PLACE

PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

ROMA
Centro Congressi
di Confindustria
Auditorium
della Tecnica

9ª Edizione

30 Settembre
1 Ottobre
2022

FIBRILLAZIONE ATRIALE: TECNICHE A CONFRONTO

MISURAZIONE DELLO SPESSORE DEL TESSUTO DELL'ATRIO DESTRO BASATO SU TECNOLOGIA DIELETTRICA DURANTE ABLAZIONI TRANSCATETERE A RADIOFREQUENZA

VINCENZO SCHILLACI

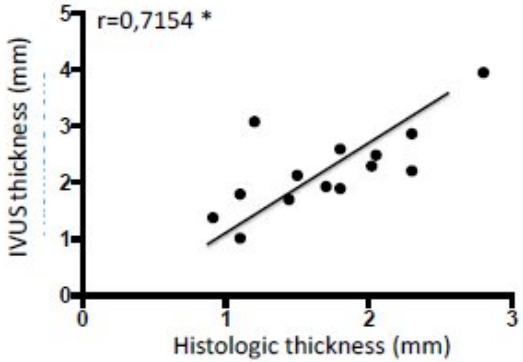
Casa di Cura Montevergine, Mercogliano (AV)

What impacts lesion with radiofrequency?

- Catheter stability
- Contact force
- Power output
- Temperature
- Duration of RF output
- **Tissue Thickness**

Real Time Atrial Wall Imaging during Radiofrequency Ablation in a Porcine Model

Mathieu Granier MD, MSc.(1), Pierre François Winum MD.(1), Mireille Granier, MD.(2), Pierre Liaud, MSc.(3), Guillaume Cayla, MD, PhD.(1,4), Patrick Messner, MD, PhD.(1,4), Jean-Luc Pasquie, MD, PhD.(5) Iris Schuster, MD, PhD.(1,3)



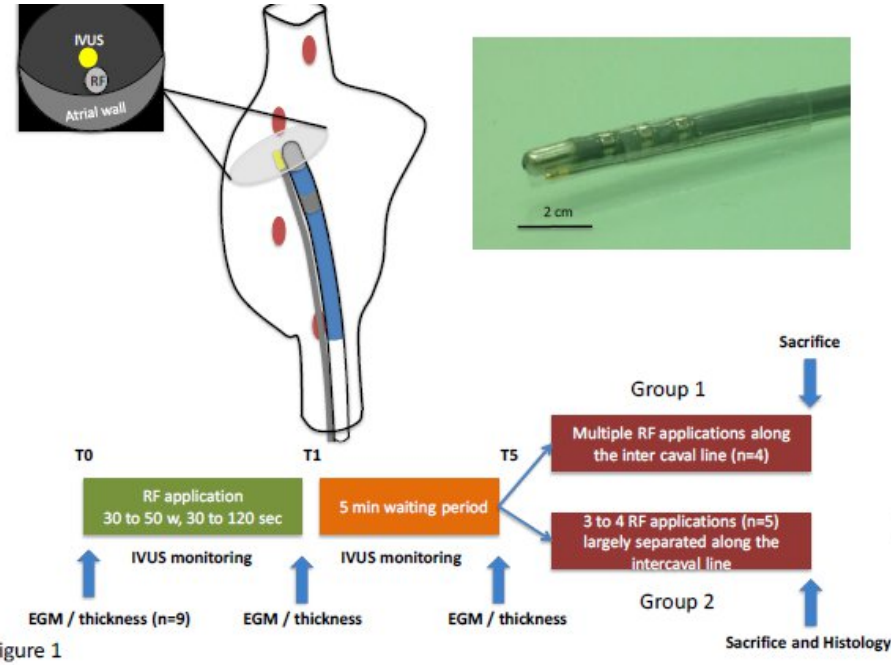
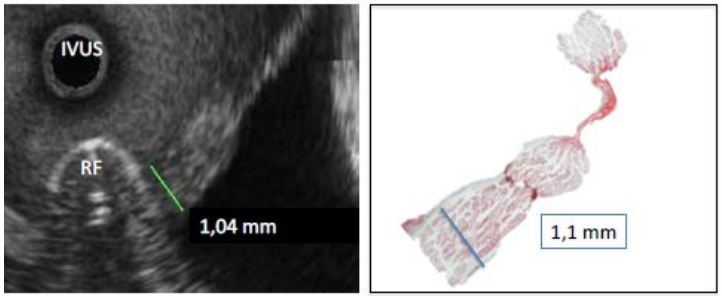


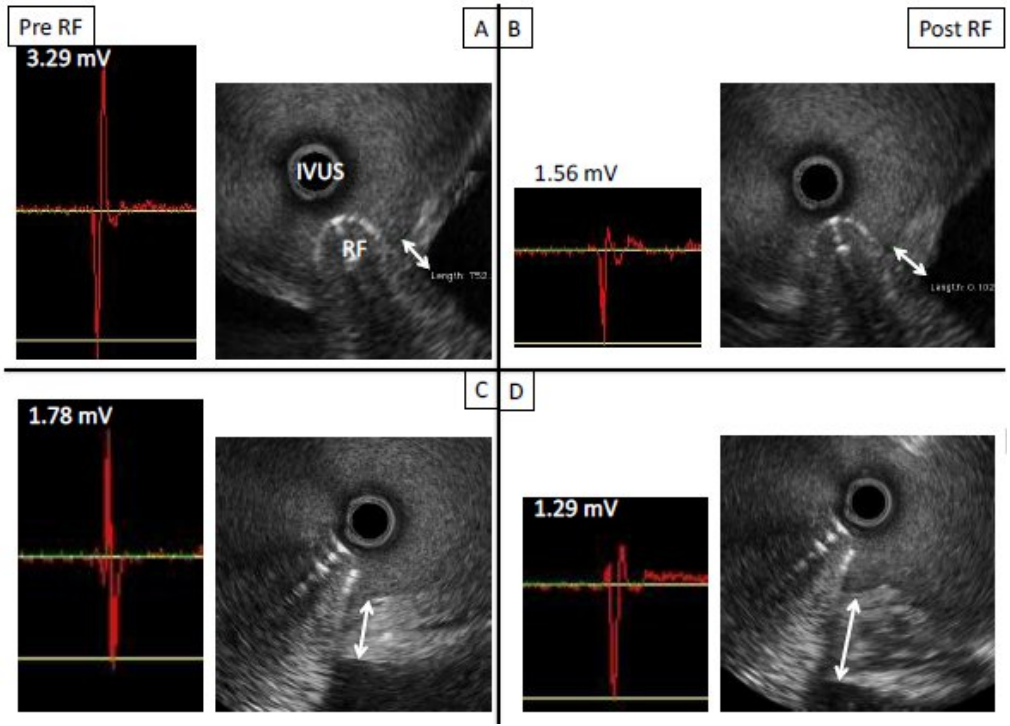
Figure 1

Real Time Atrial Wall Imaging during Radiofrequency Ablation in a Porcine Model

Mathieu Granier MD, MSc.(1), Pierre François Winum MD.(1), Mireille Granier, MD.(2), Pierre Liaud, MSc.(3), Guillaume Cayla, MD, PhD.(1,4), Patrick Messner, MD, PhD.(1,4), Jean-Luc Pasquie, MD, PhD.(5) Iris Schuster, MD, PhD.(1,3)

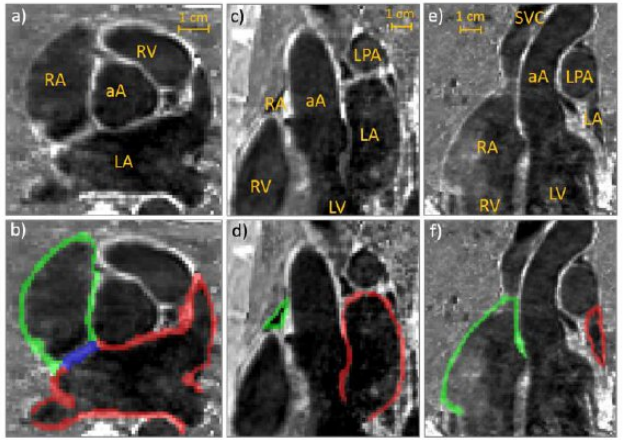
EGM/thickness relationship

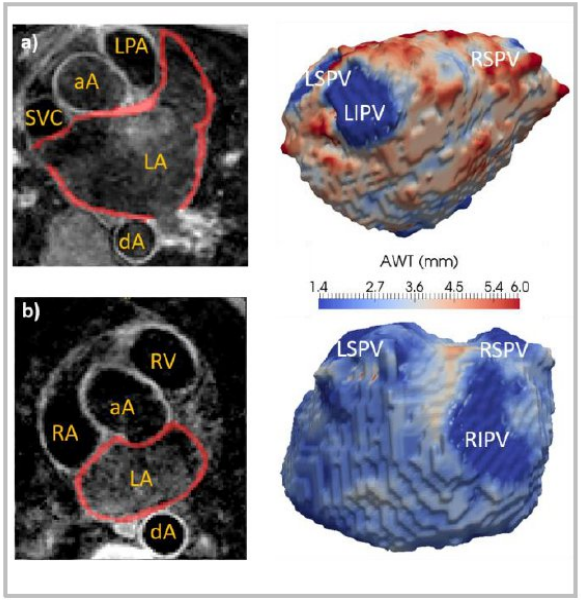


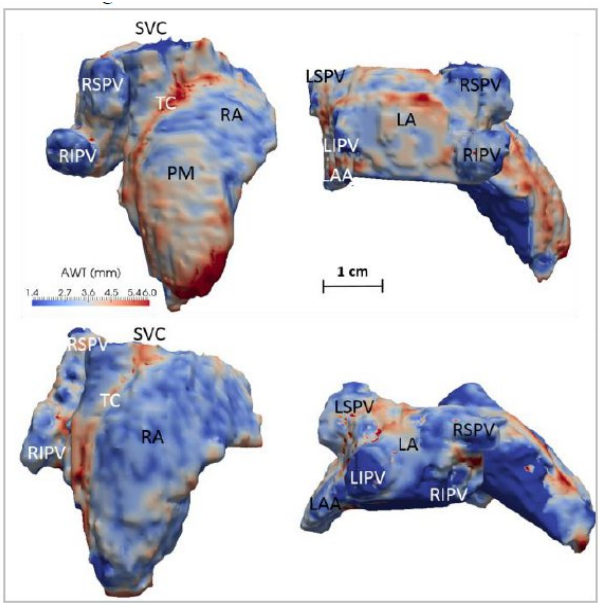


Novel MRI Technique Enables Non-Invasive Measurement of Atrial Wall Thickness

Marta Varela, Ross Morgan, Adeline Theron, Desmond Dillon-Murphy, Henry Chubb, John Whitaker, Markus Henningsson, Paul Aljabar, Tobias Schaeffter, Christoph Kolbitsch, Oleg V. Aslanidi

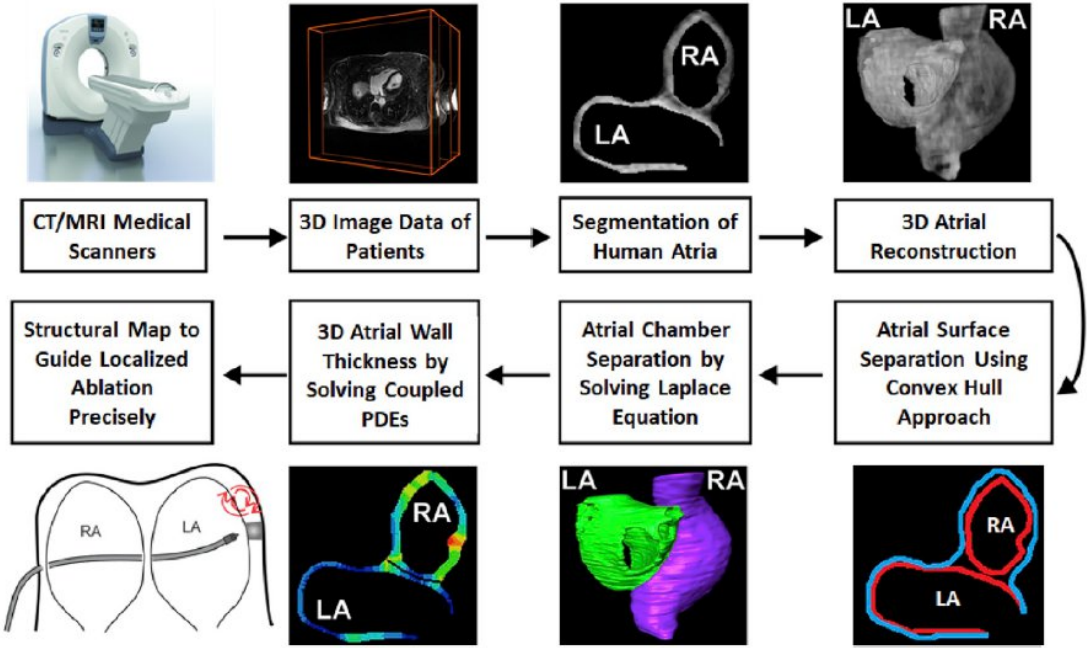






A robust computational framework for estimating 3D Bi-Atrial chamber wall thickness

