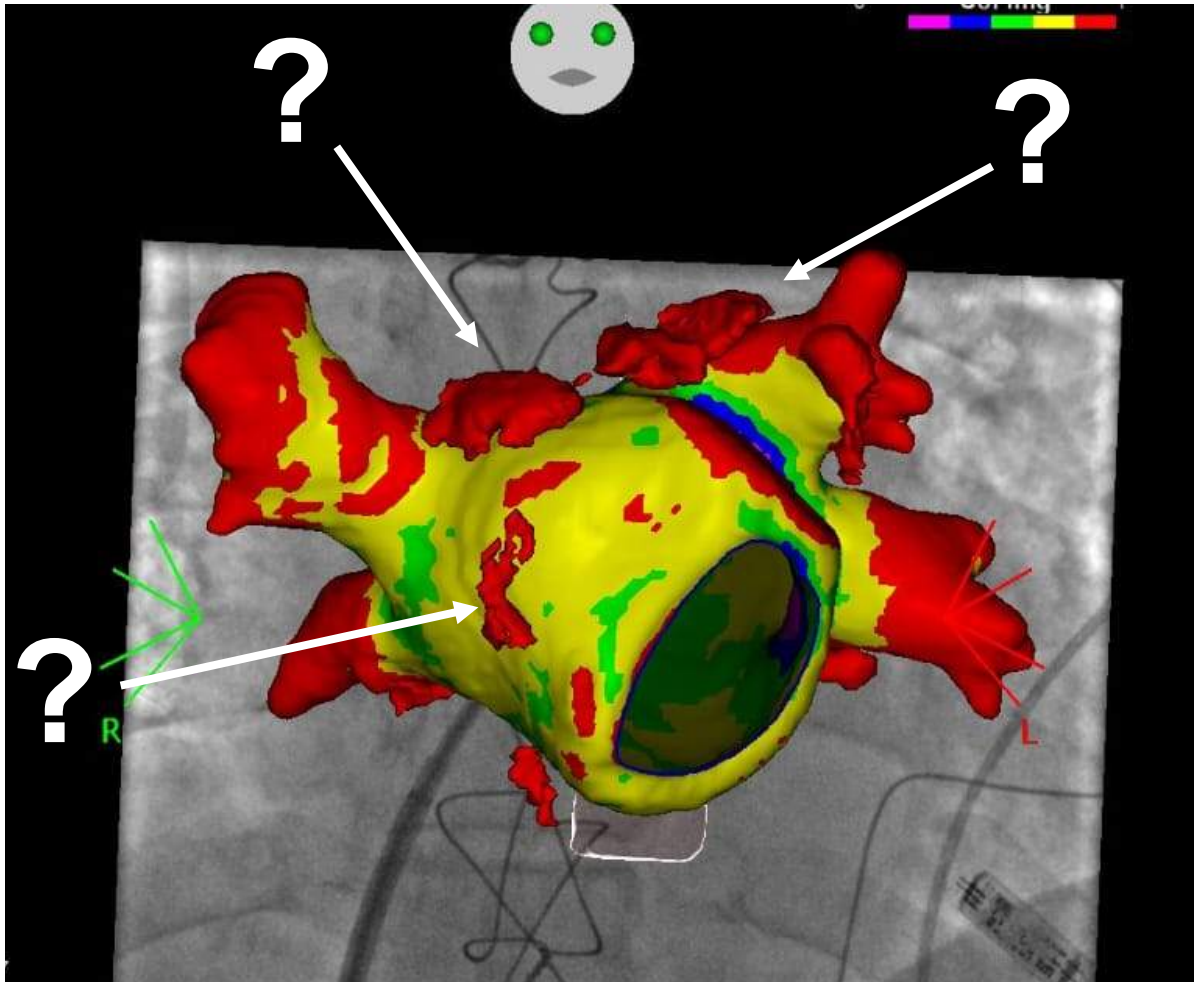
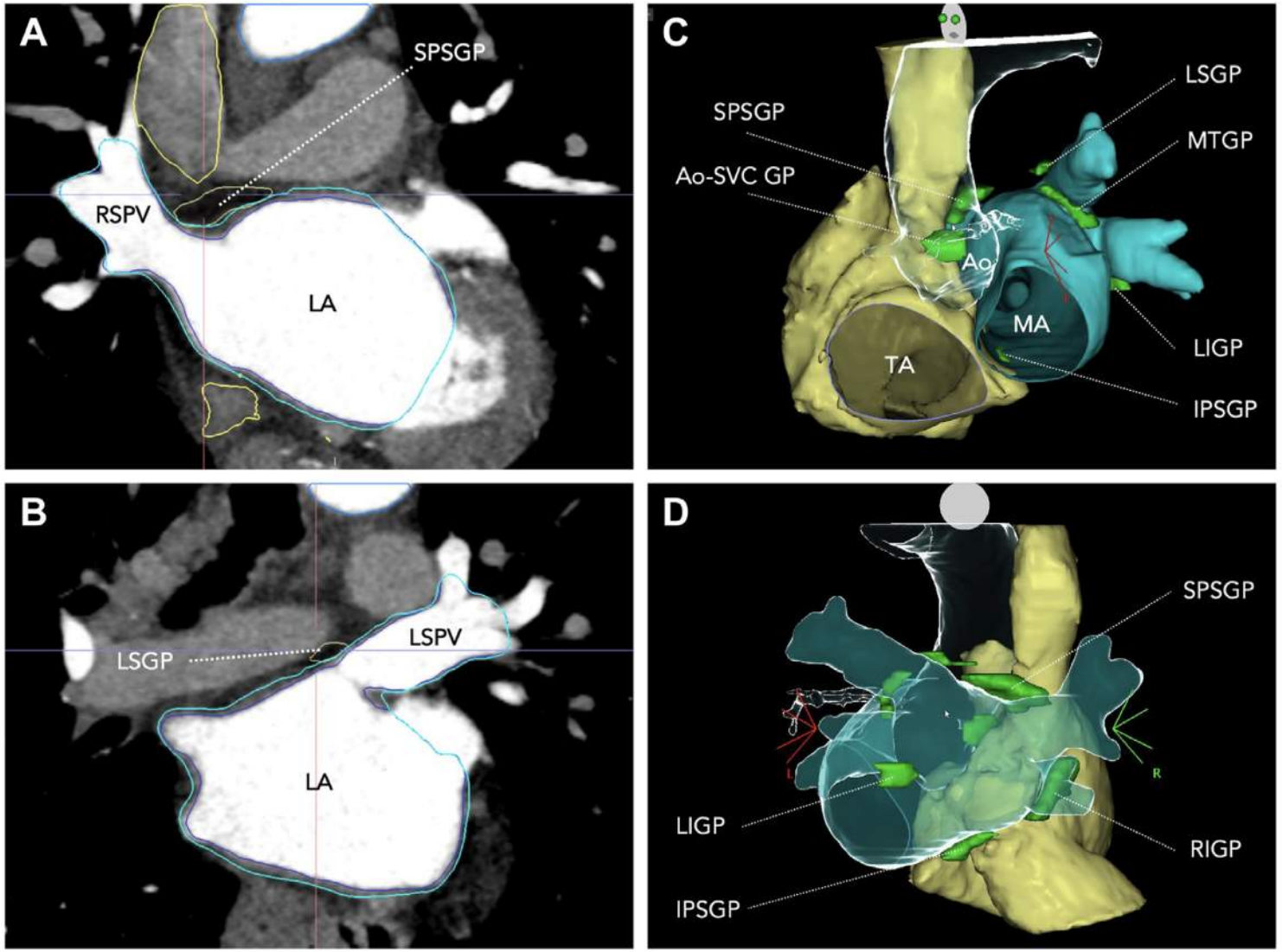
AF
Review: Mar 20, 2024 11:50:55 AM
VoXel RF Session 61
Points: 20 used / 30 total
500 ms
400 ms
206 ms
130 ms
0 ms
-200 ms
-400 ms
-500 ms
7.0
5.5
5.0
4.0
0.0
Segment 179: VoXel RF Session 61
1:1
AF
Review: Mar 20, 2024 11:50:55 AM
Points: 0 used / 0 total
5.200
5.000
4.66
4.12
3.58
3.04
2.5
1.96
1.42
0.88
0.34
0.000
-0.200
Segment None
1:1
Model
Map
Points
Lesions
Review
REF CS D,2 CL 121 ms


