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9ª Edizione

**30 Settembre
1 Ottobre
2022**

Tachicardie Ventricolari Recidivanti: come vincere la sfida?

Ruolo della TAC nel paziente con aritmie ventricolari: valutazione della scar e ablazione

Prof. Dr Daniele Andreini, MD, PhD

Director, Cardiology and Cardiac Imaging Division, IRCCS Ospedale Galeazzi Sant’Ambrogio, University of Milan, Italy

UNIVERSITÀ DEGLI STUDI DI MILANO

Identification of arrhythmic substrate by CCT (contraindications to CMR)

MDCT

MR

Hyperenhancement of the subepicardial myocardium layer of LV lateral wall on CT corresponds to the enhanced zone on the MR images

(*J Comput Assist Tomogr* 2008;32:228–232)

ORIGINAL RESEARCH

Comprehensive Evaluation of Left Ventricle Dysfunction by a New Computed Tomography Scanner

The E-PLURIBUS Study

FIGURE 1 E-PLURIBUS Study Workflow

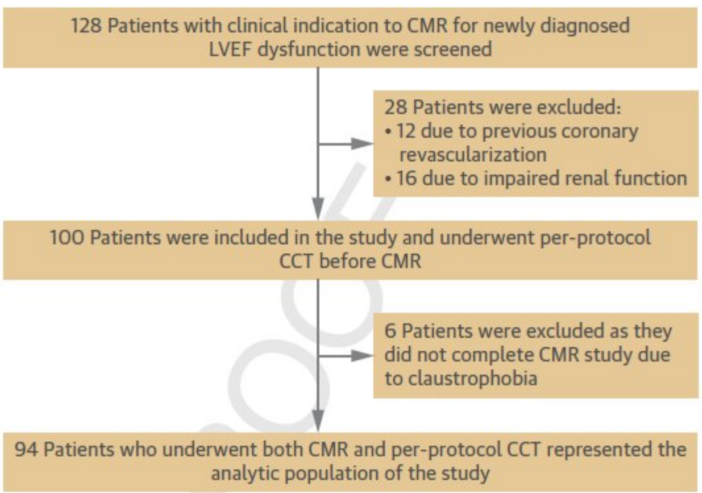
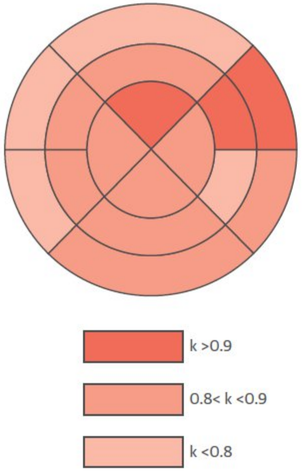


FIGURE 3 Per-Segment Analysis of the Concordance (Cohen's κ Statistic) Between CCT and CMR Assessment of All-Type Delayed Enhancement



Segment	Concordance	k Value	95% CI
Basal anterolateral	92/94 (97.8%)	0.91	0.78-1.00
Basal posterolateral	87/94 (92.6%)	0.83	0.71-0.95
Basal inferior	89/94 (94.7%)	0.85	0.73-0.99
Basal inferior spetum	85/94 (90.4%)	0.78	0.65-0.71
Basal anterior septum	85/94 (90.4%)	0.79	0.66-0.91
Basal anterior	90/94 (95.7%)	0.79	0.60-0.99
Mid anterolateral	92/94 (97.8%)	0.91	0.80-1.00
Mid posterobasal	87/94 (92.6%)	0.77	0.61-0.93
Mid inferior	89/94 (94.7%)	0.85	0.73-0.97
Mid inferior septum	89/94 (94.7%)	0.87	0.77-0.98
Mid anterior septum	86/94 (91.5%)	0.80	0.67-0.93
Mid anterior	90/94 (95.7%)	0.86	0.74-0.99
Apical lateral	91/94 (96.8%)	0.83	0.67-0.99
Apical inferior	90/94 (95.7%)	0.84	0.70-0.99
Apical septum	92/94 (97.8%)	0.85	0.71-0.99
Apical anterior	93/94 (98.9%)	0.96	0.88-1.00

Very high concordance for myocardial fibrosis detection with CMR vs CCT resulted from the present study in all myocardial segments. Abbreviations as in Figure 1.

D. Andreini, E Conte……Y Onuma and PW Serruys; JACC Imaging 2022

ORIGINAL RESEARCH

Comprehensive Evaluation of Left Ventricle Dysfunction by a New Computed Tomography Scanner