Yufeng Wang [a], Zhaohan Xiong [a], Aaqel Nalar [a], Brian J. Hansen [b], Sanjay Kharche [c], Gunnar Seemann [d], Axel Loewe [e], Vadim V. Fedorov [b], Jichao Zhao [a,*]



A robust computational framework for estimating 3D Bi-Atrial chamber wall thickness

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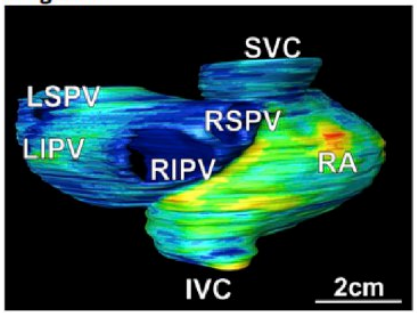
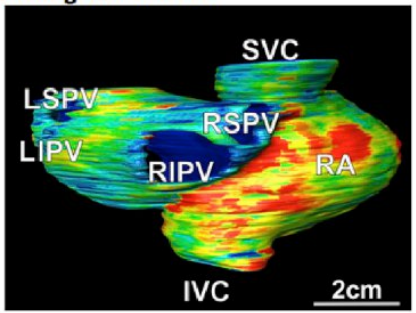
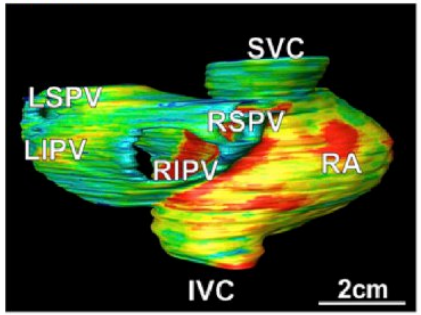
A Wall Thickness Using Nearest Neighbor



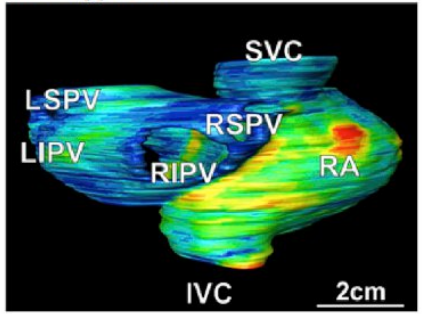
B Wall Thickness Using an Orthogonal Surface



C Wall Thickness Using Laplace Solution



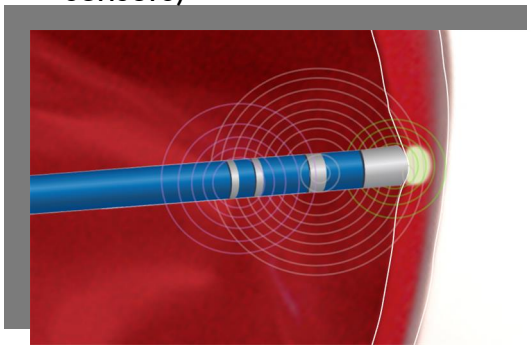
D Wall Thickness Using Coupled PDEs Approach

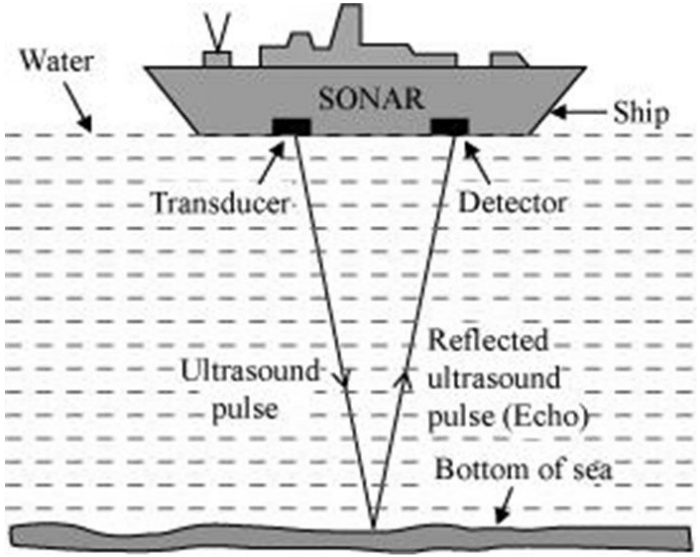


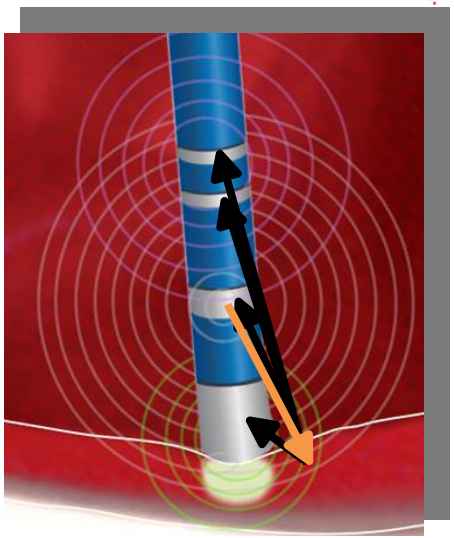
How Wall Viewer works

Local Fields

- Used for local tissue properties
- Generated between catheter electrodes
- Sensed by catheter (and sensors)







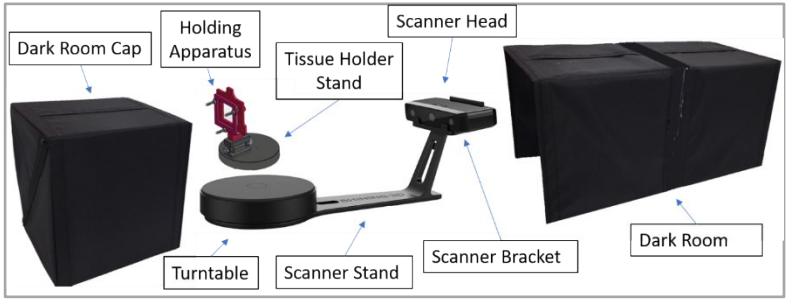
Electrical field shape + dielectric tissue signature

Regional normality distribution filter

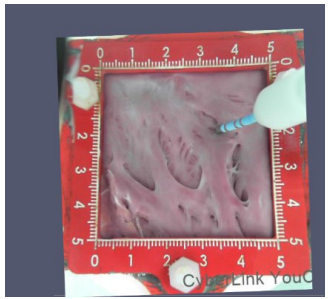
Outcome = Wall-thickness (mm)

Wall Viewer – Comparison between 3D scanner thickness and Kodex

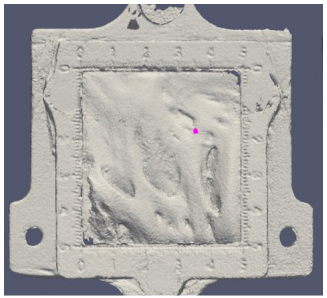
- Thickness measurement from a 3D Scan consists of scanning a cardiac tissue segment fixed by a Holding Apparatus and positioned on the 3D Scanner's turntable by a Tissue Holder Stand.
- The subjected cardiac tissue in each test setup is being 3D scanned prior a test.
- Each WV Point acquired in KODEX is compared to thickness extracted from the 3D scanner



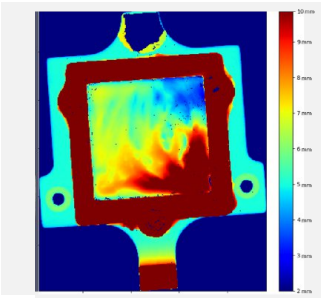
Tissue



3D Scan



Thickness Map



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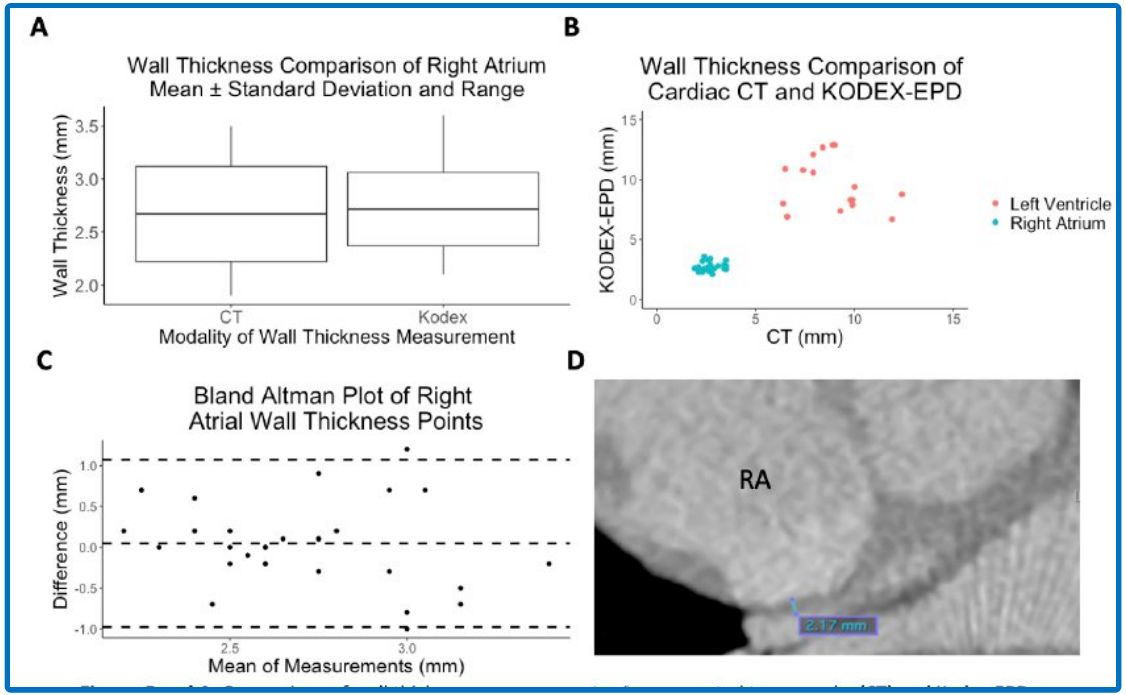
Extracted thickness from KODEX

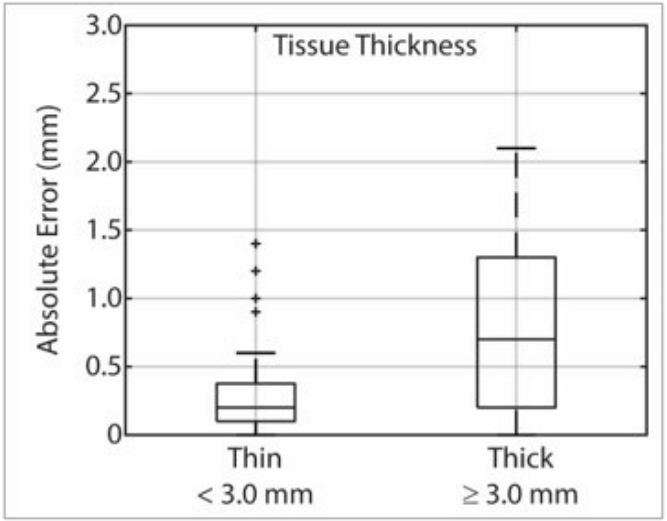
B-PO01-072 - Dielectric-based Tissue Thickness Measured With A Radiofrequency Ablation Catheter: Initial Clinical Results

- 48 wall thickness points were measured (30 in the right atrium, 18 in the left ventricle)
- Wall thickness ranged from 1.9mm to 12.9mm
- No significant difference in atrial wall thickness between KODEX-EPD and CT (3.02Â±0.35mm vs. 3.00Â±0.45mm, P=0.65)



Dielectric Tissue Imaging in Cavotricuspid Isthmus Ablation *(ERUCA)*

ClinicalTrials.gov Identifier: NCT04438395; PI - Dr. Larry Chinitz; Estimated enrollment N=30



Our experience

Received: 5 January 2022 | Revised: 16 March 2022 | Accepted: 6 April 2022

DOI: 10.1111/jce.15530

CASE REPORT

WILEY

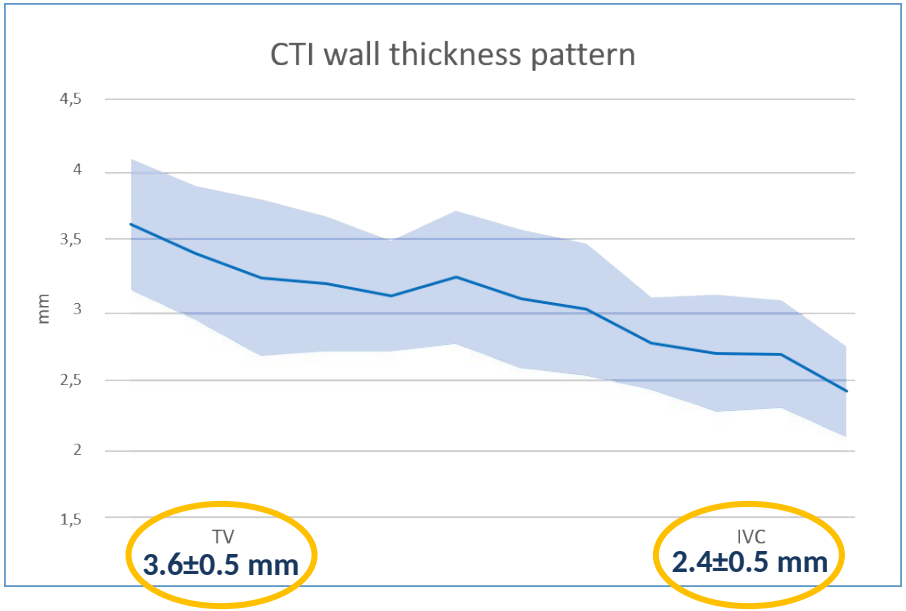
Dielectric-based tissue thickness measured during radiofrequency catheter ablation