1-LA (3384, 0) Resp
0.05 mV
Bi
0.50 mV
Coherent Vectors
Img
R
L
AP PA LAO RAO LL RL INF SUP
LAT
0
Col Img
1
1.77
AP
Sync


?
?
?
R
L


A
SPSGP
RSPV
LA
B
LSGP
LSPV
LA
C
SPSGP
LSGP
MTGP
Ao-SVC GP
Ao
MA
TA
LIGP
IPSGP
D
SPSGP
LIGP
RIGP
IPSGP
R

Clinical impact of aging on outcomes of cardioneuroablation for reflex syncope or functional bradycardia: Results from the cardionEuroabLation: patiEnt selection, imaGe integrAtioN and outComEs—The ELEGANCE multicenter study

Pietro Francia, MD,*† Daniel Viveros, MD,* Giulio Falasconi, MD,* Diego Penela, MD,* David Soto-Iglesias, PhD,* Julio Martí-Almor, MD, PhD,* José Alderete, MD,* Andrea Saglietto, MD,* Aldo Francisco Bellido, MD,* Paula Franco-Ocaña, BS,* Fatima Zaraket, MD,*‡ Maria Matiello, MD,§ Juan Fernández-Armenta, MD,¶ Rodolfo San Antonio, MD,*‖ Antonio Berruezo, MD, PhD*

*From the *Arrhythmia Department, Teknon Heart Institute, Teknon Medical Center, Barcelona, Spain, †Cardiology Unit, Department of Clinical and Molecular Medicine, Sant'Andrea Hospital, University Sapienza, Rome, Italy, ‡Clínica del Pilar, Barcelona, Spain, §Hospital General de Catalunya, Barcelona, Spain, ¶Puerta del Mar University Hospital, Cádiz, Spain, and ‖Hospital Universitari de Bellvitge, Barcelona, Spain.*

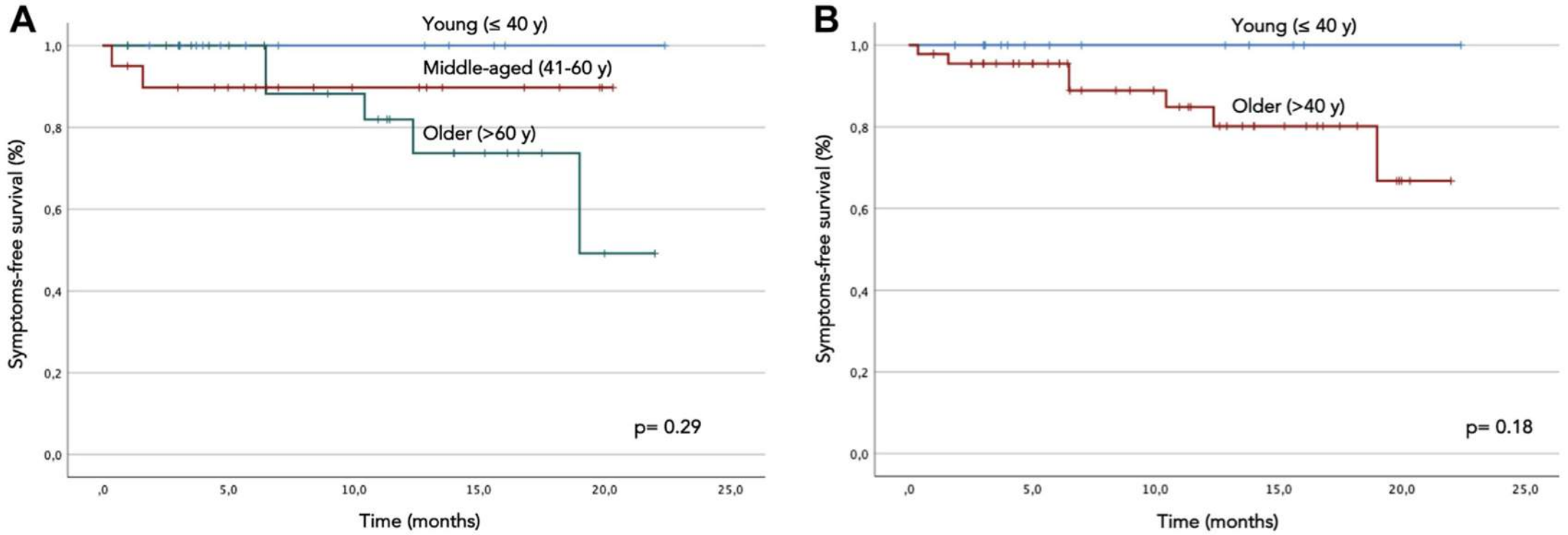
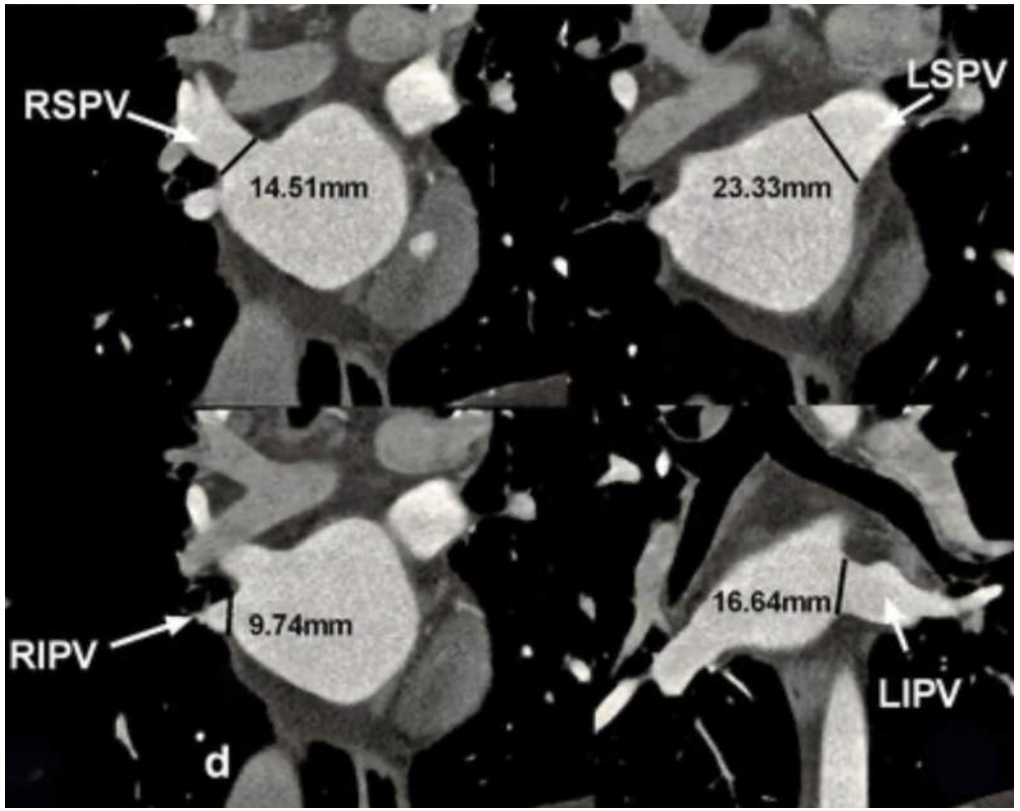
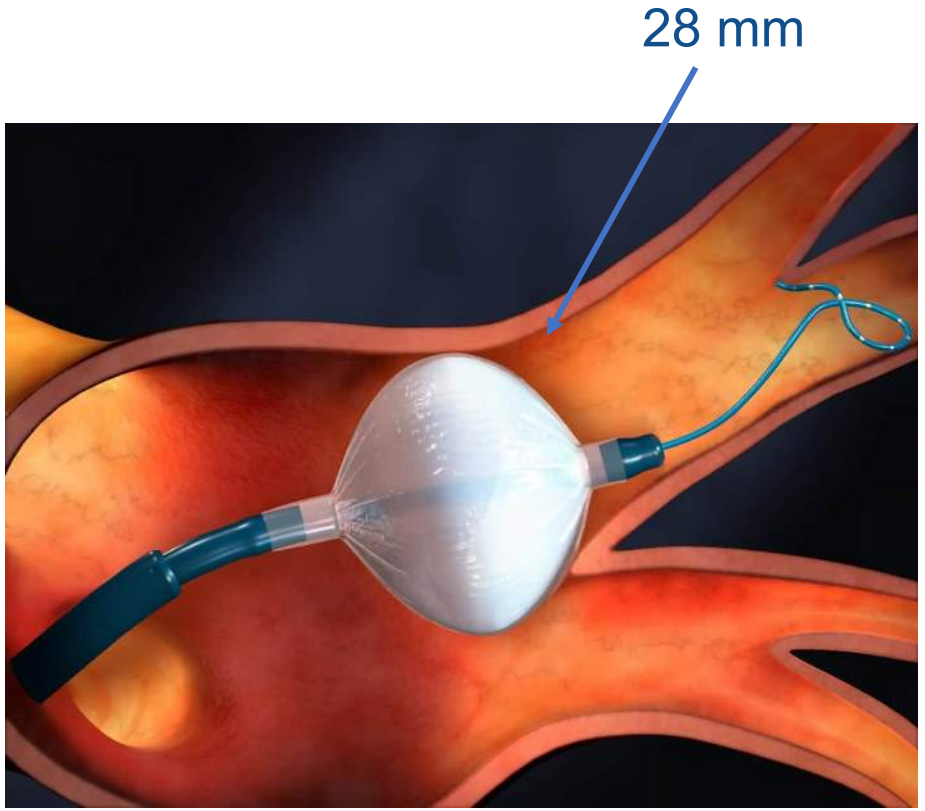