The E-PLURIBUS Study

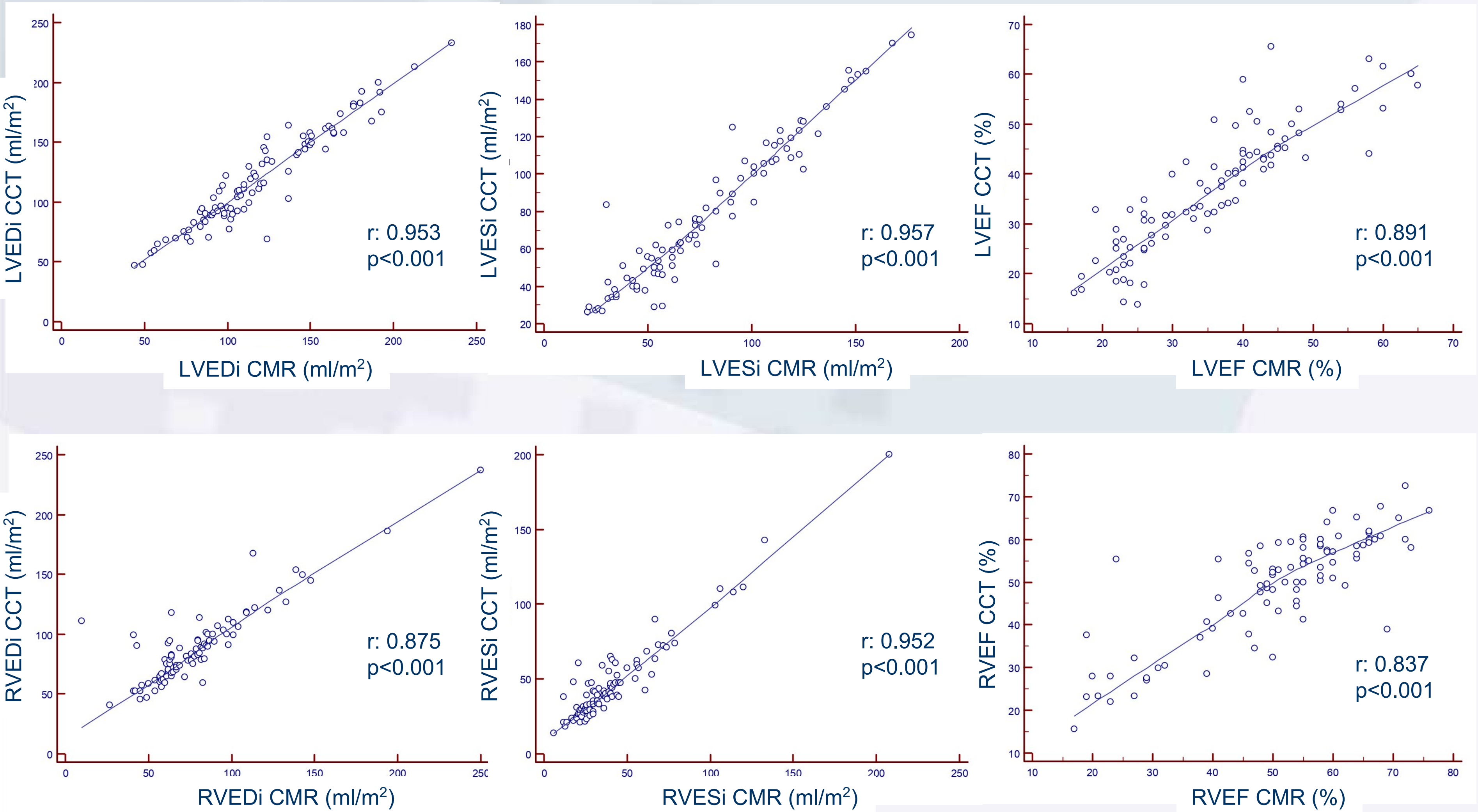
TABLE 2 Territory- and Patient-Based Analysis of Myocardial Fibrosis (All Fibrosis Subtypes)

n	TN	TP	FN	FP	Sn (95% CI)	Sp (95% CI)	NPV (95% CI)	PPV (95% CI)	Accuracy (95% CI)
Territory-based analysis with nonevaluable segments censored as negative (all fibrosis CCT vs CMR)									
1,598	1,196	319	45	38	87.6 (83.8-90.8)	96.9 (95.9-97.8)	96.3 (95.3-97.2)	89.3 (85.9-92.1)	94.8 (93.6-95.8)
Territory-based analysis excluding nonevaluable segments (all fibrosis CCT vs CMR)									
1,544	1,152	319	35	38	90.1 (86.5-93)	96.8 (95.6-97.3)	97.1 (96-97.8)	89.4 (85.9-92.1)	95.3 (94.1-96.3)
Patient-based analysis (all fibrosis CCT vs CMR)									
94	25	59	9	1	86.7 (76.3-93.7)	96.2 (80.4-99.9)	73.5 (60.1-83.6)	98.3 (89.6-99.8)	89.4 (81.3-97.8)

CMR = cardiac magnetic resonance; FN = false negative; FP = false positive; NPV = negative predictive value; PPV = positive predictive value; Sn = sensitivity; Sp = specificity; TN = true negative; TP = true positive; other abbreviation as in Table 1.

D. Andreini, E Conte…….Y Onuma and PW Serruys; JACC Imaging 2022

Correlation between left and right ventricle end-diastolic and end-systolic volume and EF measured at CCT and CMR.