Vincenzo Schillaci MD[1] | Giuseppe Stabile MD[1,2,3] | Alberto Arestia MD[1] | Gergana Shopova MD[1] | Alessia Agresta MD[1] | Armando Salito MD[1] | Carlo M. Giannitti BioMed Eng[4] | Andrea Natalizia BioMed Eng[4] | Antonio De Simone MD[2] | Francesco Solimene MD[1]

Our experience

- 12 consecutive patients with AFL - CTI dependent
- 4mm MAP-iT catheter (*APT, Access Point Technologies*) with a 6-hole irrigated tip
- Point by point ablation 35W
- Interlesion distance ≤6 mm

- Mean CTI length was **29.5±2.6 mm**
- Mean procedure time **37±13 min**
- Mean fluoroscopic time was **690±378 s**
- Mean RF time **763±205 s**
- Mean number of RF pulses of **28±7**
- Acute bidirectional cavo-tricuspid isthmus block achieved in all patients without any complications



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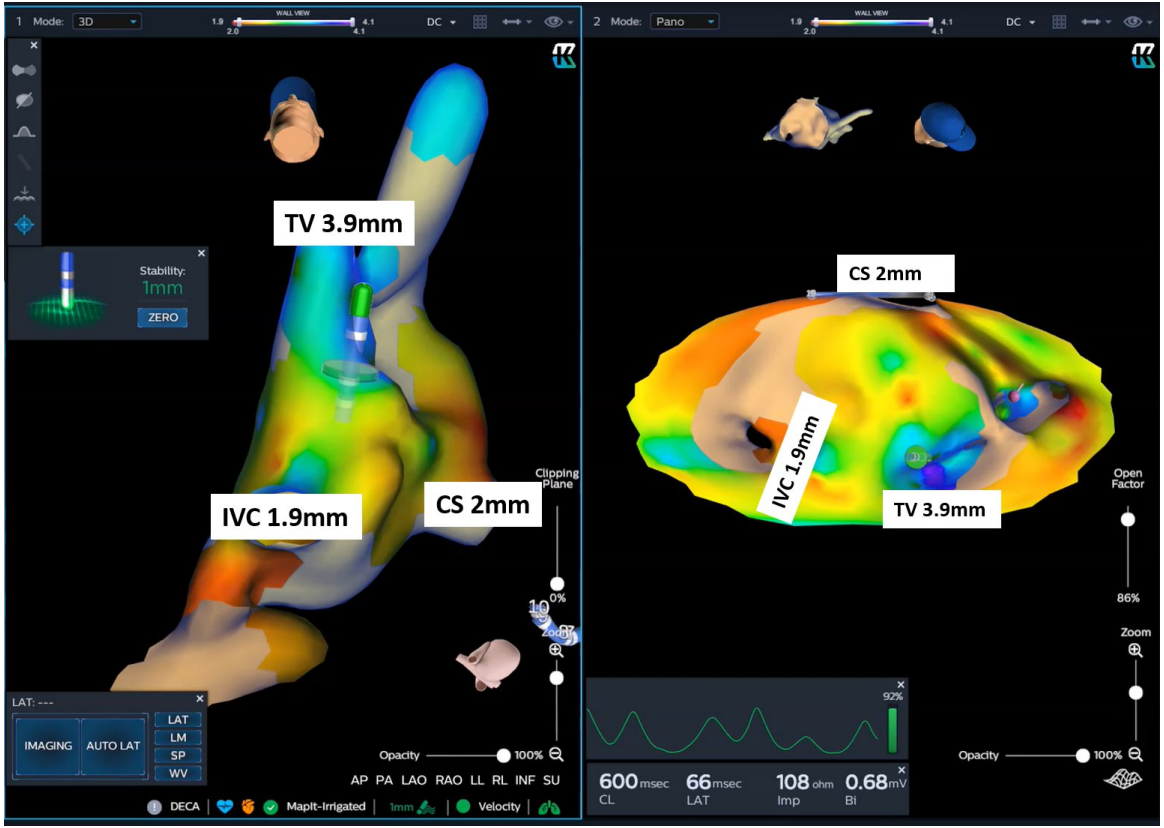
Our experience



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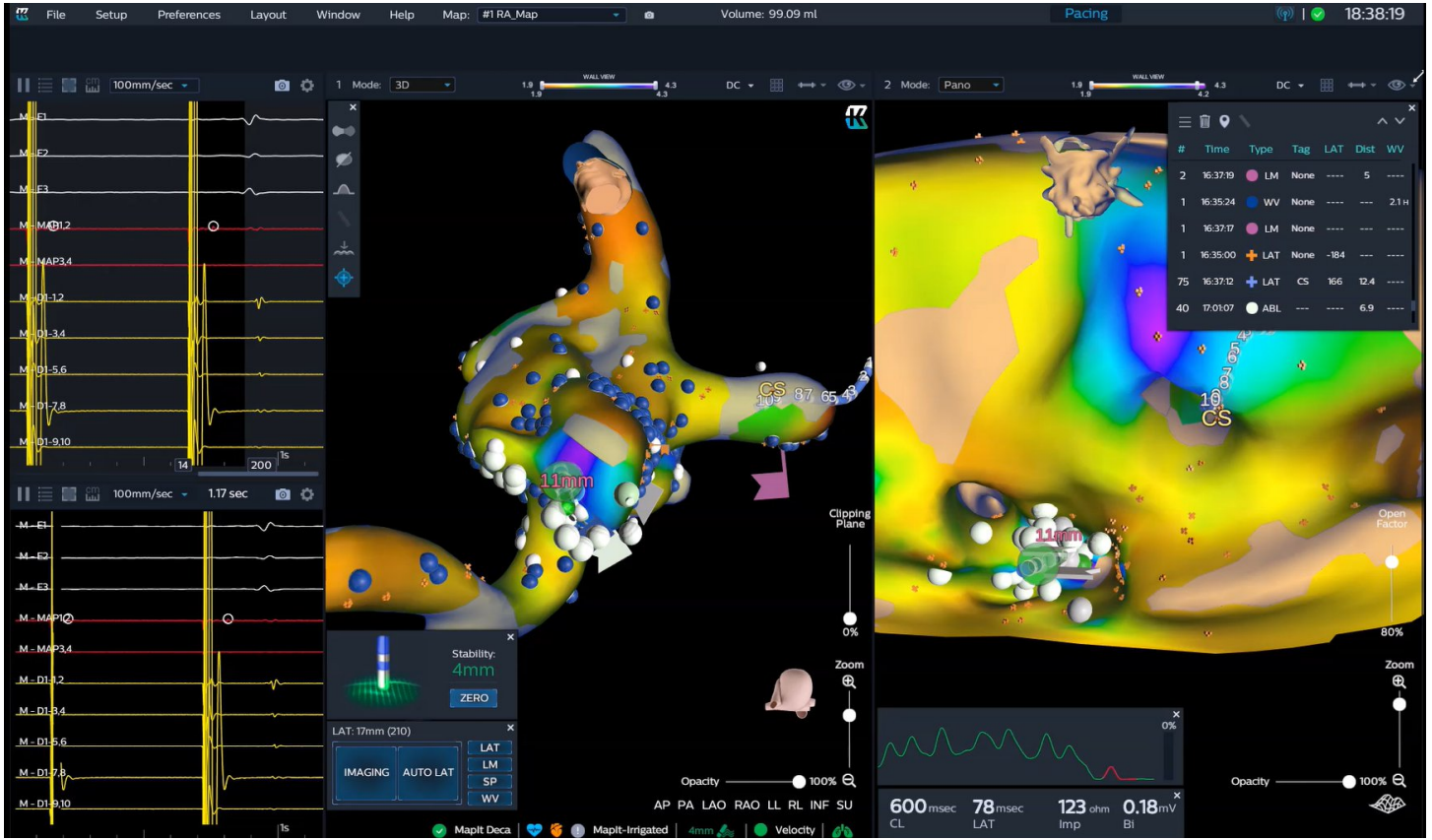

Kodex v 1.5.0

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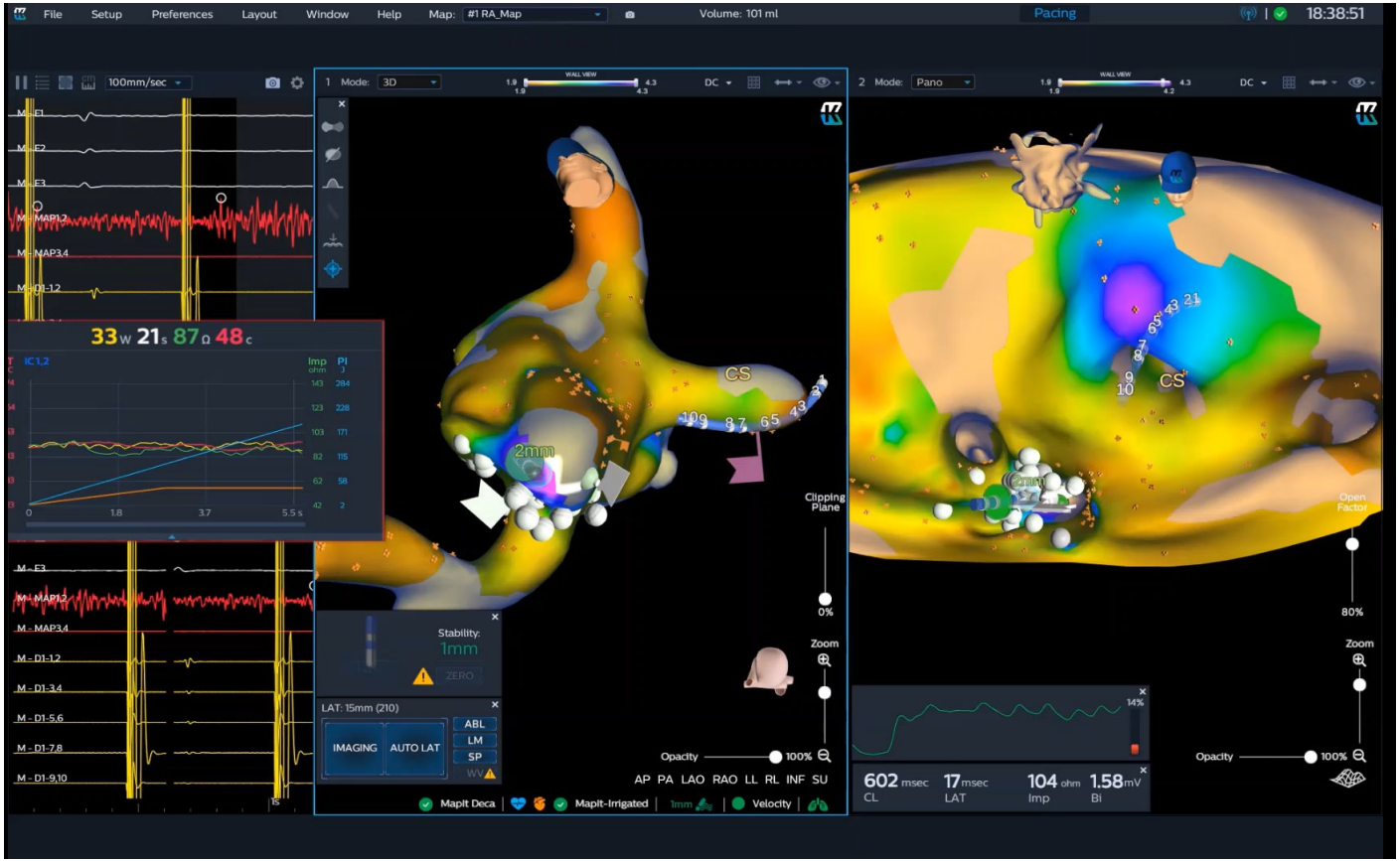
Our experience