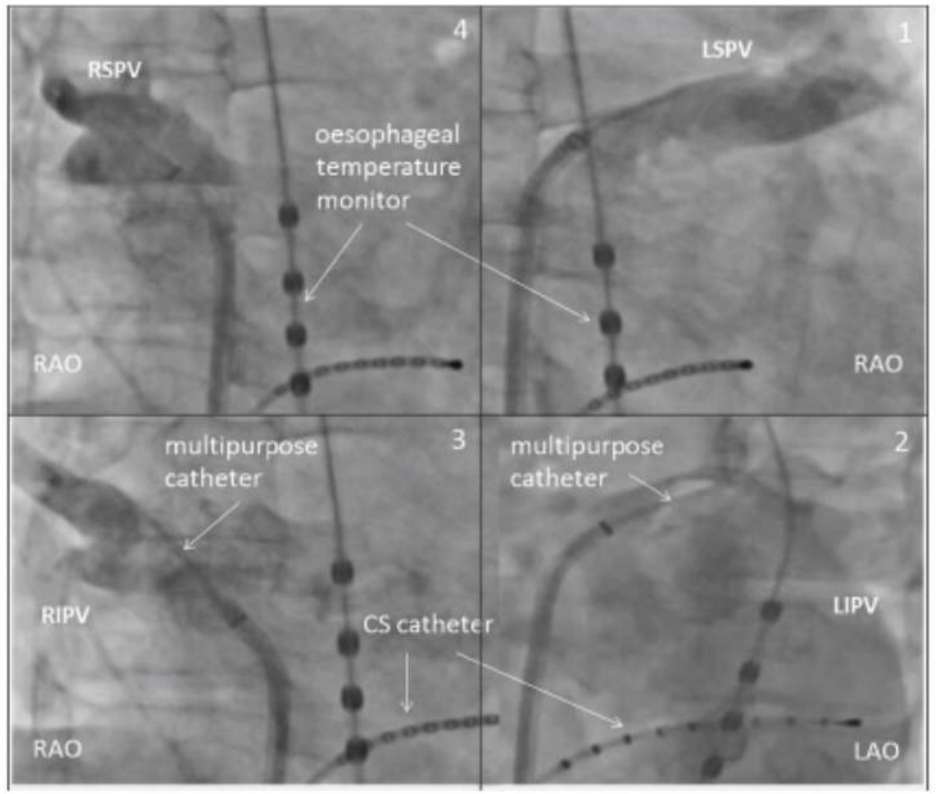
Figure 4 Outcomes of cardioneuroablation. Cumulative survival free from syncope in the 3 predefined age groups **(A)** and in patients young (≤40 years) vs older (>40 years) **(B).** *P* values determined by the log-rank test.

CT: ruolo nella crioablazione





CT-aided workflow



Fluoro

Virtual fluoro (CT)

RM?

Cosa vorremmo dalla RM

- Individuazione affidabile delle aree di fibrosi
- Aree di fibrosi come “target” dell’ablazione
- Individuazione dei “gap” nelle procedure redo
- Tutte le informazioni anatomiche della TC

JAMA | Original Investigation

Effect of MRI-Guided Fibrosis Ablation vs Conventional Catheter Ablation on Atrial Arrhythmia Recurrence in Patients With Persistent Atrial Fibrillation

The DECAAF II Randomized Clinical Trial

Nassir F. Marrouche, MD; Oussama Wazni, MD; Christopher McGann, MD; Tom Greene, PhD; J. Michael Dean, MD; Lilas Dagher, MD; Eugene Kholmovski, PhD; Moussa Mansour, MD; Francis Marchlinski, MD; David Wilber, MD; Gerhard Hindricks, MD; Christian Mahnkopf, MD; Darryl Wells, MD; Pierre Jais, MD; Prashanthan Sanders, MD; Johannes Brachmann, MD; Jeroen J. Bax, MD; Leonie Morrison-de Boer, MD; Thomas Deneke, MD; Hugh Calkins, MD; Christian Sohns, MD; Nazem Akoum, MD; for the DECAAF II Investigators

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JAMA

QUESTION Does the addition of magnetic resonance imaging (MRI)-guided fibrosis ablati
affect atrial arrhythmia recurrence?

CONCLUSION MRI-guided fibrosis ablation plus pulmonary vein isolation (PVI), compared
resulted in no significant difference in atrial arrhythmia recurrence among patients with p