JACC: CARDIOVASCULAR IMAGING
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VOL. ■, NO. ■, 2019

ORIGINAL RESEARCH

CMR for Identifying the Substrate of Ventricular Arrhythmia in Patients With Normal Echocardiography

Daniele Andreini, MD, PhD,[a,b] Antonio Dello Russo, MD, PhD,[a] Gianluca Pontone, MD, PhD,[a] Saima Mushtaq, MD,[a] Edoardo Conte, MD,[a] Marco Perchinunno, MD,[c] Marco Guglielmo, MD,[a] Ana Coutinho Santos, MD,[d] Marco Magatelli, MD,[e] Andrea Baggiano, MD,[a] Simone Zanchi, MD,[a] Eleonora Melotti, MD,[a] Laura Fusini, MD,[a] Paola Gripari, MD,[a] Michela Casella, MD, PhD,[a] Corrado Carbucicchio, MD,[a] Stefania Riva, MD,[a] Gaetano Fassini, MD,[a] Letizia Li Piani, MD,[a] Cesare Fiorentini, MD,[a,b] Antonio L. Bartorelli, MD,[a,f] Claudio Tondo, MD, PhD,[a,b] Mauro Pepi, MD[a]

Aim of this study is to prospectively evaluate whether in a large cohort of consecutive patients with significant VA assessed by an electrophysiology specialist and normal findings at echocardiography, cardiac MRI may identify patients with structural heart disease whose risk has been underestimated by a third-level transthoracic echocardiography.

JACC img 2019

Results

CMR was diagnostic of a definite structural cardiac disease in 241 patients (25.5%)

CENTRAL ILLUSTRATION Distribution of Different Structural Heart Diseases Diagnosed Using CMR Studies

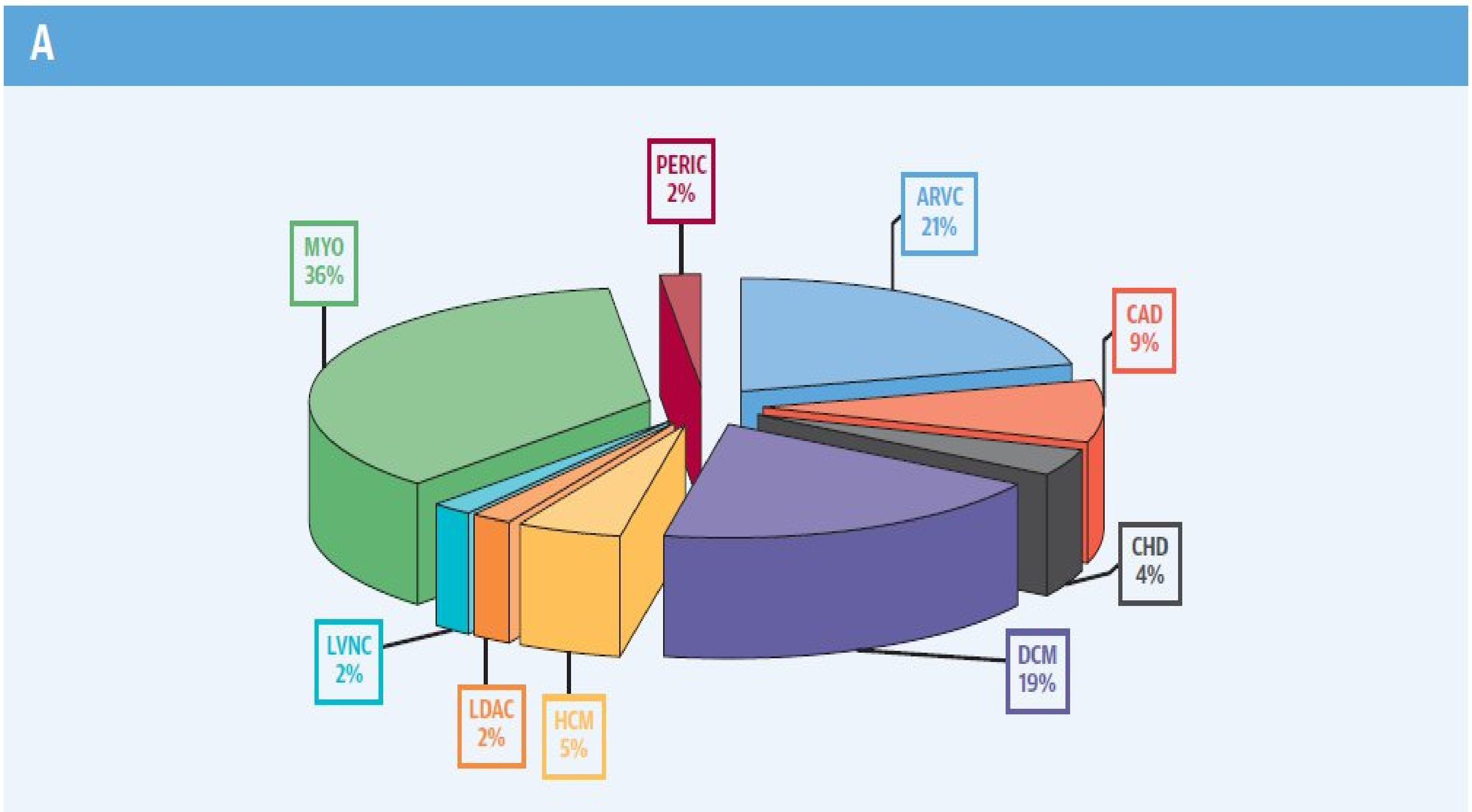
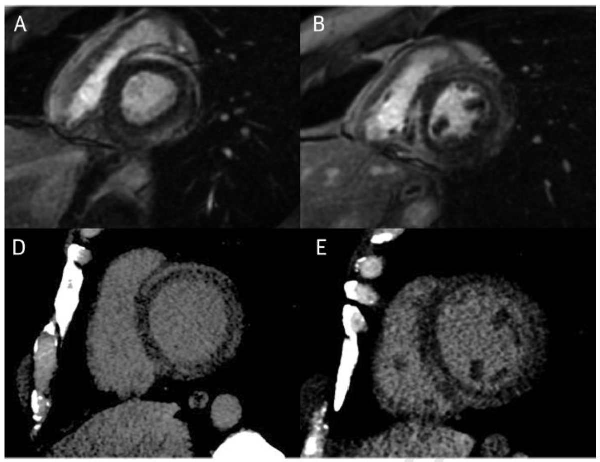
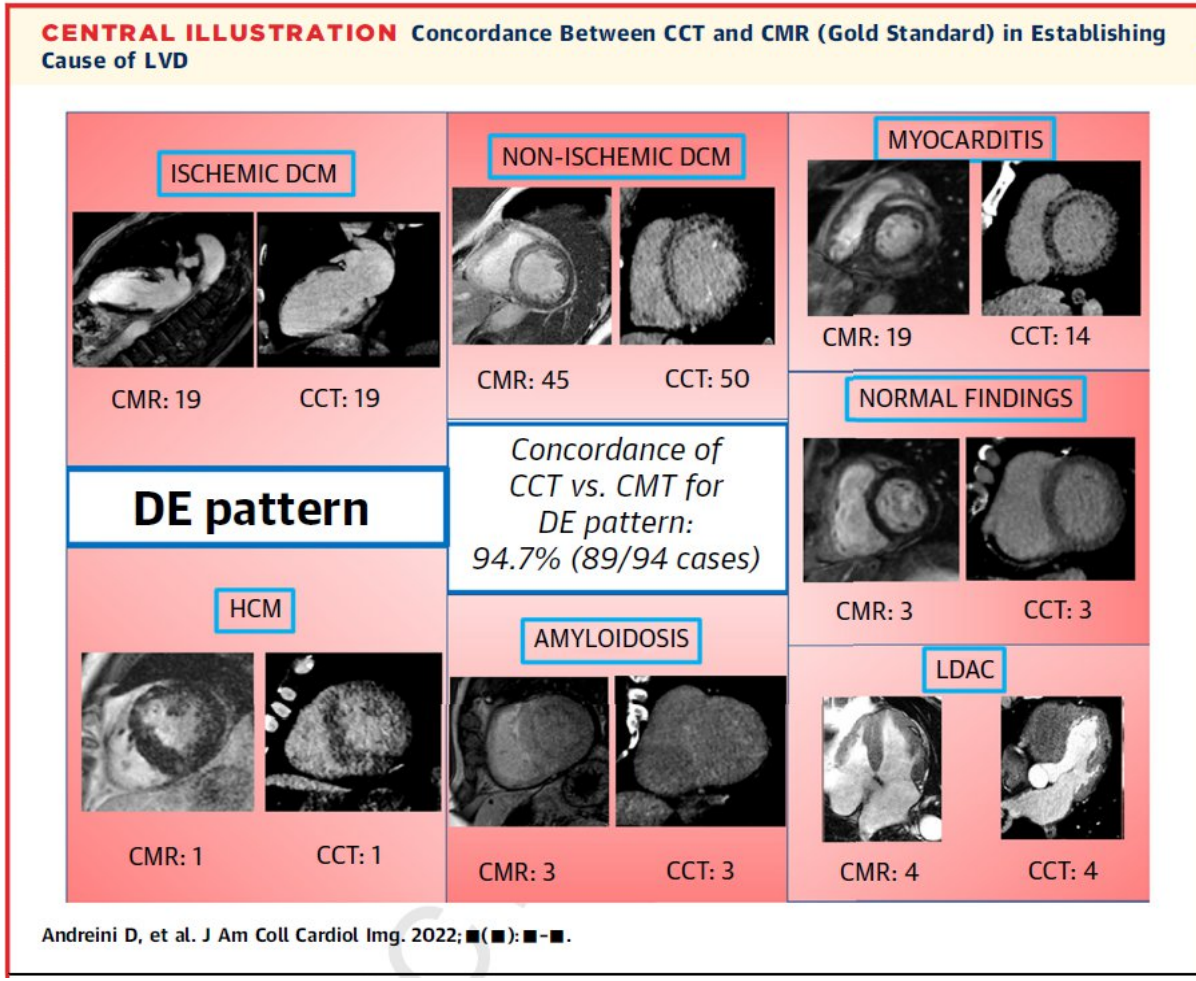