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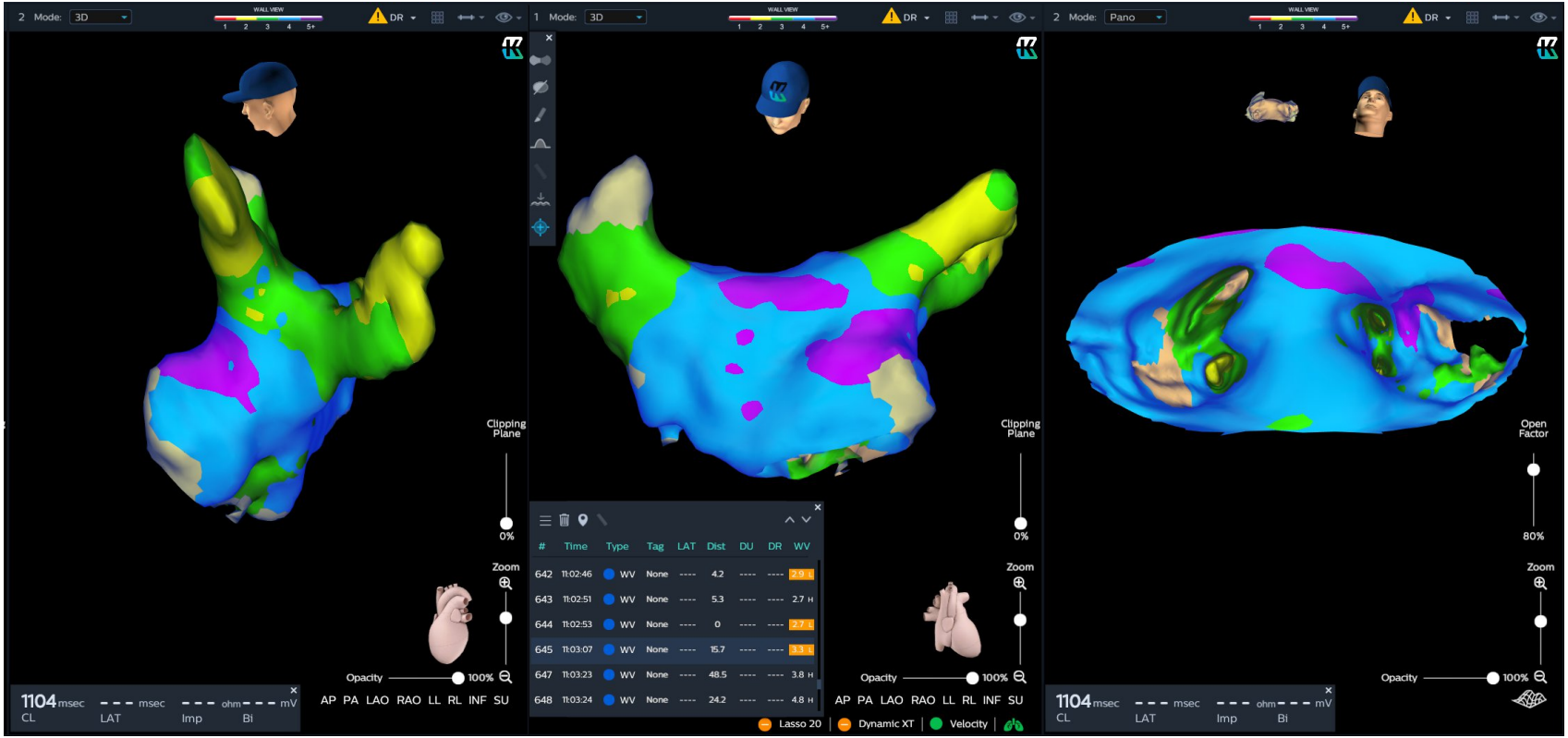
Our experience



Kodex v 1.5.1

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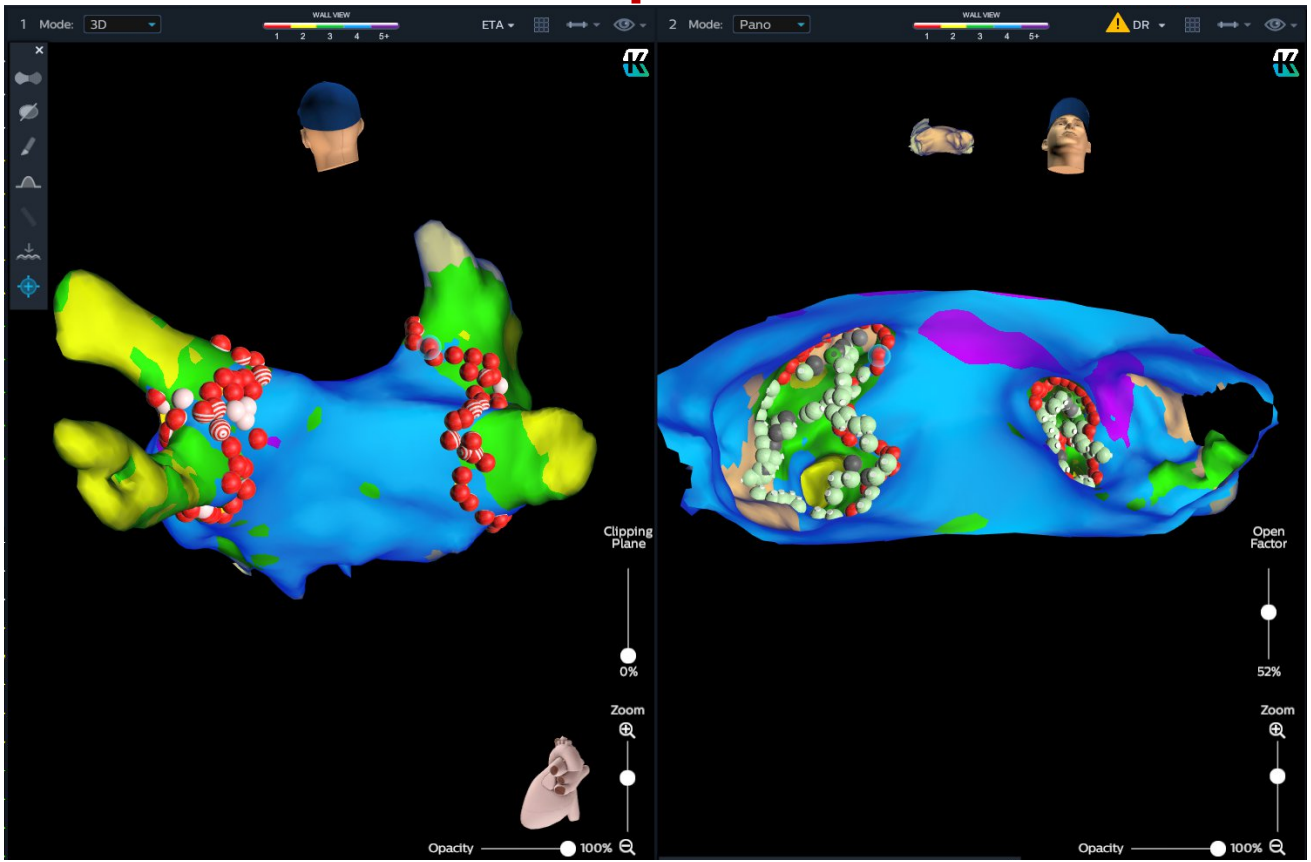
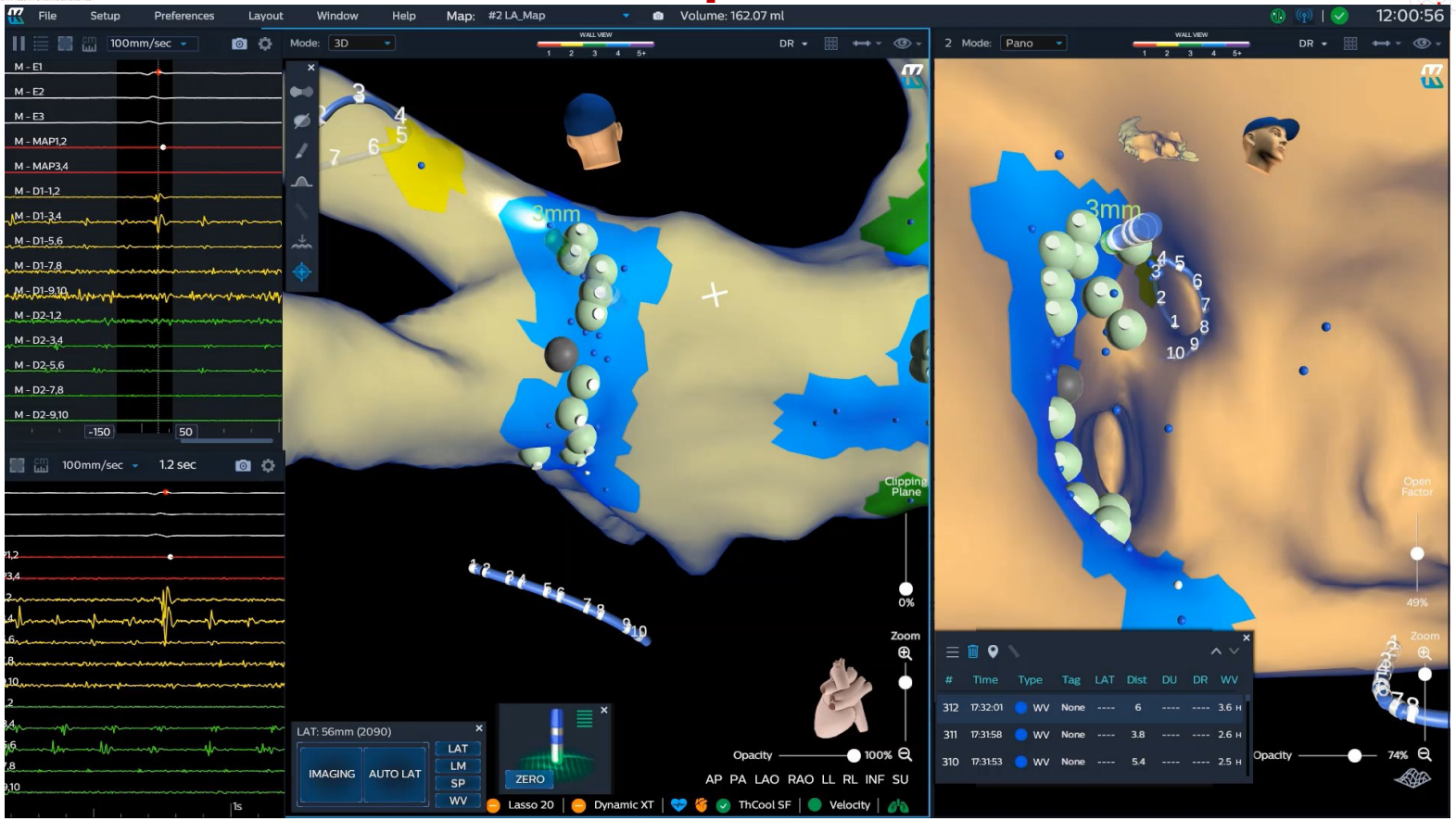
Our experience



Kodex v 1.5.1

Our experience



Kodex v 1.5.1

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Response Study

Study Purpose	<u>Assumptions</u> <u>Tissue Response Viewer (TRV)</u> is the primary feature which will be studied 1.5.1a software enables identification/localization of PVI gaps <u>Primary endpoints:</u> Correlation between TRV (index procedure) and sites of late PV reconnections (3-month mapping procedure) <u>Secondary endpoints:</u> Procedural data: total procedure time, RF application time, mapping time, location of RF applications, number of RF applications, fluoroscopy time/dose, RF ablation parameters
Study Design	Prospective, non- randomized, open label, multi-center
Number of subjects	Up to 50 subjects
Number of sites	5 in Europe
Follow-up	• Mandated 3-month mapping procedure • Data collection at discharge , 3-month-post index PVI procedure and Safety FU at 4 months.

EPD Solutions
A Philips company

EUROPEAN SOCIETY OF CARDIOLOGY
Europace (2016) **18**, 376–383
doi:10.1093/europace/euv073

CLINICAL RESEARCH
Ablation for atrial fibrillation

Three-dimensional atrial wall thickness maps to inform catheter ablation procedures for atrial fibrillation

Martin Bishop[1], Ronak Rajani[1,2,3], Gernot Plank[4,5], Nicholas Gaddum[1], Gerry Carr-White[1,2,3], Matt Wright[1,3], Mark O'Neill[1,3]*, and Steven Niederer[1]

Conclusions Left atrial wall thickness can be measured robustly and efficiently across the whole left atrium using a solution of the Laplace equation over a finite element mesh of the left atrium. Further studies are indicated to determine whether the integration of LAWT maps into pre-existing 3D anatomical mapping systems may provide important anatomical information for guiding radiofrequency ablation.