POPULATION

665 Men
178 Women

Adults with symptomatic or asymptomatic persistent AF and undergoing AF ablation

Mean age: 62.7 years

INTERVENTION

843 Patients randomized
815 Patients analyzed

421
PVI plus MRI-guided atrial fibrosis ablation
PVI followed by ablation of all fibrotic areas observed on MRI

422
PVI alone
Electrical isolation of all pulmonary veins

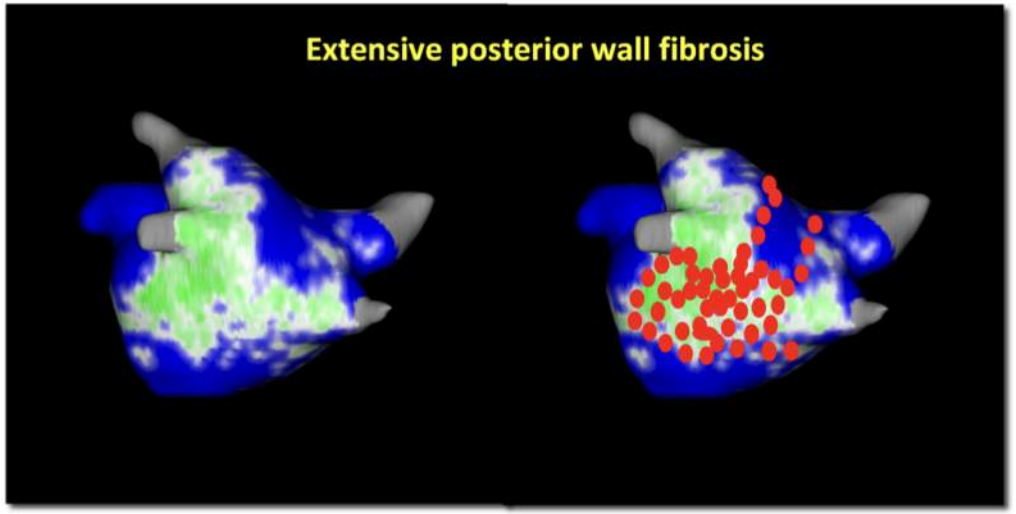
LOCATIONS

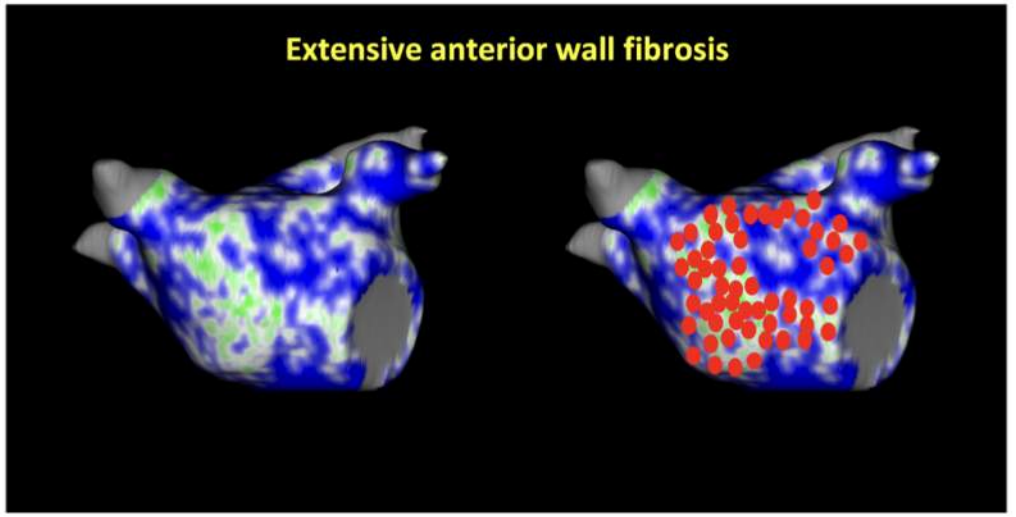
44
Medical centers in 10 countries

PRIMARY OUTCOME

Time to first atrial arrhythmia recurrence after a 90-day blanking period postablation

Marrouche NF, Wazni O, McGann C, et al. Effect of MRI-guided fibrosis ablation vs conventional catheter ab
with persistent atrial fibrillation: the DECAAF II randomized clinical trial. *JAMA*. Published June 21, 2022. c





MARREK™
Utah method

TIGULLIO II Congresso Nazionale di 2024ARITMOLOGIA
16-17 Aprile Sestri Levante (GE)

JAMA | Original Investigation

Effect of MRI-Guided Fibrosis Ablation vs Conventional Catheter Ablation on Atrial Arrhythmia Recurrence in Patients With Persistent Atrial Fibrillation
The DECAAF II Randomized Clinical Trial

Nassir F. Marrouche, MD; Oussama Wazni, MD; Christopher McGann, MD; Tom Greene, PhD; J. Michael Dean, MD; Lilas Dagher, MD; Eugene Kholmovski, PhD; Moussa Mansour, MD; Francis Marchlinski, MD; David Wilber, MD; Gerhard Hindricks, MD; Christian Mahnkopf, MD; Darryl Wells, MD; Pierre Jais, MD; Prashanthan Sanders, MD; Johannes Brachmann, MD; Jeroen J. Bax, MD; Leonie Morrison-de Boer, MD; Thomas Deneke, MD; Hugh Calkins, MD; Christian Sohns, MD; Nazem Akoum, MD; for the DECAAF II Investigators

JAMA

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665 Men
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Adults with symptomatic or asymptomatic persistent AF and undergoing AF ablation

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Electrical isolation of all pulmonary veins

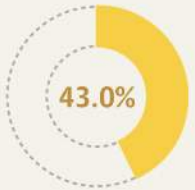
PRIMARY OUTCOME

Time to first atrial arrhythmia recurrence after a 90-day blanking period postablation

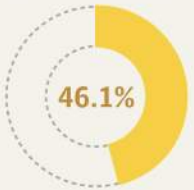
FINDINGS

Patients with atrial arrhythmia recurrence

PVI plus MRI-guided atrial fibrosis ablation
175 of 407 patients



PVI alone
188 of 408 patients



There was no significant difference:
Hazard ratio, 0.95
(95% CI, 0.77 to 1.17); $P = .63$

Marrouche NF, Wazni O, McGann C, et al. Effect of MRI-guided fibrosis ablation vs conventional catheter ablation on atrial arrhythmia recurrence in patients with persistent atrial fibrillation: the DECAAF II randomized clinical trial. *JAMA*. Published June 21, 2022. doi:10.1001/jama.2022.8831

EP Europace
EHJ Arrhythmias and Electrophysiology

JOURNAL ARTICLE ACCEPTED MANUSCRIPT

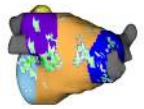
Effect of Fibrosis Regionality on Atrial Fibrillation Recurrence: Insights from DECAAF II

Ala' Assaf, Mario Mekhael, Charbel Noujaim, Nour Chouman, Hadi Younes, Han Feng, Abdelhadi El Hajjar, Botao Shan, Peter Kistler, Omar Kreidieh ... Show more

EP Europace, euad199, https://doi.org/10.1093/europace/euad199
Published: 10 July 2023 **Article history** ▾

Effect of Fibrosis Regionality on Atrial Fibrillation Recurrence

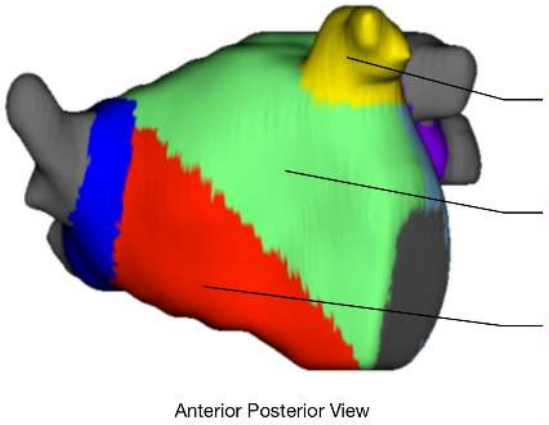
Regional Fibrosis Percentage = Fibrosis in a Region / Total Fibrosis in LA

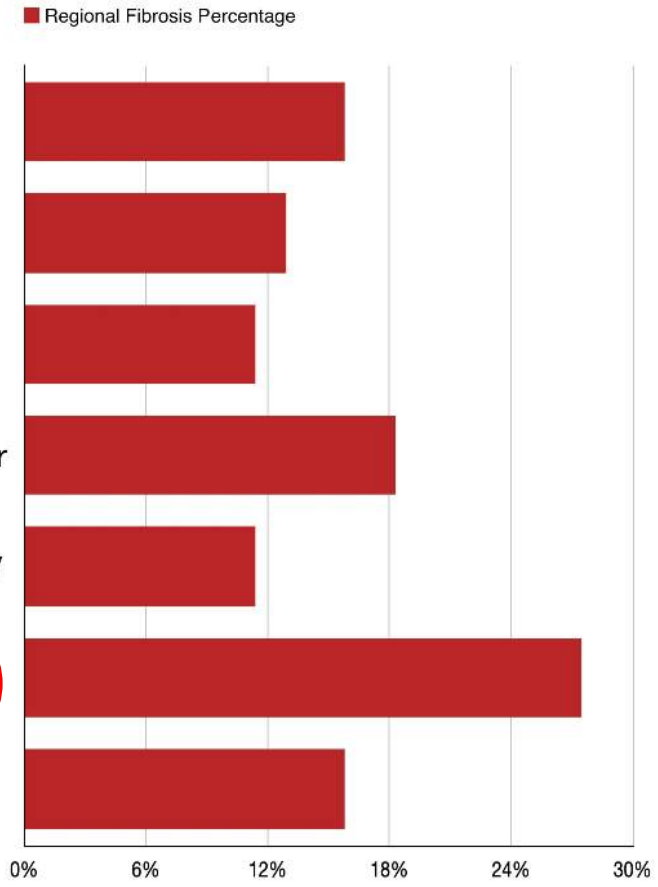


Atrial remodeling is **not** a homogenous process, and **does not** affect the LA wall **uniformly**

The **left pulmonary vein** exhibits a greater amount of fibrosis in comparison with the rest of the wall, which may explain the **superiority of PVI** as a treatment for AF

Regional Fibrosis Percentage of **LAA** is a **significant predictor** of AF recurrence only in patients in the PVI + SM group (OR=1.02, p=0.01)





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Regional Fibrosis Percentage of **LAA** is a **significant predictor** of AF recurrence only in patients in the PVI + SM group (OR=1.02, p=0.01)

???

JOURNAL ARTICLE ACCEPTED MANUSCRIPT

EP Europace
EHJ Arrhythmias and Electrophysiology

Does the Spatial Distribution of Atrial Arrhythmogenic Substrate Matter? Insights from the DECAAF II trial

Till F Althoff, MD ✉, Andreu Porta-Sanchez, MD, PhD ✉

EP Europace, euad282, https://doi.org/10.1093/europace/euad282
Published: 15 September 2023 **Article history** ▾

transmural lesions.[20] Moreover, complete isolation of the LAA was not envisaged in the study protocol and would have implicated further considerations such as LAA closure. Taken together, although we can only speculate, reluctant, incomplete ablation resulting in iatrogenic substrate may have caused an unfavourable outcome in patients in whom peri-LAA fibrosis was targeted.