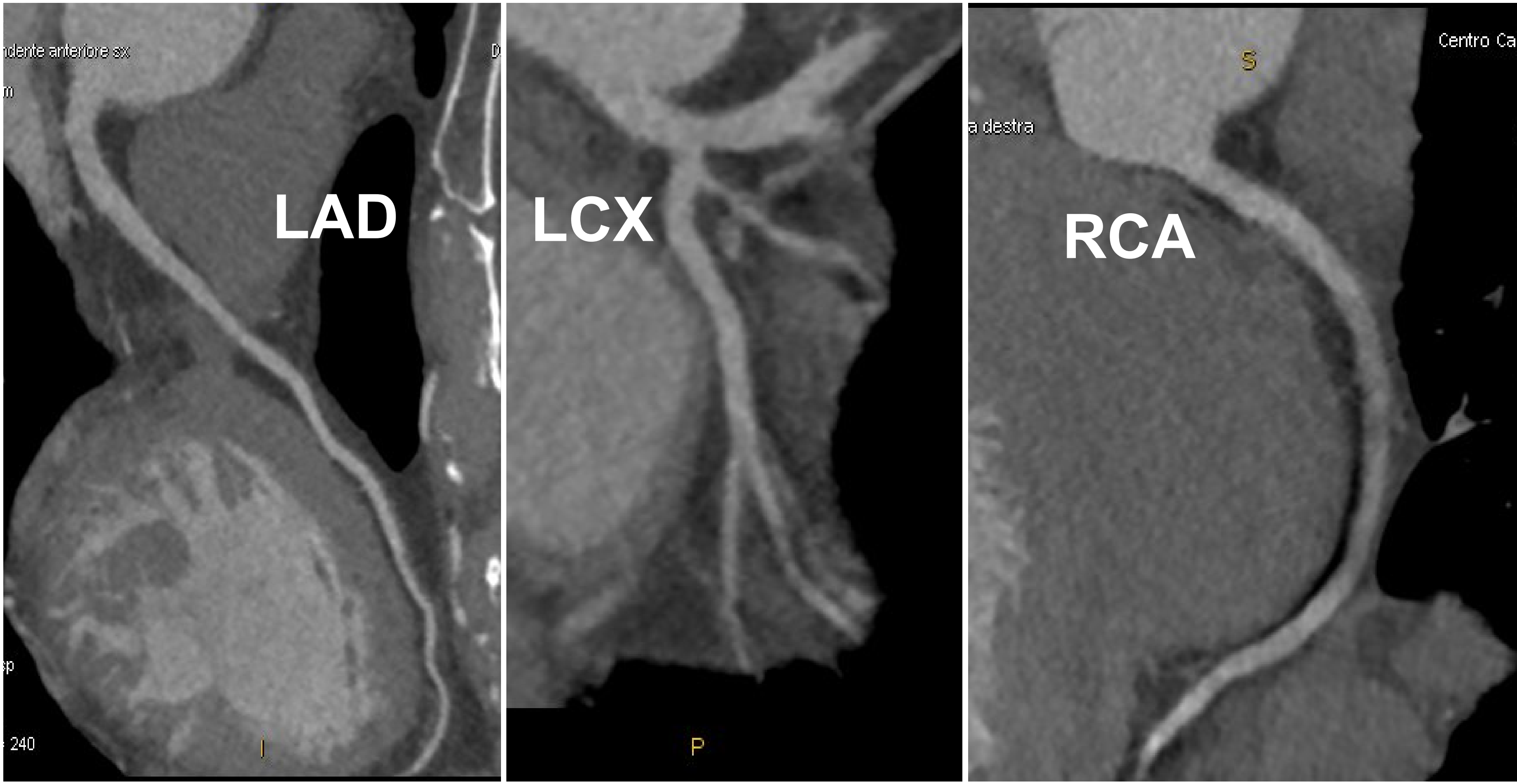
FIGURE 4 Case Example





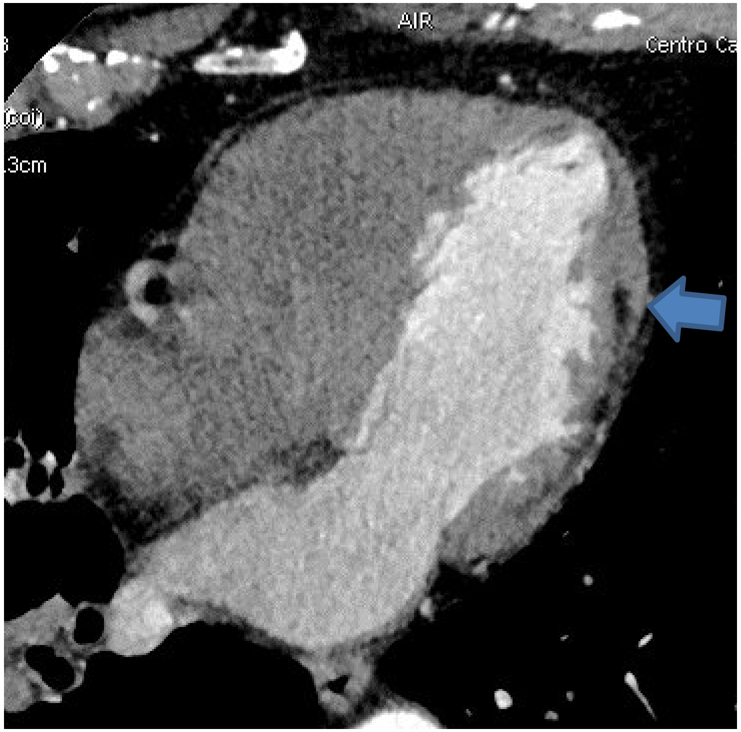
D. Andreini, E Conte…….Y Onuma and PW Serruys; JACC Imaging 2022

Master athletes (42 yo, cyclism), NSVT at ECG-Holter (PVB, RBBB morphology), TT echo normal.