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ELECTROPHYSIOLOGY

Left atrial wall thickness of the pulmonary vein reconnection sites during atrial fibrillation redo procedures

Cheryl Teres MD | David Soto-Iglesias MSc, PhD | Diego Penela MD, PhD | Beatriz Jáuregui MD, MSc | Augusto Ordoñez MD, PhD | Alfredo Chauca MD | Marina Huguet MD, PhD | Carlos Ramírez-Paesano MD | Guillermo Oller MD, PhD | Agustí Jornet MD, PhD | Jordi Palet MD, PhD | David Santana MD | Alejandro Panaro MD | Giuliana Maldonado MD | Gustavo de Leon MD | Belen Gualis MD | Gustavo Jimenez-Britez MD, PhD | Arturo Evangelista MD, PhD | Julio Carballo MD | José T. Ortiz-Perez MD, PhD | Antonio Berruezo MD, PhD

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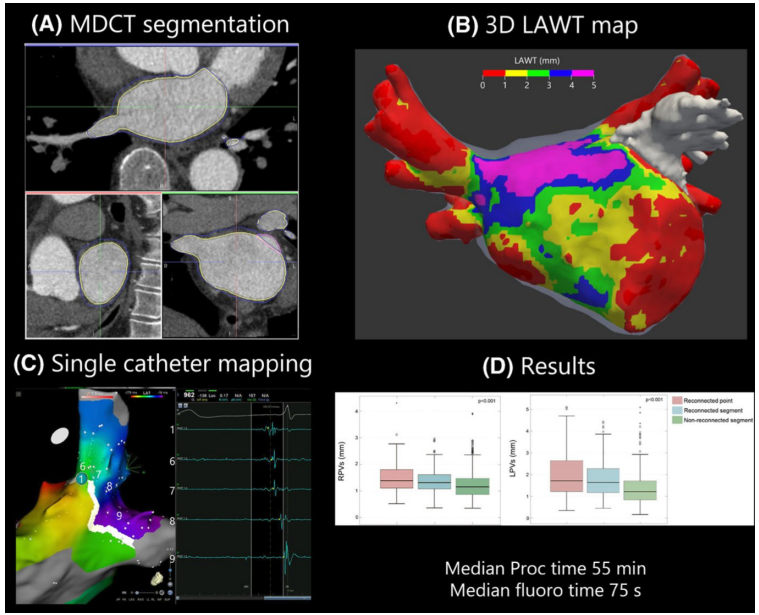
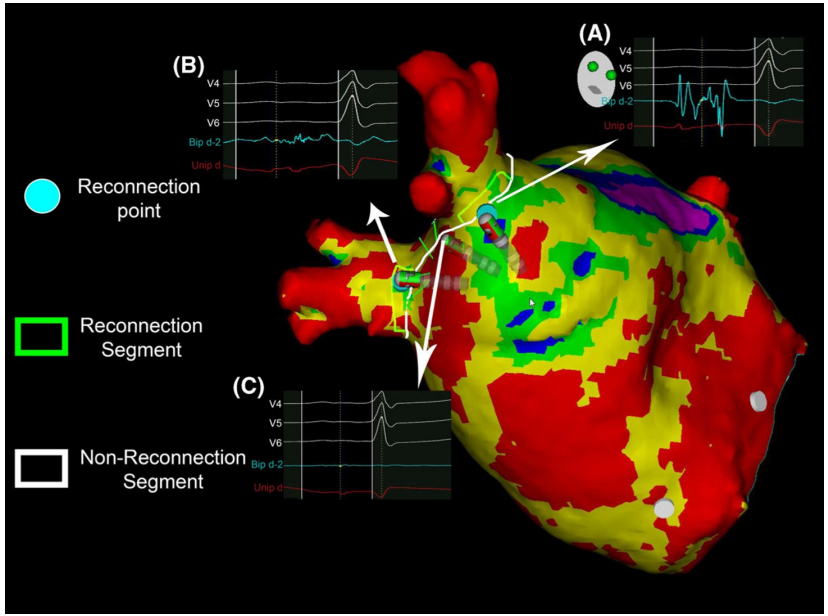
ELECTROPHYSIOLOGY

Left atrial wall thickness of the pulmonary vein reconnection sites during atrial fibrillation redo procedures





PLACE 9ª Edizio DOI: 10.1111/pace.14222

ELECTROPHYSIOLOGY

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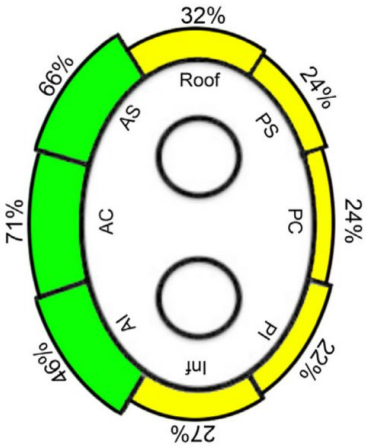
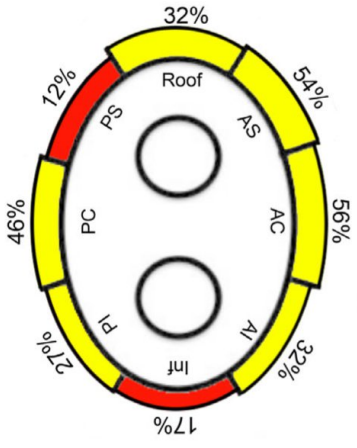
Left atrial wall thickness of the pulmonary vein reconnection sites during atrial fibrillation redo procedures

1) Left Pulmonary Veins



LAWT	Roof	PS	PC	PI	Inf	AI	AC	AS
(mm)	1.5	1.2	1.1	1.3	1.6	2.3	2.2	2.3

2) Right Pulmonary Veins



Roof	AS	AC	AI	Inf	PI	PC	PS
1.5	1.8	1.6	1.3	1.0	1.1	1.2	1.0

4.3 | LAWT and gap identification

The result of this pilot study confirms previous observations from retrospective studies, on that atrial WT is a major determinant of lesion transmurality and that PV reconnections occur more frequently in thicker parts of the PV circumferential line. We have found that the more frequently reconnected sites are those with thicker atrial WT, in particular the right and left anterior carinas. In fact, previous histological[17] and imaging[18] studies have shown that the left atrial ridge is the thickest structure around the circumferential PV lines and that it is also where reconnection sites were more frequently found in this study. Nevertheless, despite an excellent spatial resolution which

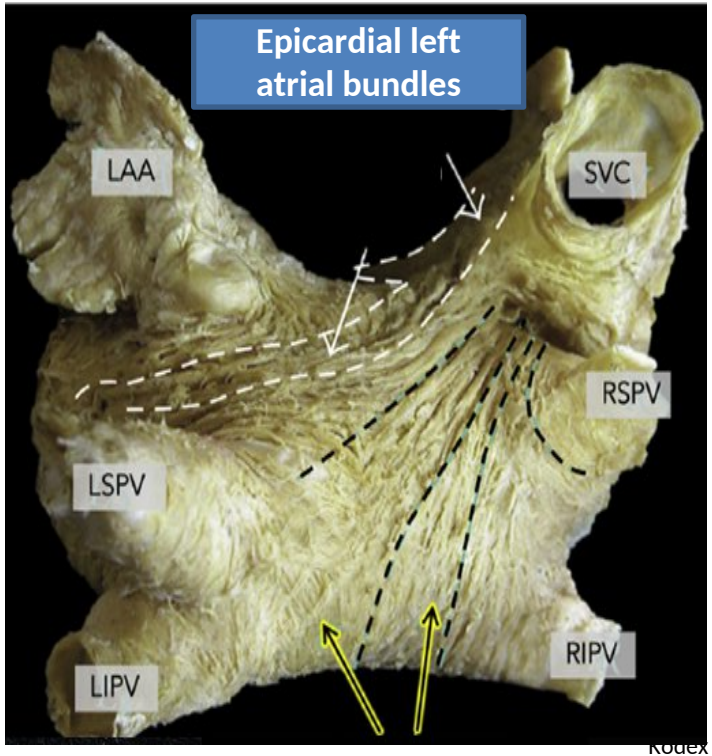
Hybrid non surgical endo-epi ablation of persistent AF: when tissue thickness map and local impedance information work together

- 49 year old male, persistent AF, highly symptomatic

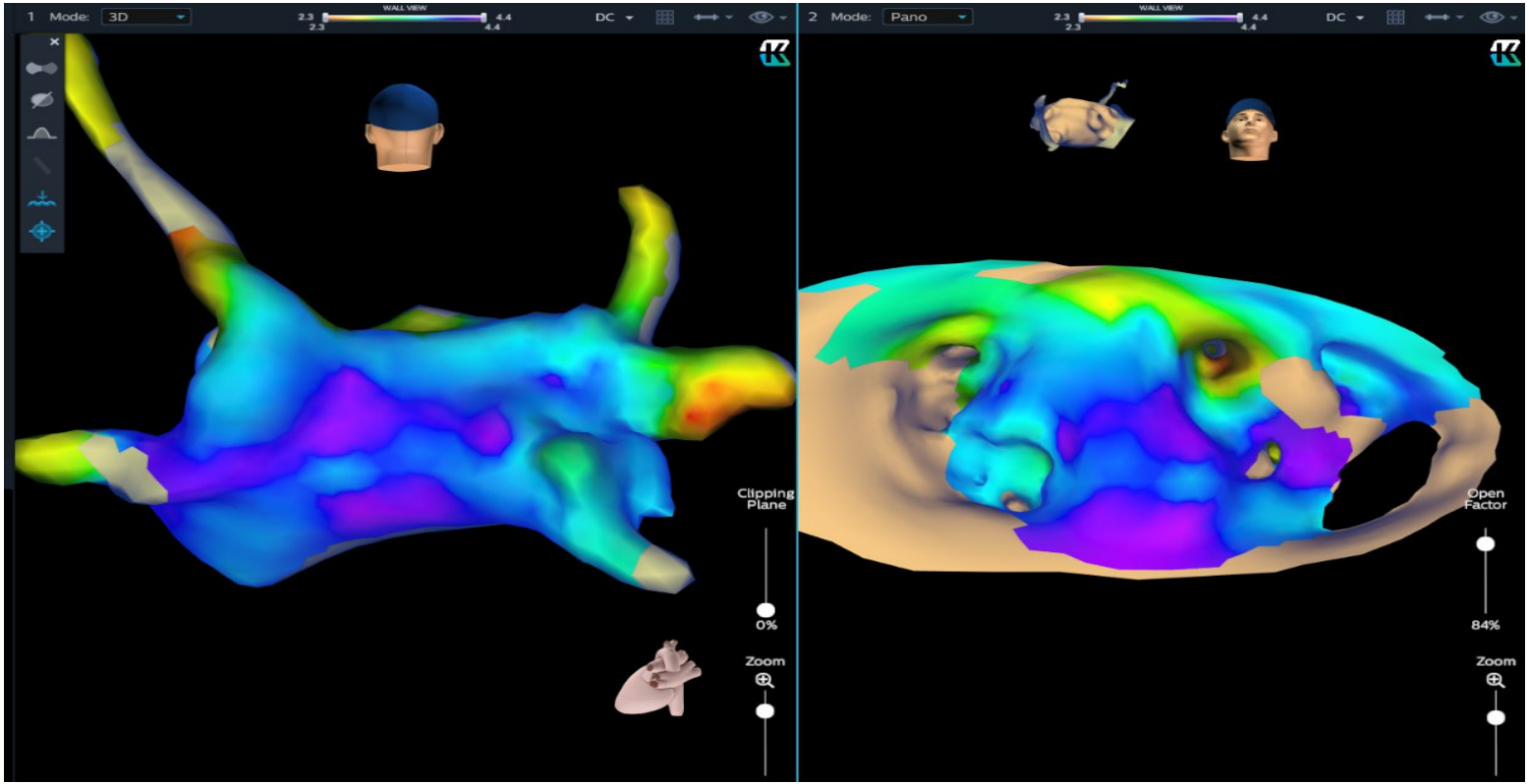
- Third ablation procedure: first procedures 2012(PVI only), 2017 (PVI plus posterior box)

- Mapping during CS pacing revealed:

  - Three reconnected veins
  - Roof line not blocked



Wall view measurements displayed with colors KODEX EPD



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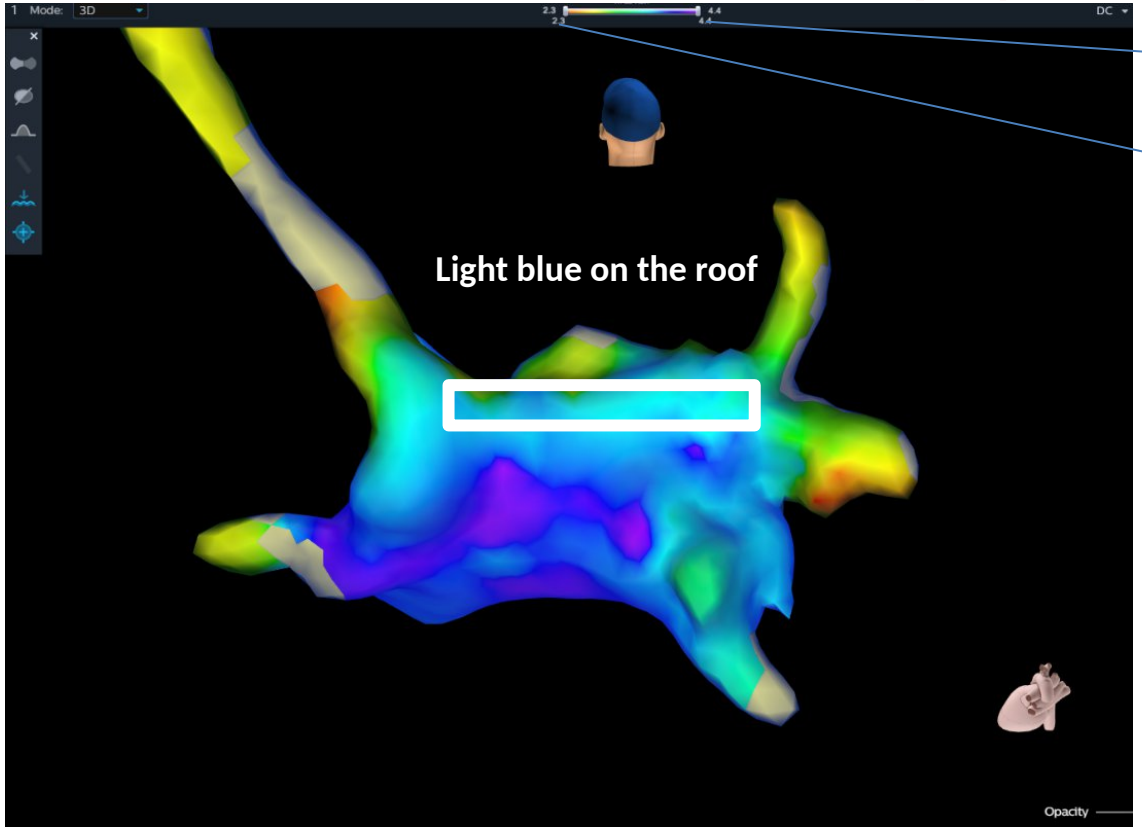
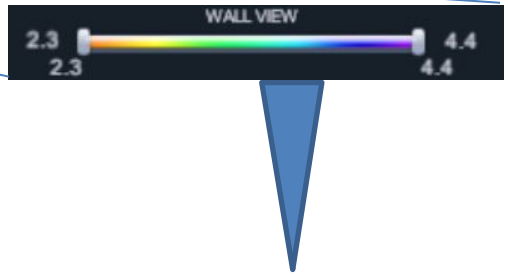
Wall view measurements displayed with colors KODEX EPD