ESC European Society of Cardiology
Europace (2024) **26**, 1–107
https://doi.org/10.1093/europace/euae043
EHRA DOCUMENT
EHRA European Heart Rhythm Association

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

6.1.2.2. Magnetic resonance imaging fibrosis guidance

Magnetic resonance imaging has been used to identify areas of atrial fibrosis in patients scheduled for AF catheter ablation.[105,583,584] However, adequate spatial resolution remains problematic in the thin-walled LA, and reproducibility of the different imaging techniques across centers remains low (*Section 5.2.1.4.*). Several RCTs have failed to document that ablation of MRI-detected fibrotic areas provides incremental benefit in postablation rhythm outcome (*Section 8.2.6.*).

Ablation of MRI-detected atrial delayed enhancement areas is not beneficial during persistent AF ablation[a]	Advice NOT TO DO	META[848,849]

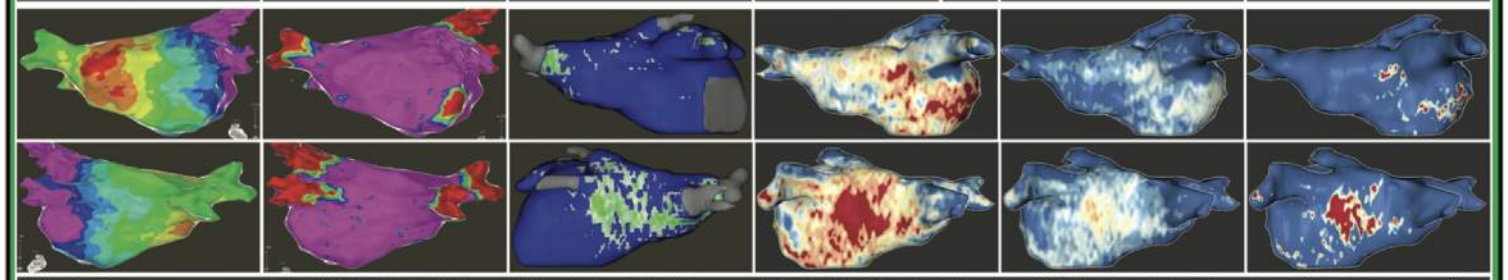
ESC European Society of Cardiology
Europace (2022) **24**, 1102–1111
https://doi.org/10.1093/europace/euac010

CLINICAL RESEARCH
Ablation for atrial fibrillation

Comparison of various late gadolinium enhancement magnetic resonance imaging methods with high-definition voltage and activation mapping for detection of atrial cardiomyopathy

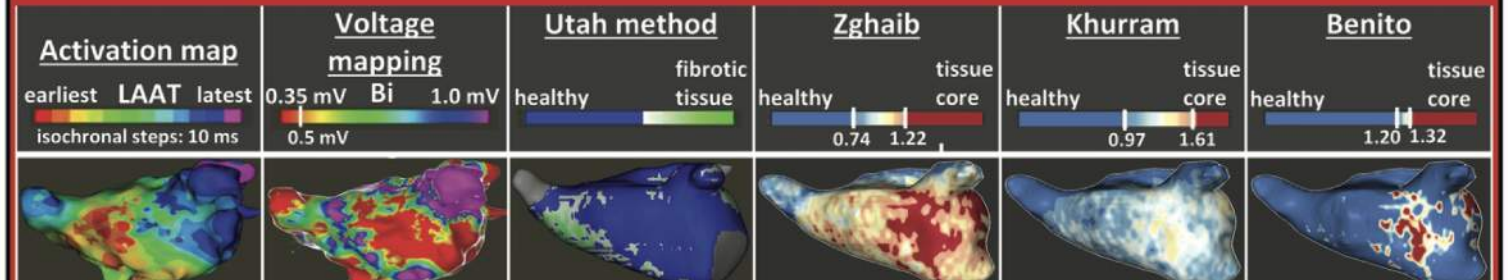
Martin Eichenlaub [1]*, Bjoern Mueller-Edenborn[1], Jan Minners[1], Rosa M. Figueras i Ventura[2], Barbara Rubio Forcada[2], Anna Vallès Colomer[2], Manuel Hein[1], Philipp Ruile[1], Heiko Lehrmann[1], Simon Schoechlin[1], Juergen Allgeier[1], Marius Bohnen[1], Dietmar Trenk[1], Franz-Josef Neumann[1], Thomas Arentz[1], and Amir Jadidi[1]