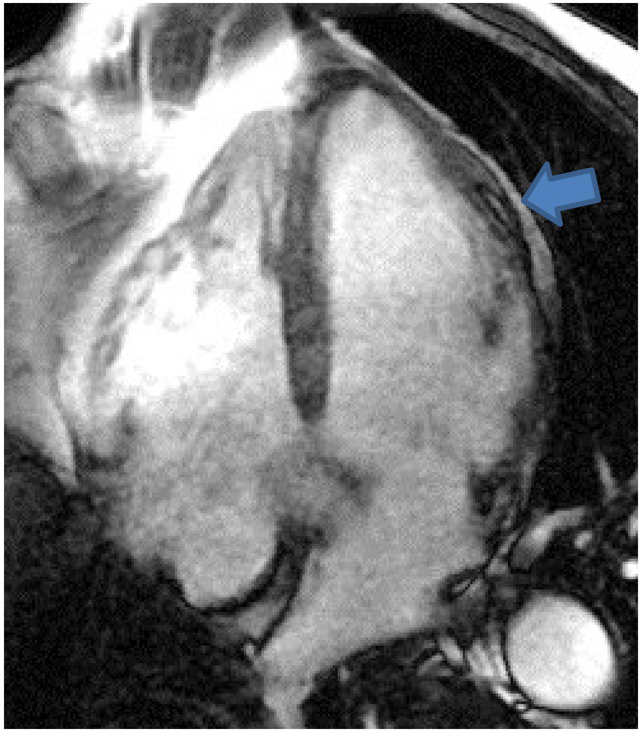


CTA vs CMR

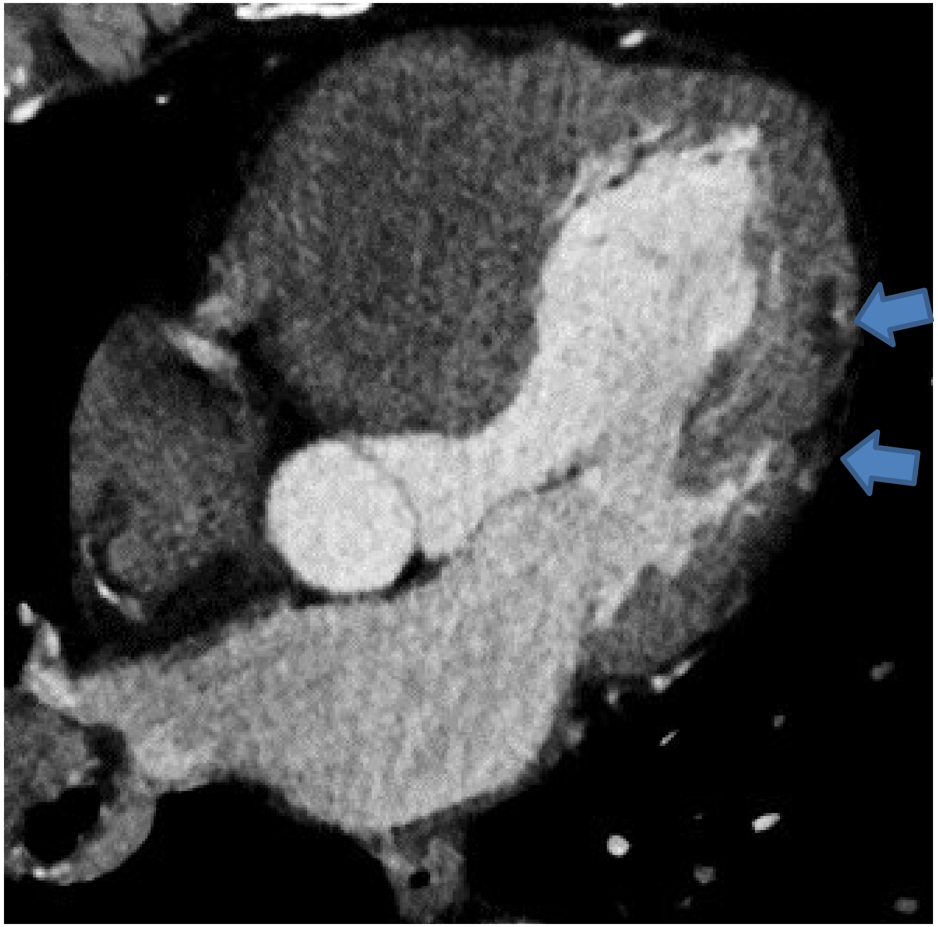
CTA



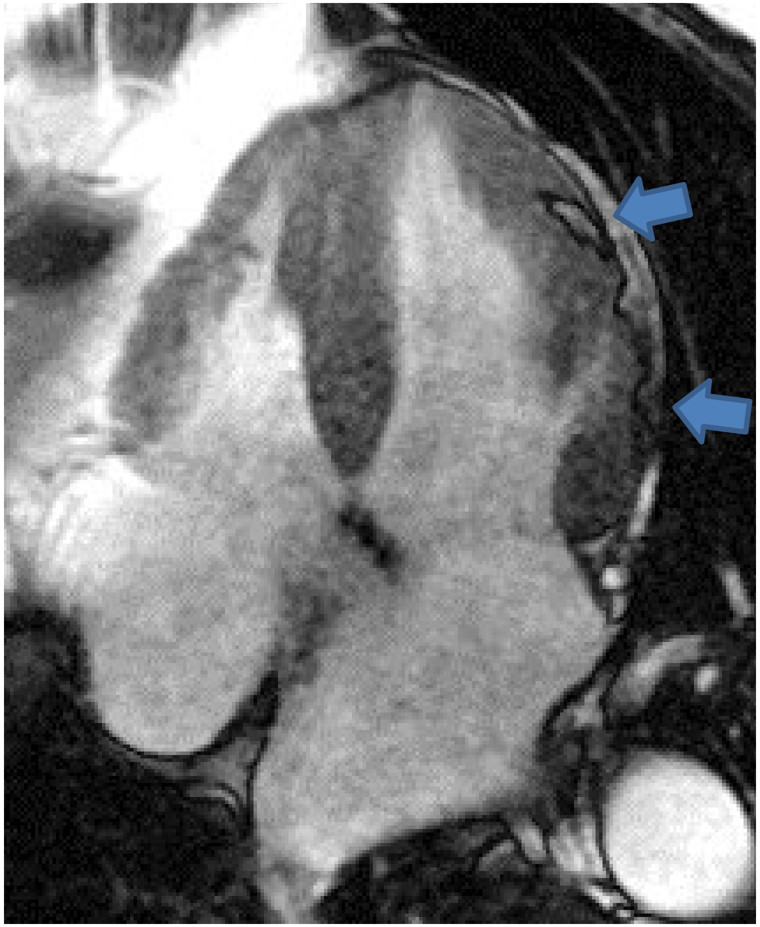
CMR



CTA



CMR



EMB: ARVD

Contents lists available at ScienceDirect

Journal of Cardiovascular Computed Tomography

journal homepage: www.elsevier.com/locate/jcct

Left-dominant arrhythmogenic cardiomyopathy diagnosed at cardiac CT

Edoardo Conte[a], Saima Mushtaq[a], Gianluca Pontone[a], Michela Casella[a], Antonio dello Russo[a], Mauro Pepi[a], Daniele Andreini[a,b,*]

[a] Centro Cardiologico Monzino, IRCCS, Milan, Italy
[b] Department of Clinical Sciences and Community Health, Cardiovascular Section, University of Milan, Milan, Italy