Indicates wall thickness between 3/3.5 mm

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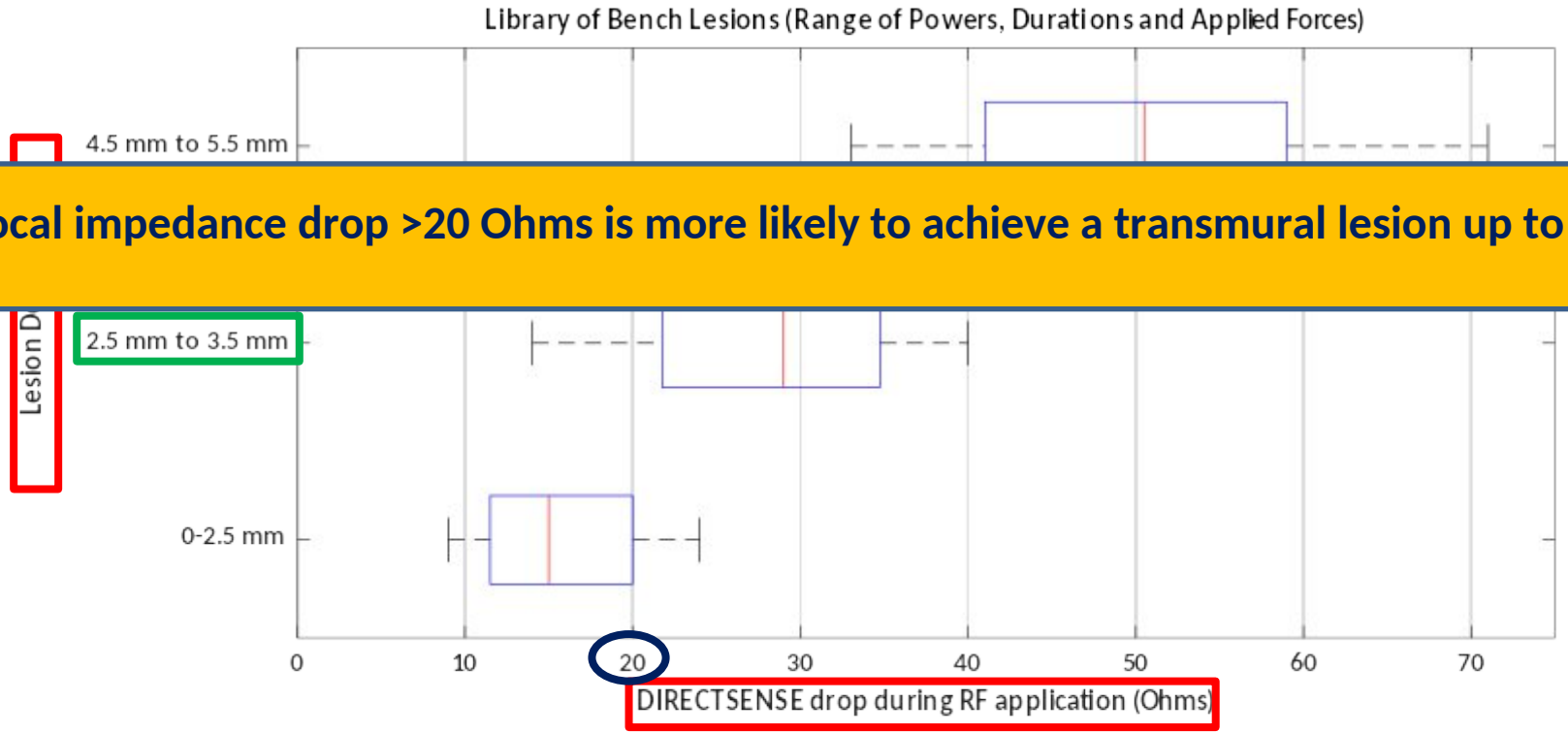
Relationship between local impedance drop and lesion depth



A local impedance drop >20 Ohms is more likely to achieve a transmural lesion up to 3.5 mm

Kodex v 1.5.0

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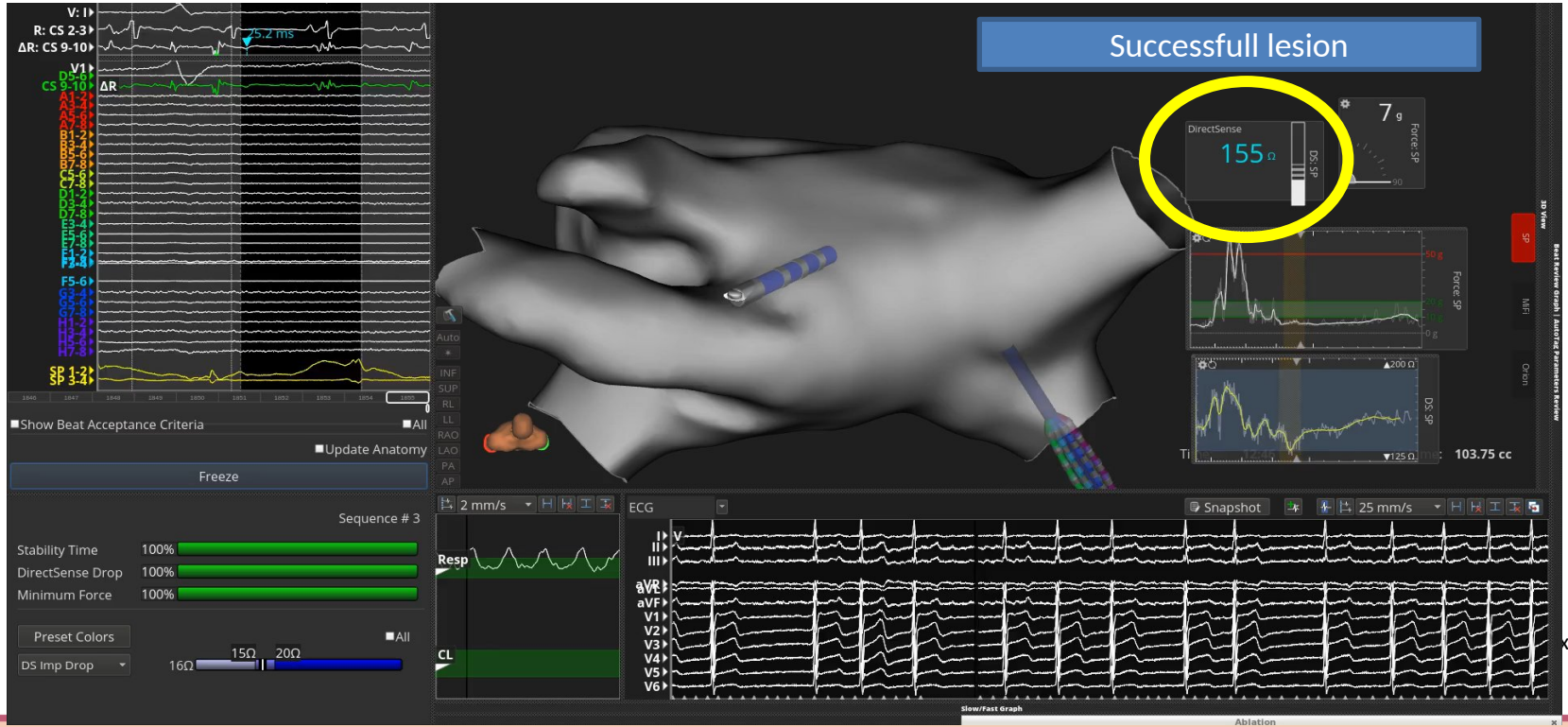
Roof line block after PVI

Based on the KODEX EPD map we aimed at a local impedance drop >20 on the roof



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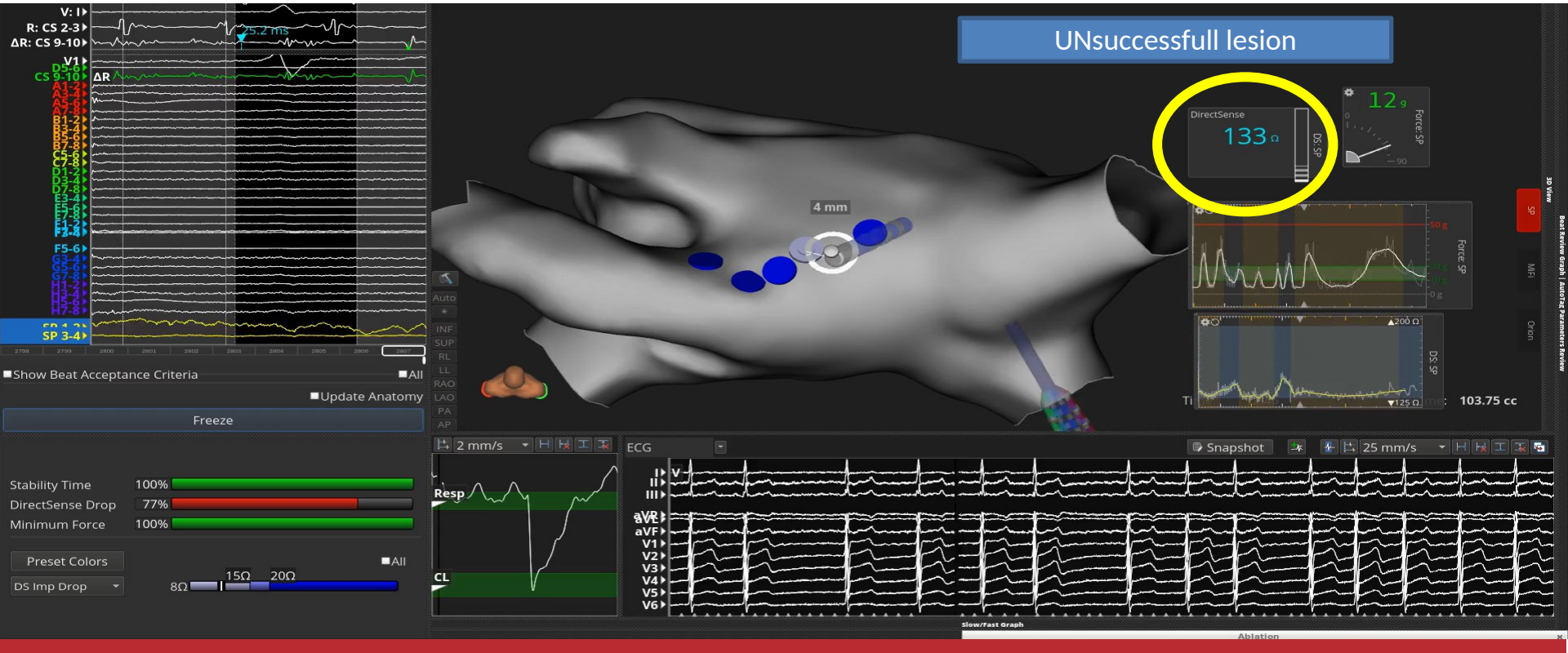
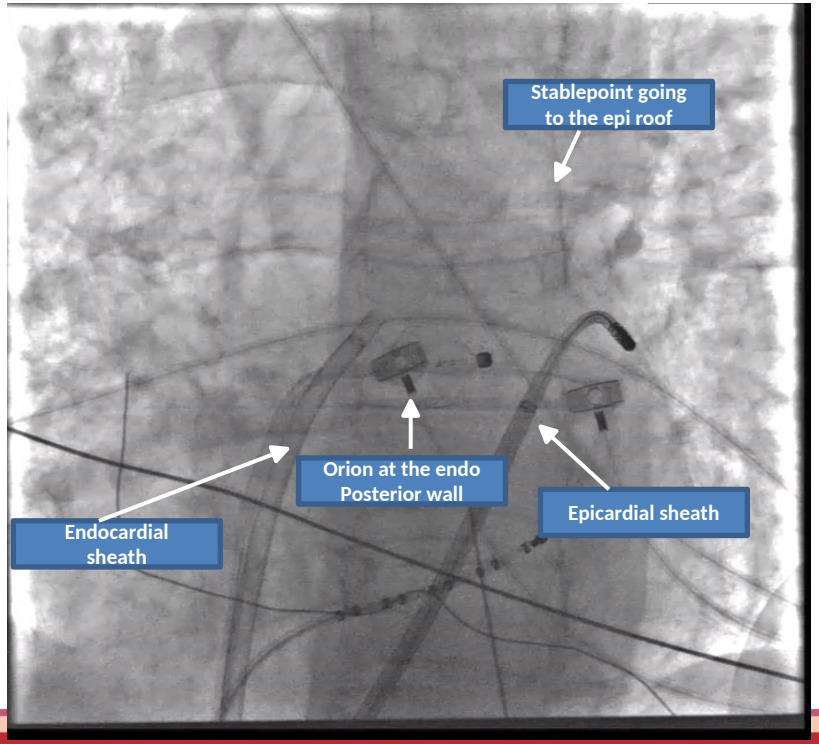
Unsuccessfull lesions