Patient without LA-LVS

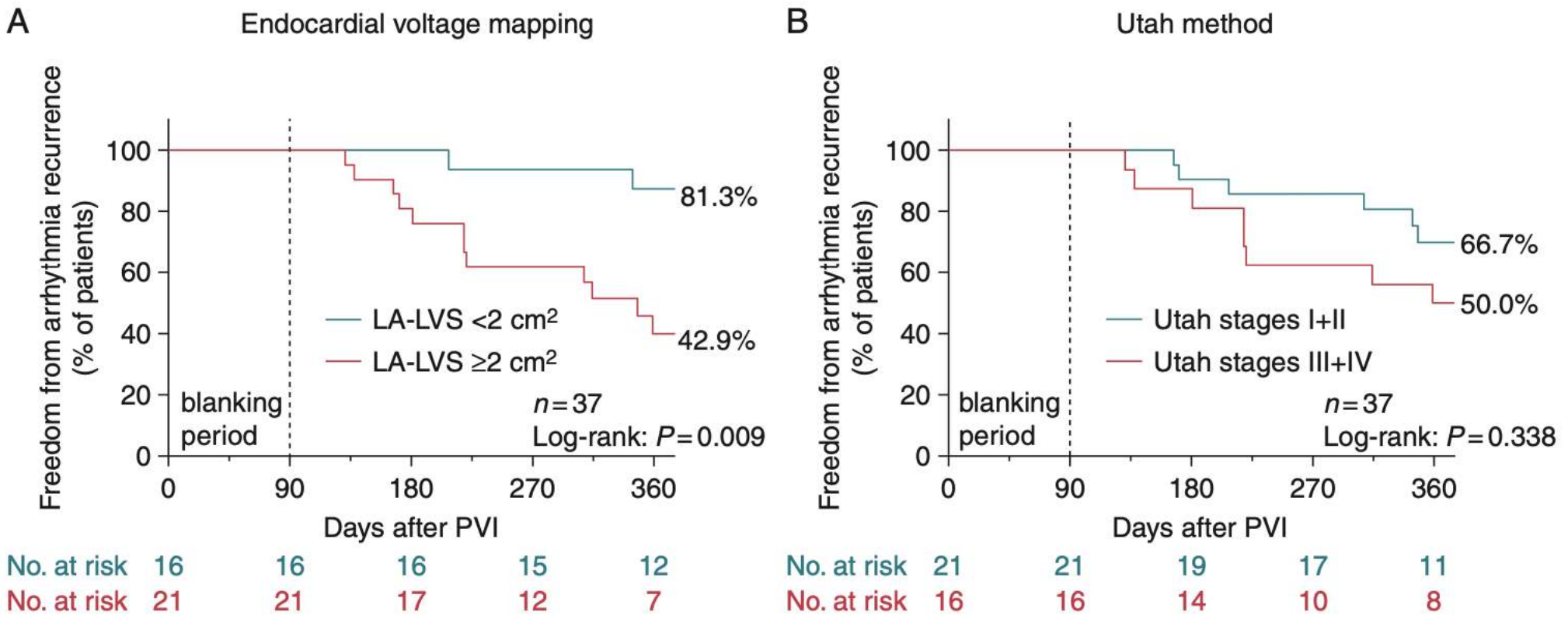


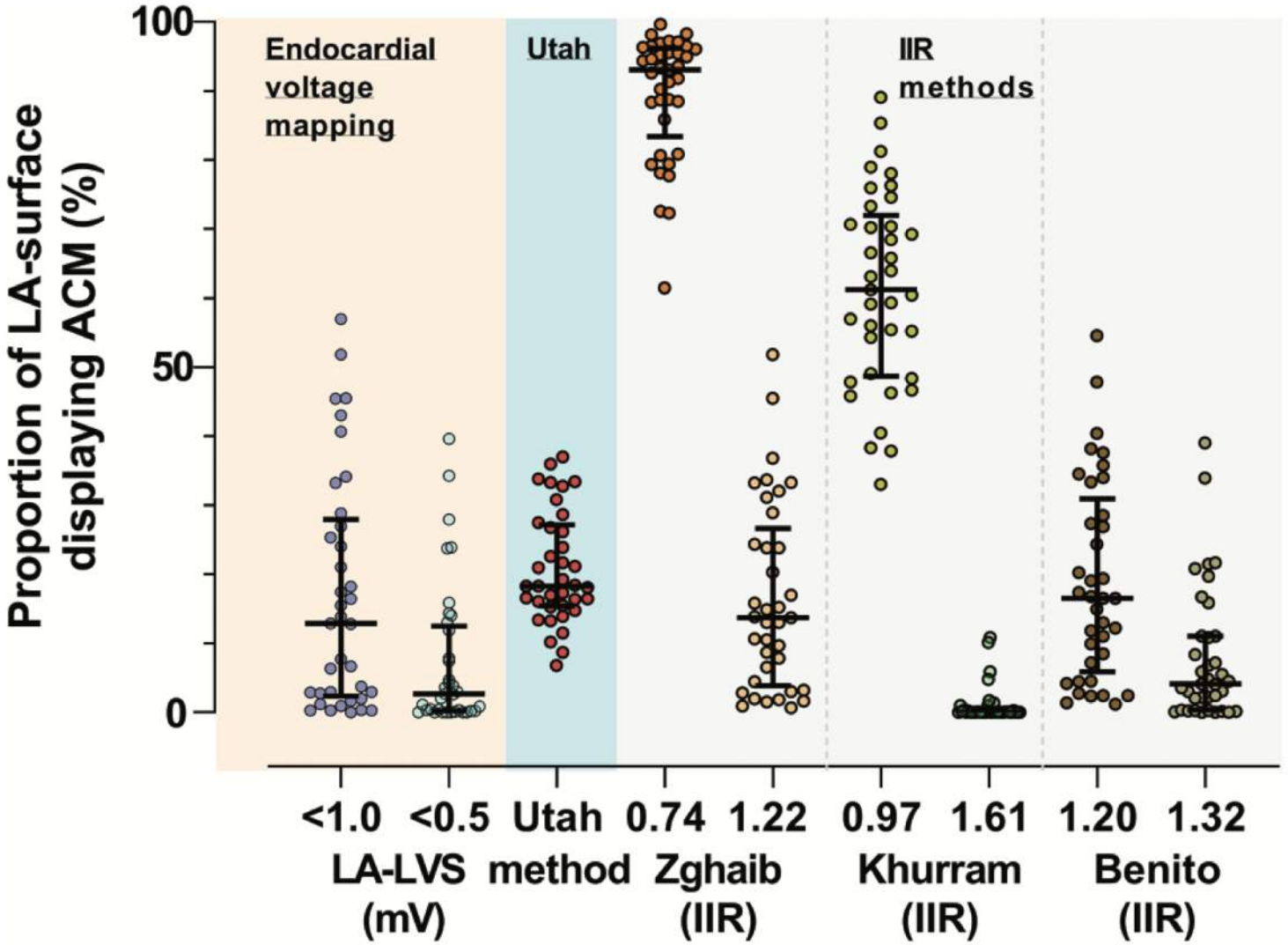
LAAT: 83 ms	LA-LVS 0.5 mV: 0% LA-LVS 1.0 mV: 0.3%	LGE Utah: 15.5%	LGE IIR 0.74: 91.8% LGE IIR 1.22: 7.9%	LGE IIR 0.97: 56.0% LGE IIR 1.61: 0%	LGE IIR 1.20: 10.0% LGE IIR 1.32: 2.3%

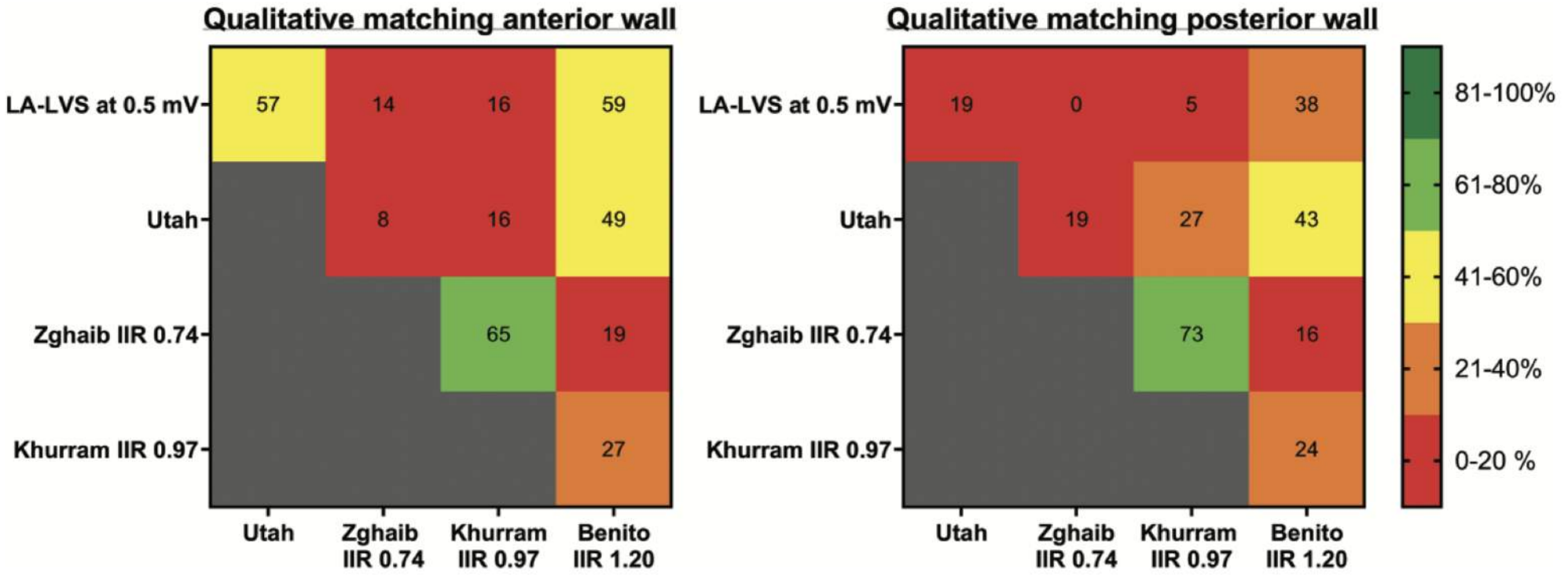
Patient with LA-LVS ≥2cm²



LAAT: 108 ms	LA-LVS 0.5 mV: 13.0% LA-LVS 1.0 mV: 25.4%	LGE Utah: 33.4%	LGE IIR 0.74: 95.4% LGE IIR 1.22: 14.9%	LGE IIR 0.97: 78.0% LGE IIR 1.61: 0%	LGE IIR 1.20: 19.1% LGE IIR 1.32: 3.1%


A
Endocardial voltage mapping
Freedom from arrhythmia recurrence (% of patients)
100
80
60
40
20
0
81.3%
42.9%
LA-LVS <2 cm²
LA-LVS ≥2 cm²
blanking period
n=37
Log-rank: P=0.009
0
90
180
270
360
Days after PVI
No. at risk 16 16 16 15 12
No. at risk 21 21 17 12 7
B
Utah method
Freedom from arrhythmia recurrence (% of patients)
100
80
60
40
20
0
66.7%
50.0%
Utah stages I+II
Utah stages III+IV
blanking period
n=37
Log-rank: P=0.338
0
90
180
270
360
Days after PVI
No. at risk 21 21 19 17 11
No. at risk 16 16 14 10 8


Proportion of LA-surface displaying ACM (%)
100
50
0
Endocardial voltage mapping
Utah
IIR methods
<1.0
<0.5
Utah
0.74
1.22
0.97
1.61
1.20
1.32
LA-LVS (mV)
method
Zghaib (IIR)
Khurram (IIR)
Benito (IIR)