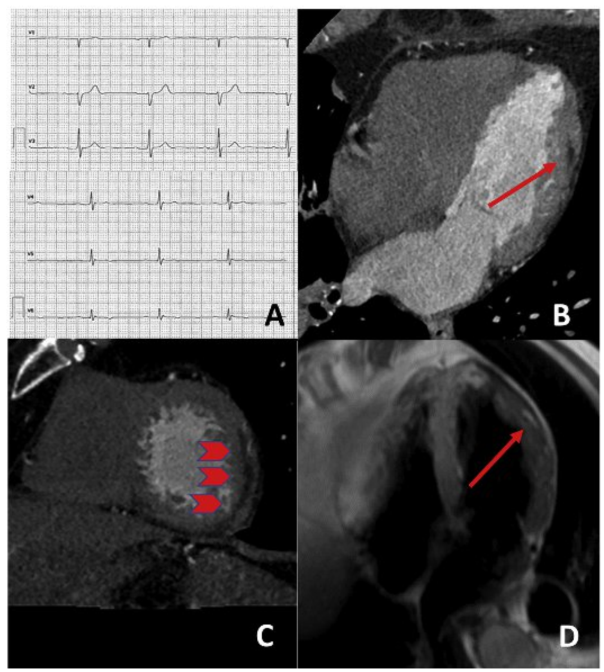


Fig. 1. In panel A an ECG with negative T-waves on V4-V6 leads is showed; in panel B and C fibro-adipose tissue infiltration of left ventricular lateral wall was evident both in left ventricle long axis and short axis view at cardiac CT (red arrows in Panel B and red arrows head in Panel C, respectively); these findings were subsequently confirmed at cardiac MRI (black-blood T1w images, red arrows in panel D). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

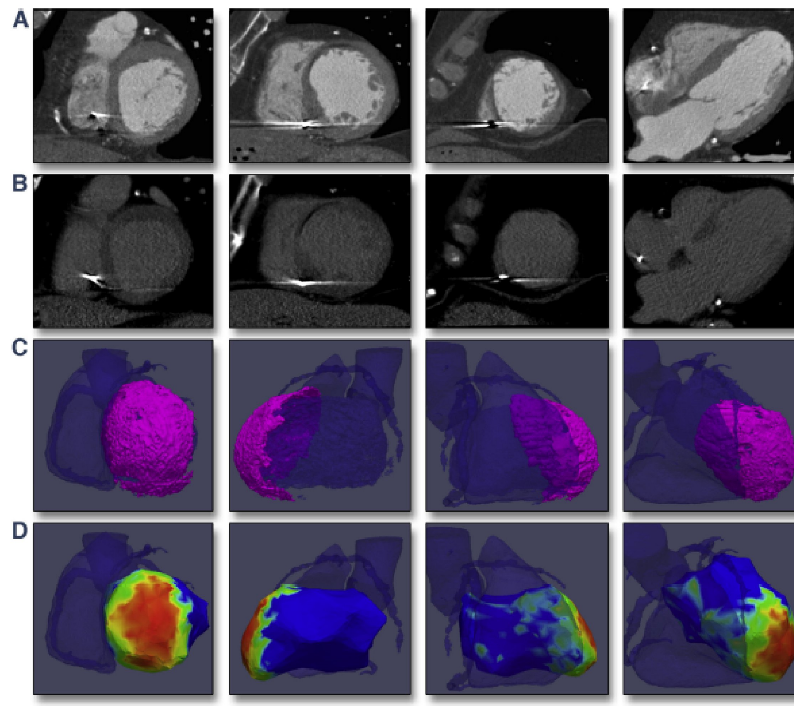
Cardiac CT for VT Ablation

Cardiac CT With Delayed Enhancement in the Characterization of Ventricular Tachycardia Structural Substrate