Based on KODEX EPD map we aimed at a local impedance drop >20 on the roof

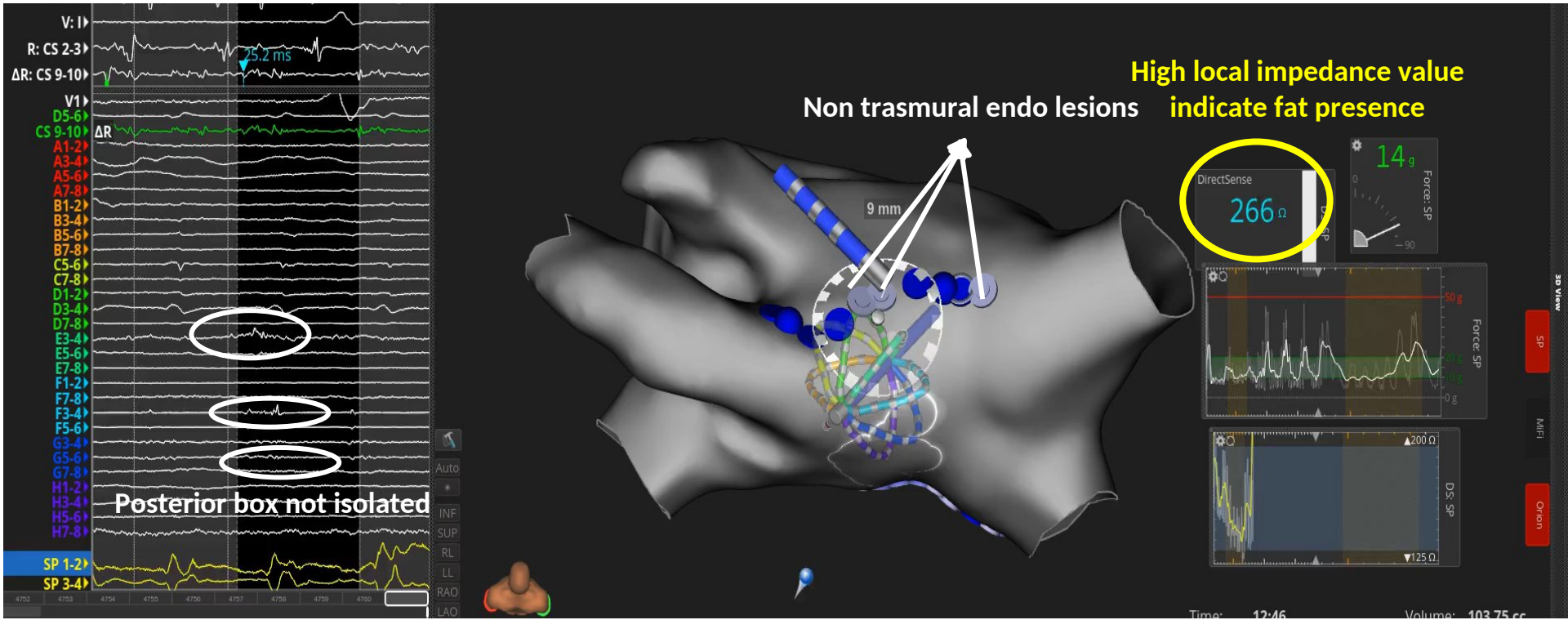


Epicardial ablation

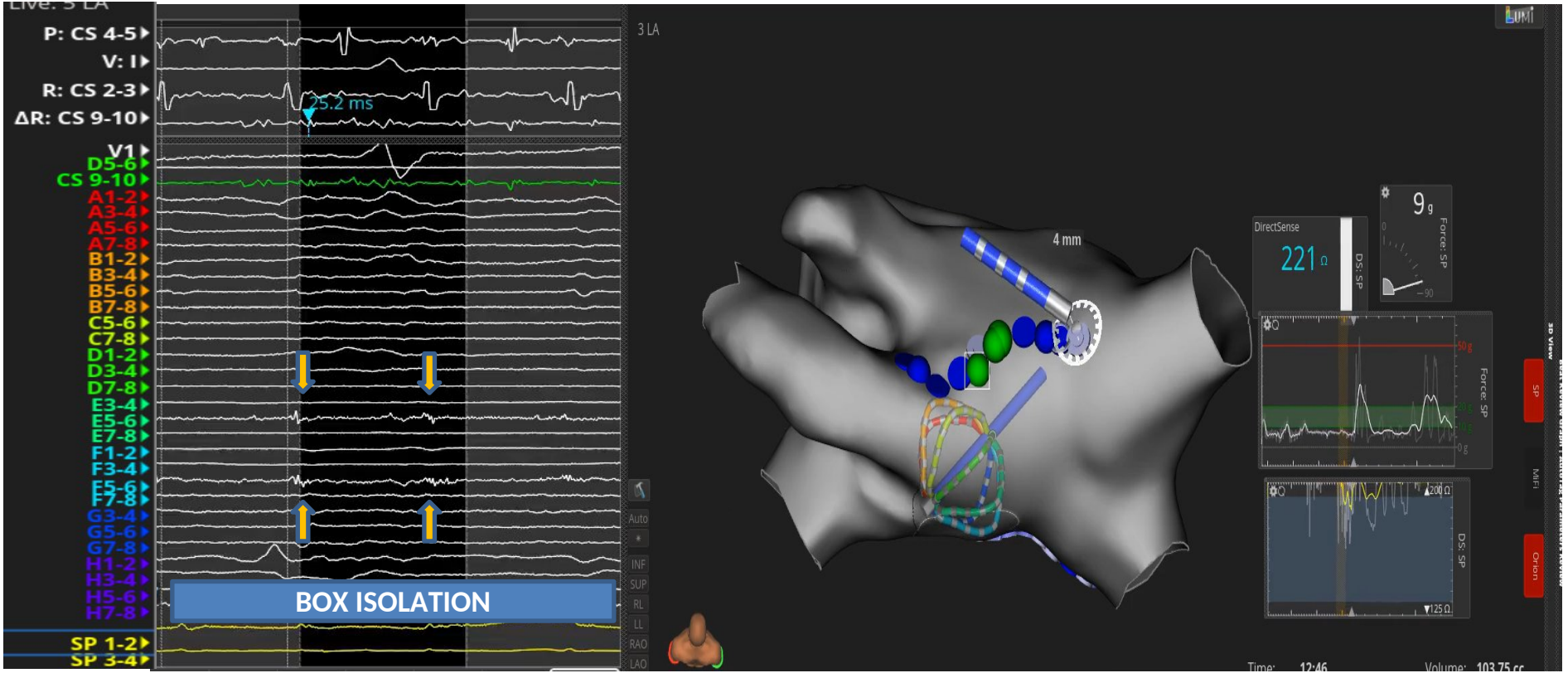
Posterior box could not be isolated so we decided to ablate epicardially on the roof



Epicardial ablation on the roof



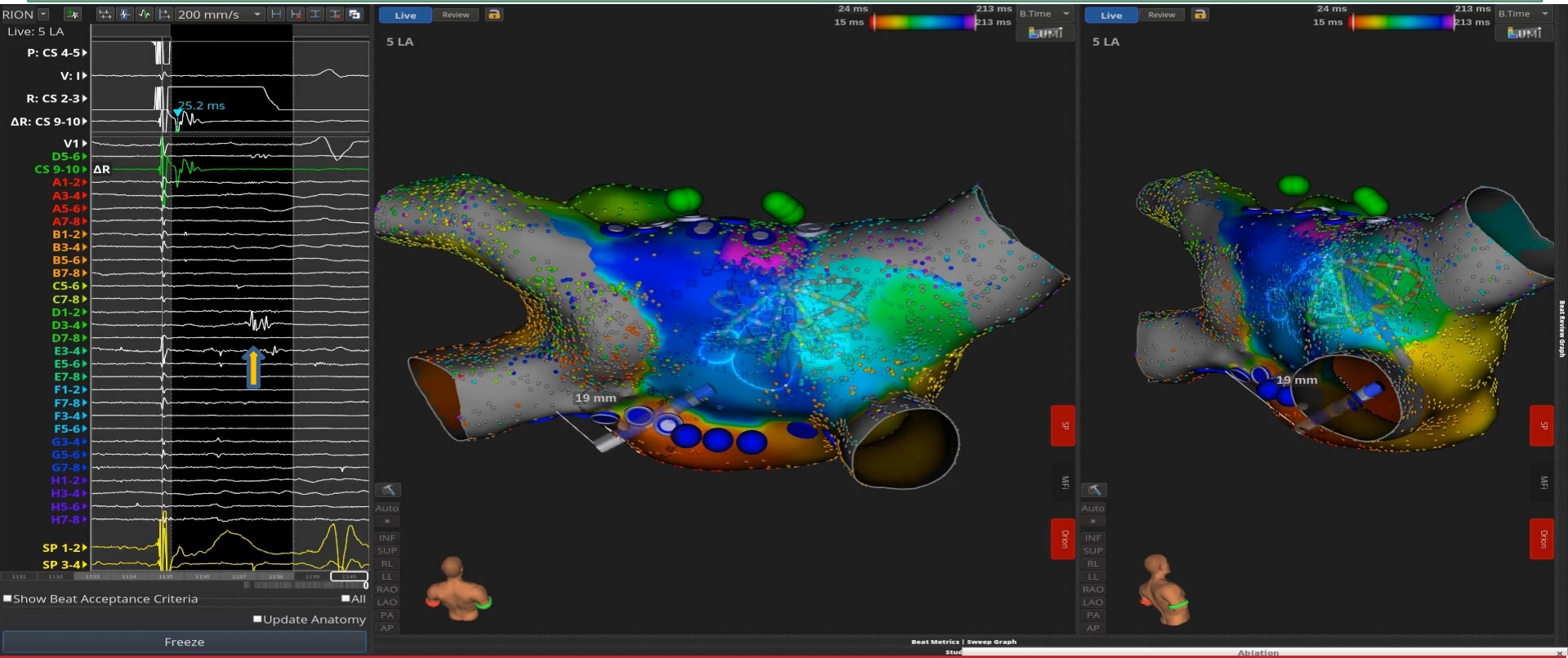
Box isolation with epicardial ablation



PLACE 9ª Edizione
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

Remap after cardioversion

Posterior box still connected: very small signal detected by the Orion catheter



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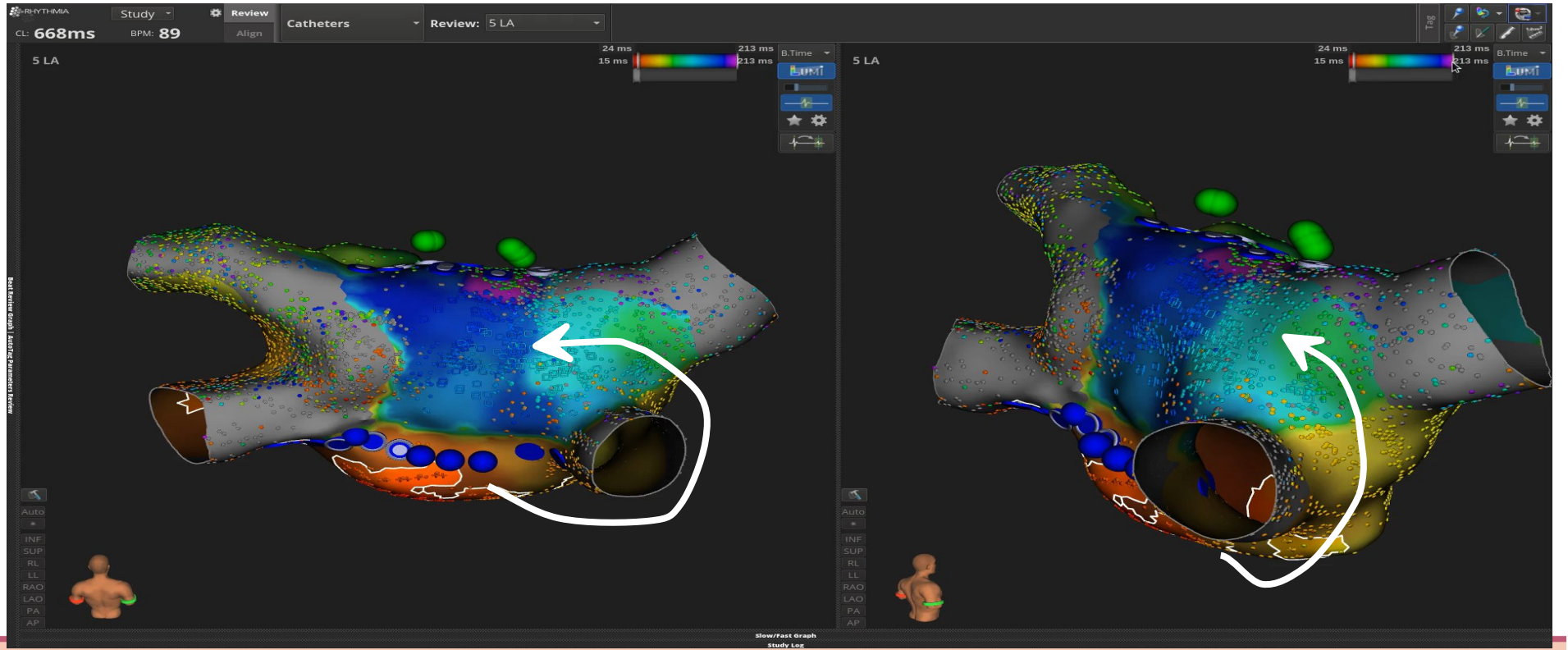
Remap after cardioversion