Qualitative matching anterior wall
LA-LVS at 0.5 mV
Utah
Zghaib IIR 0.74
Khurram IIR 0.97
57
14
16
59
8
16
49
65
19
27
Utah
Zghaib IIR 0.74
Khurram IIR 0.97
Benito IIR 1.20
Qualitative matching posterior wall
LA-LVS at 0.5 mV
Utah
Zghaib IIR 0.74
Khurram IIR 0.97
19
0
5
38
19
27
43
73
16
24
Utah
Zghaib IIR 0.74
Khurram IIR 0.97
Benito IIR 1.20
81-100%
61-80%
41-60%
21-40%
0-20 %

ESC European Society of Cardiology

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BASIC SCIENCE

Personalized ablation vs. conventional ablation strategies to terminate atrial fibrillation and prevent recurrence

Luca Azzolin [1*†], Martin Eichenlaub [2†], Claudia Nagel[1], Deborah Nairn[1], Jorge Sanchez[1], Laura Unger[1], Olaf Dössel [1], Amir Jadidi[2†], and Axel Loewe[1†]

[1]Institute of Biomedical Engineering at Karlsruhe Institute of Technology, Building 30.33, Fritz-Haber-Weg 1, 76131 Karlsruhe, Germany; and [2]Division of Cardiology and Angiology II, University Heart Center Freiburg-Bad Krozingen, Suedring 15, 79189 Bad Krozingen, Germany

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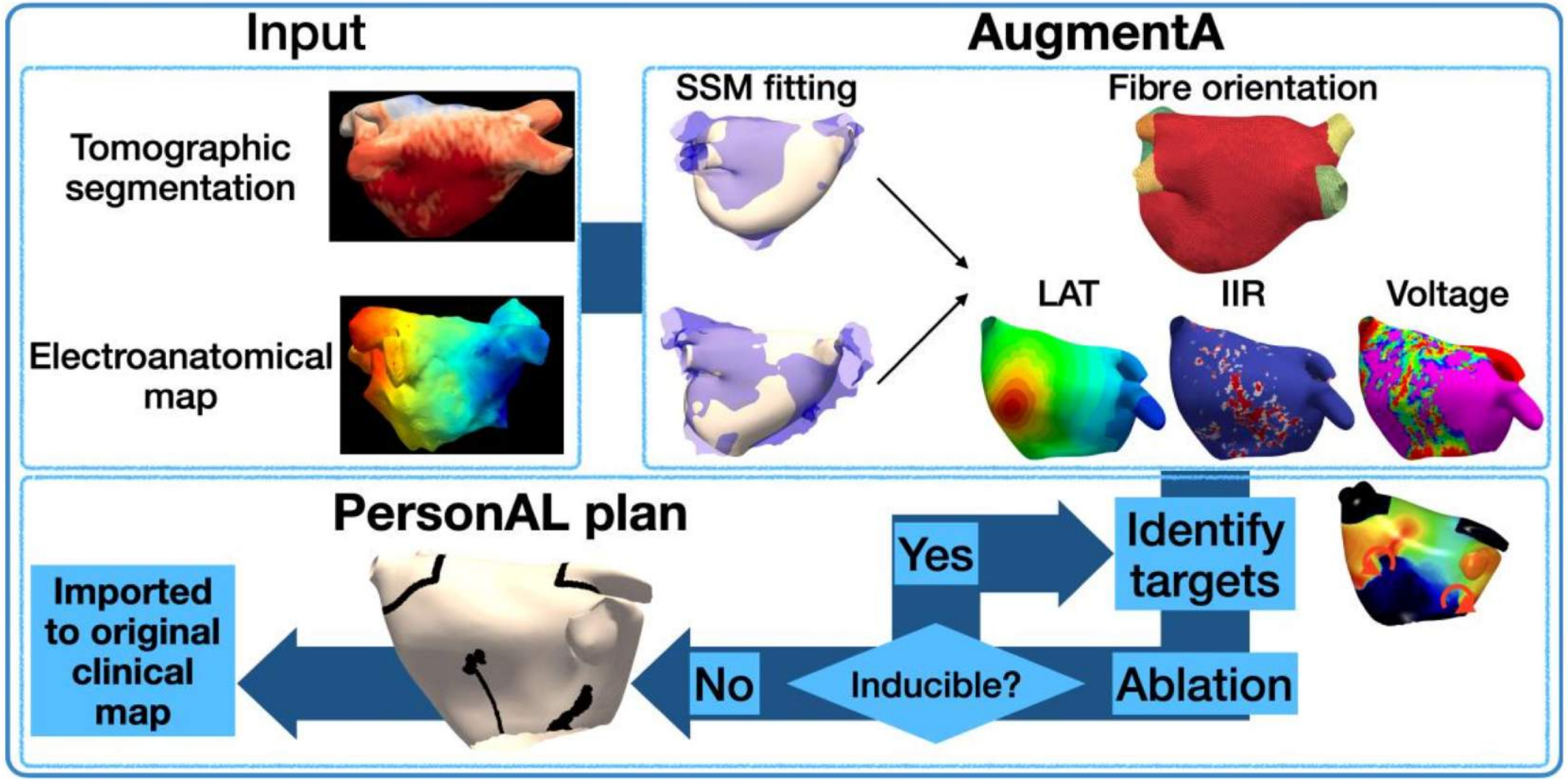
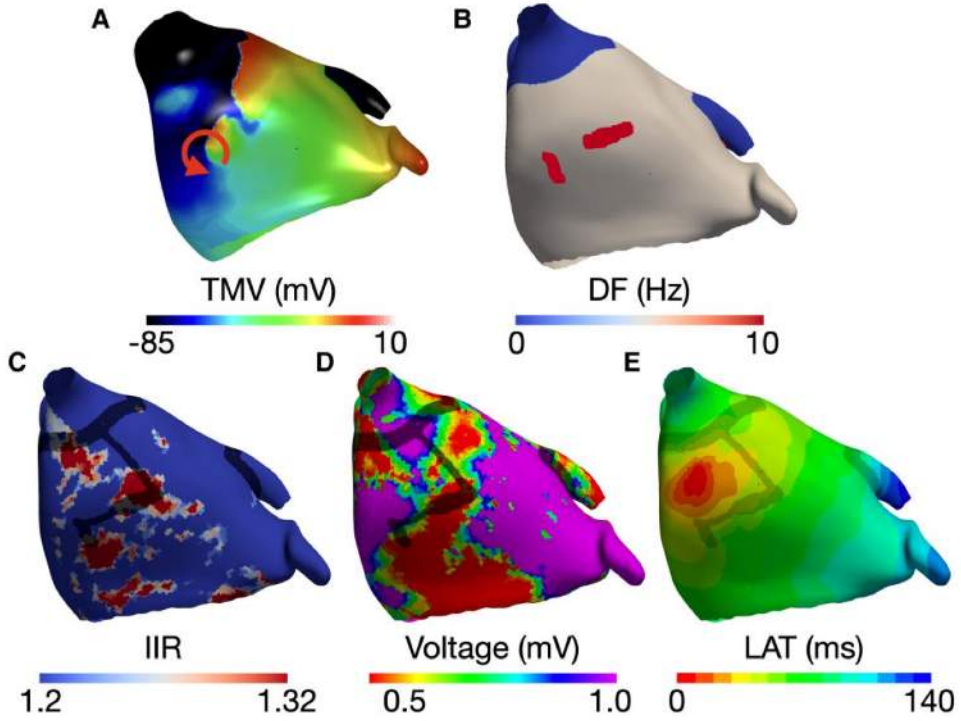
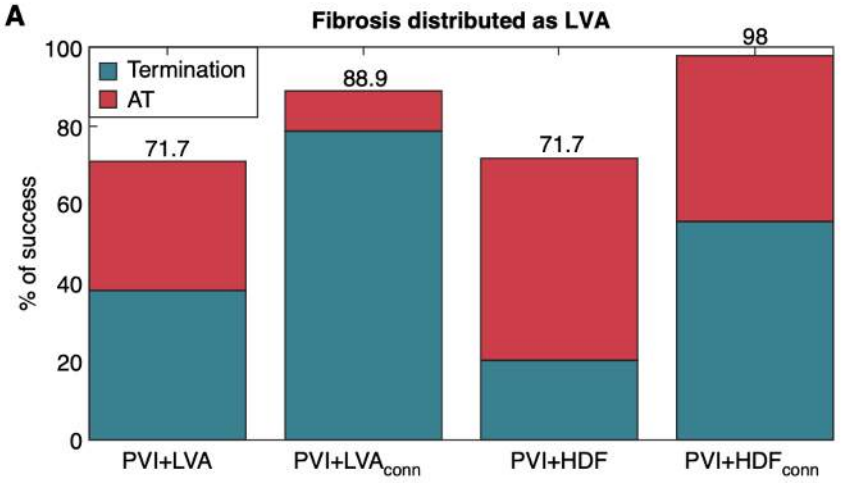
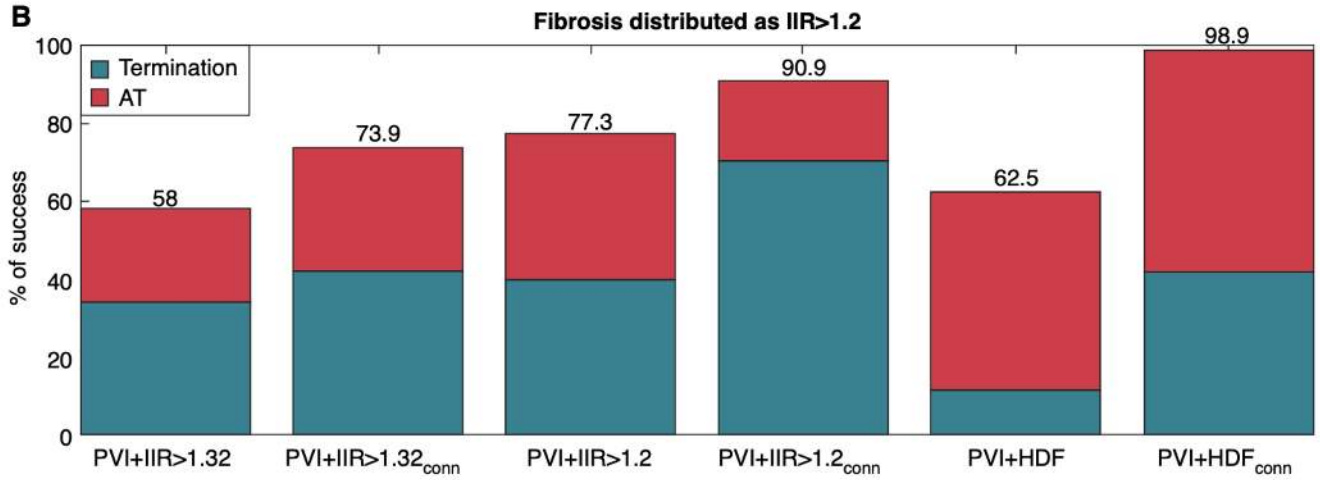
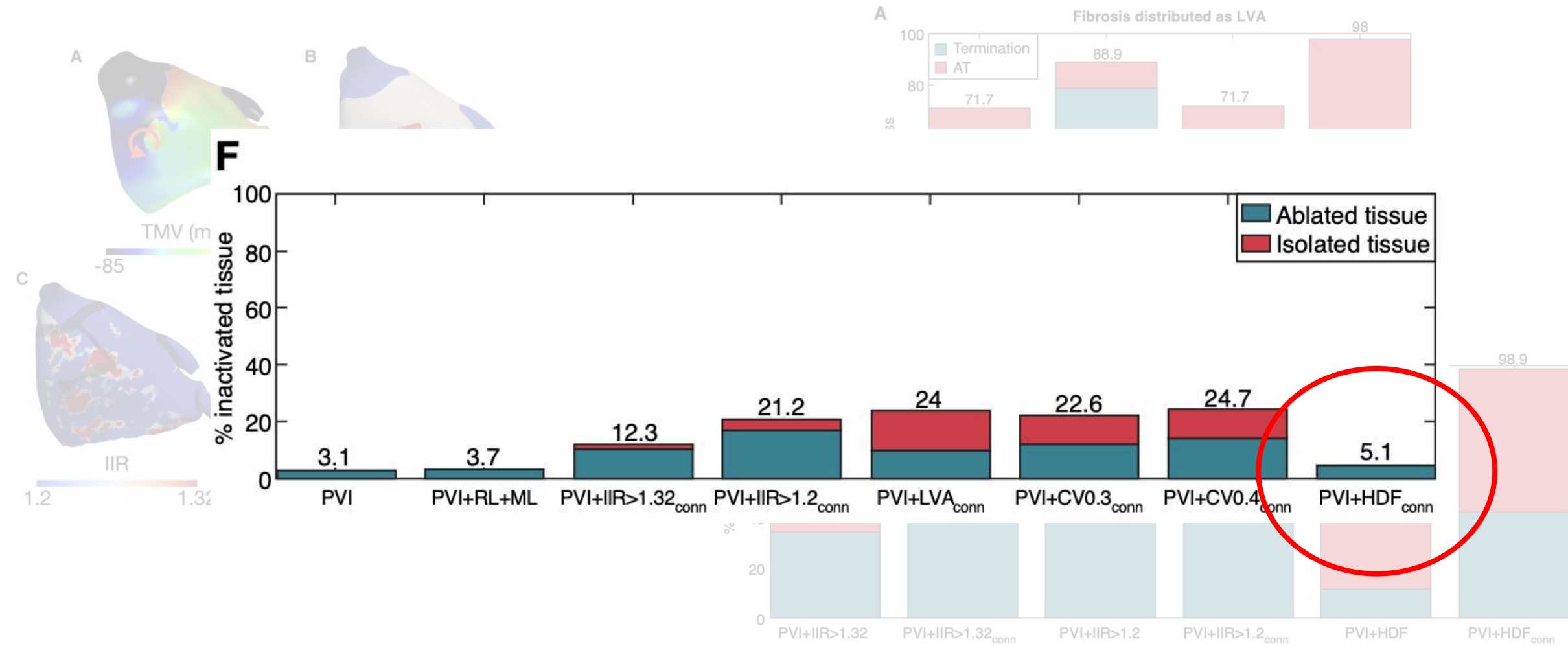