Roof is blocked: the gap is at the right carena



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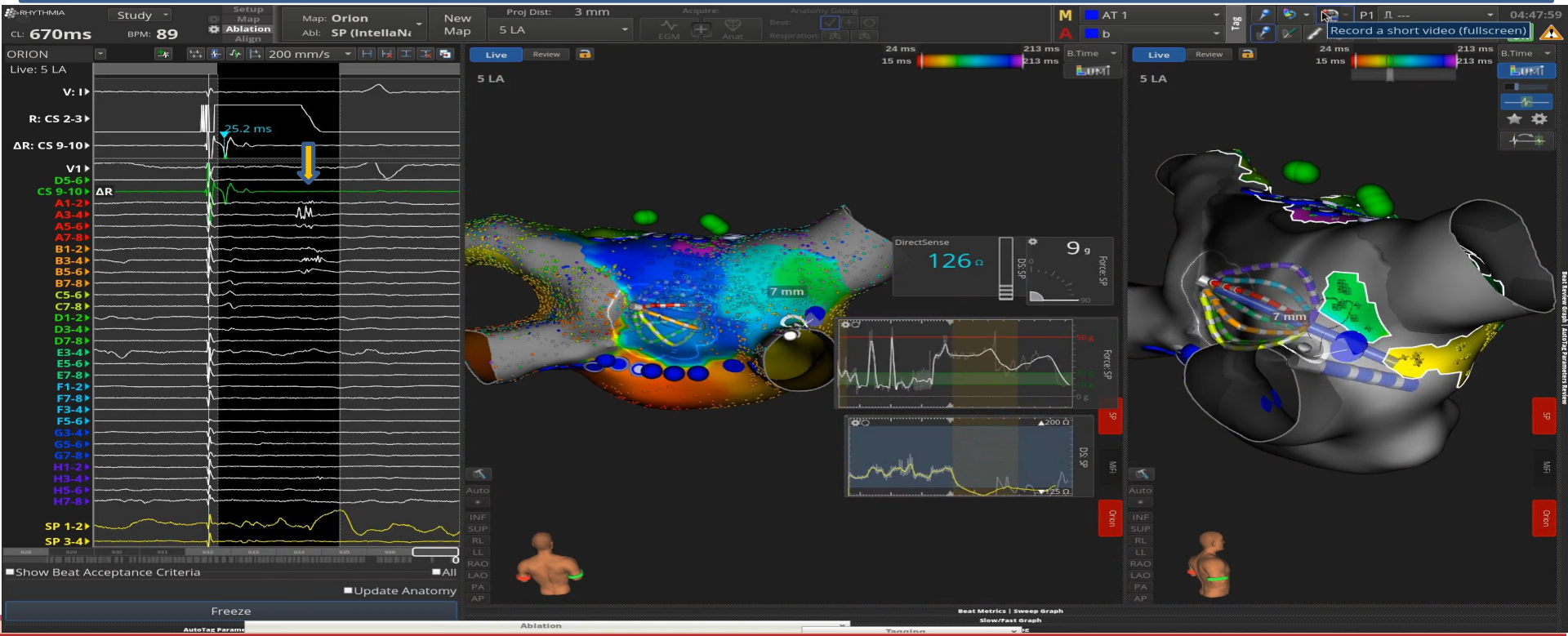
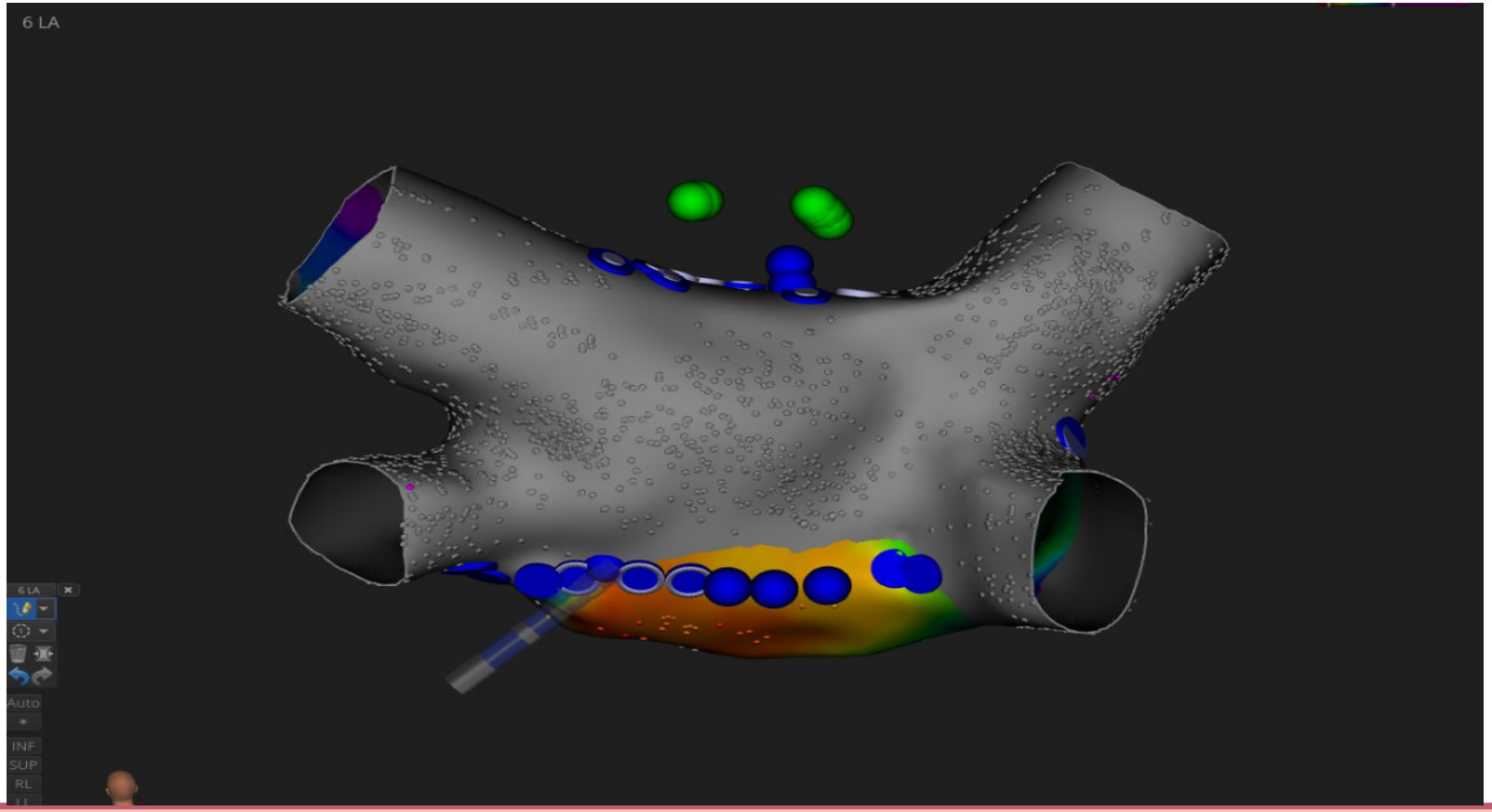
Final isolation

Roof is blocked: the gap is at the right carena

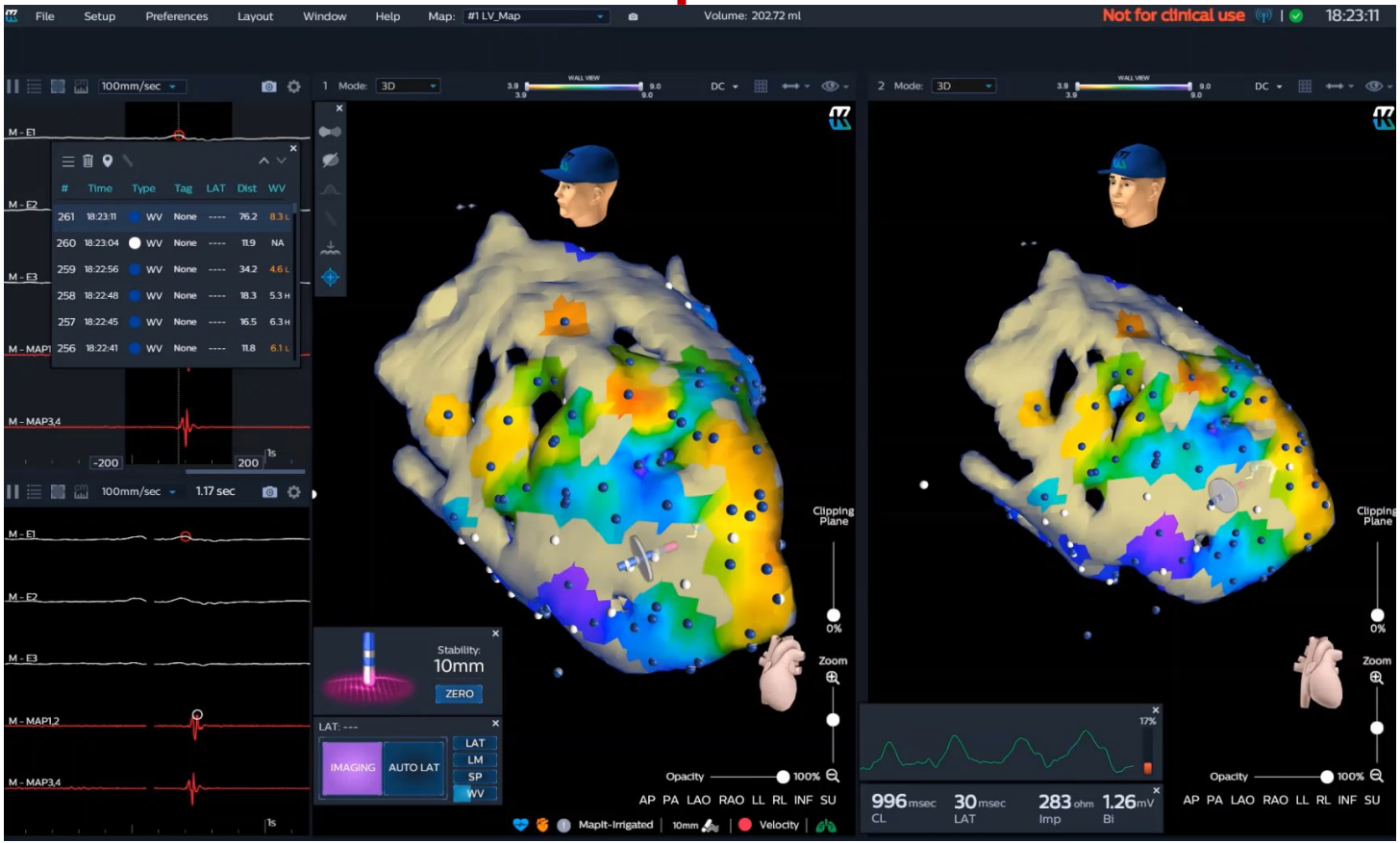


Final remap



PLACE 9ª Edizione
PLATFORM OF LABORATORIES FOR ADVANCES IN CARDIAC EXPERIENCE

Our experience



Kodex v 1.5.0

Conclusion

Left atrial wall thickness provides anatomical information wich may be useful to guide ablative approach

The combination of tissue thickness map and local impedance drop information can help understand when epicardial approach is necessary optimizing the patient outcome

THANK YOU