Input
Tomographic segmentation
Electroanatomical map
AugmentA
SSM fitting
Fibre orientation
LAT
IIR
Voltage
PersonAL plan
Yes
Identify targets
Ablation
Inducible?
No
Imported to original clinical map


A
B
TMV (mV)
-85
10
DF (Hz)
0
10
C
D
E
IIR
1.2
1.32
Voltage (mV)
0.5
1.0
LAT (ms)
0
140


A
Fibrosis distributed as LVA
Termination
AT
% of success
100
80
60
40
20
0
71.7
88.9
71.7
98
PVI+LVA
PVI+LVA$_{conn}$
PVI+HDF
PVI+HDF$_{conn}$


B
Fibrosis distributed as IIR>1.2
Termination
AT
% of success
100
80
60
40
20
0
58
73.9
77.3
90.9
62.5
98.9
PVI+IIR>1.32
PVI+IIR>1.32$_{conn}$
PVI+IIR>1.2
PVI+IIR>1.2$_{conn}$
PVI+HDF
PVI+HDF$_{conn}$


A
B
C
TMV (m
-85
IIR
1.2
1.32
A
Fibrosis distributed as LVA
100
80
Termination
AT
71.7
88.9
71.7
98
F
% inactivated tissue
100
80
60
40
20
0
Ablated tissue
Isolated tissue
3.1
3.7
12.3
21.2
24
22.6
24.7
5.1
98.9
PVI
PVI+RL+ML
PVI+IIR>1.32conn
PVI+IIR>1.2conn
PVI+LVAconn
PVI+CV0.3conn
PVI+CV0.4conn
PVI+HDFconn
20
0
PVI+IIR>1.32
PVI+IIR>1.32conn
PVI+IIR>1.2
PVI+IIR>1.2conn
PVI+HDF
PVI+HDFconn

Take home messages

- CT: anatomia → wall-thickness → efficienza e sicurezza (*e …non solo RF*)
- CT: individuazione affidabile grasso → CT-guided CNA *…e?*
- CMR: tecnologia immatura *not ready for prime time* (DECAAF-II)
- CT+CMR+EAM+AI: attenzione al futuro "*digital twin aided*"

Grazie per tutto quello che mi hai insegnato perché di tutto quello che oggi so, sicuramente gran parte è merito tuo .

Ti saluto come facevamo sempre :
"Ora e sempre Resistenza "

Ti voglio bene

Tutti noi volevamo essere un po' Ezio,
Solo che Ezio lo è stato sempre e fino in fondo

Dott. Ezio Soldati
1957-2024