Relationship Between CT-Segmented Scar and Electro-Anatomic Mapping

Antonio Esposito, MD,[a,b] Anna Palmisano, MD,[a,b] Sofia Antunes, PhD,[c] Giuseppe Maccabelli, MD,[d] Caterina Colantoni, MD,[a,b] Paola Maria Vittoria Rancoita, PhD,[e] Francesca Baratto, MD,[d] Clelia Di Serio, PhD,[e] Giovanna Rizzo, MSc,[f] Francesco De Cobelli, MD,[a,b] Paolo Della Bella, MD,[d] Alessandro Del Maschio, MD[a,b]

FIGURE 2 CT Versus EAM Scar in a Patient With ICM



CT scans identified scars in 39 patients and defined left ventricular wall involvement and mural distribution

CT identified segments characterized by low voltages with good sensitivity (76%), good specificity (86%), and very high negative predictive value (95%).

This information may offer assistance to plan EAM and RFCA procedures and is potentially suitable for EAM-imaging integration.

J Am Coll Cardiol Img 2016;9:822–32

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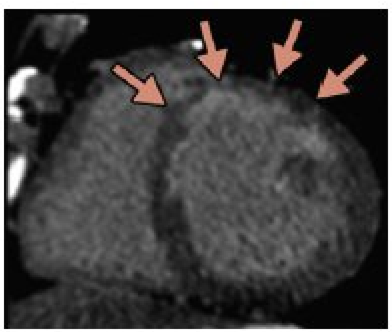
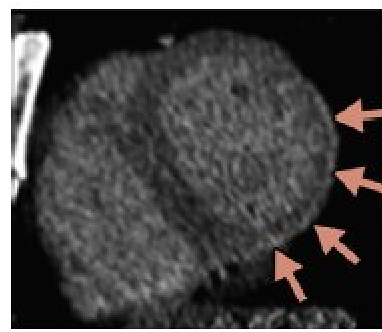
Scars With Subendocardial Distribution at CT

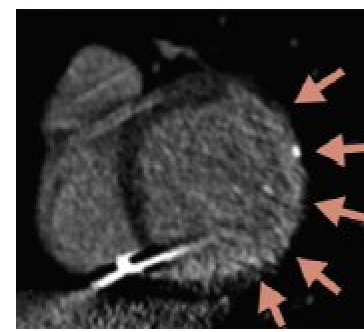


Scars With Mesocardial Distribution at CT

Scars With Subepicardial Distribution at CT



Scars With Transmural Distribution at CT

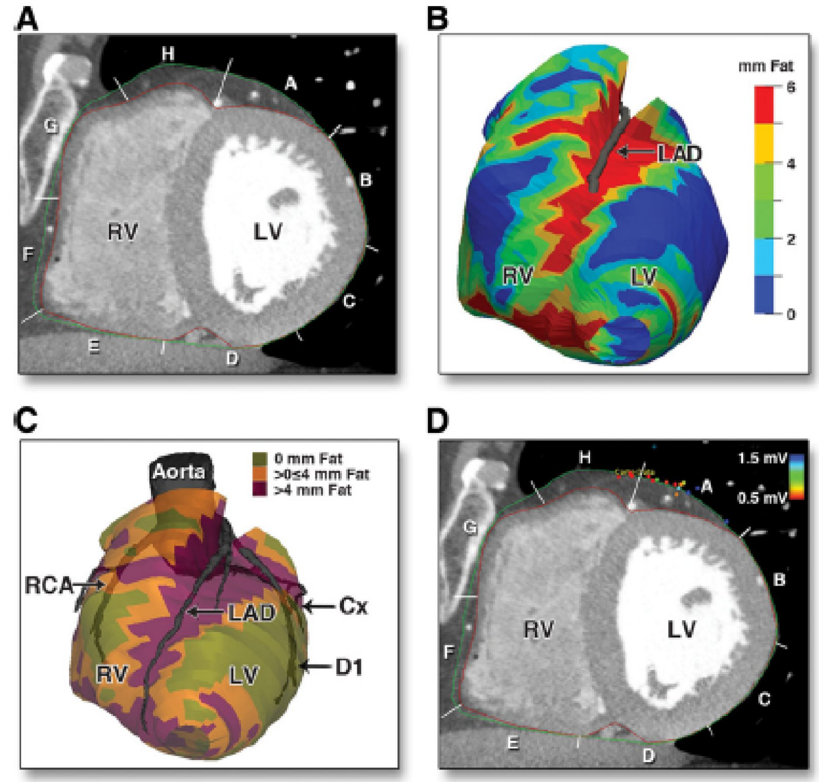


Cardiac CT for VT Ablation

Real-Time Integration of MDCT-Derived Coronary Anatomy and Epicardial Fat

Impact on Epicardial Electroanatomic Mapping and Ablation for Ventricular Arrhythmias

Carine F. van Huls van Taxis, MD,* Adrianus P. Wijnmaalen, MD, PHD,* Sebastiaan R. Piers, MD,* Rob J. van der Geest, PHD,† Martin J. Schalij, MD, PHD,* Katja Zeppenfeld, MD, PHD*



In 28 pts image co-registration with electroanatomical mapping was successful and accurate in all patients (position error 2.8 ± 1.3 mm).

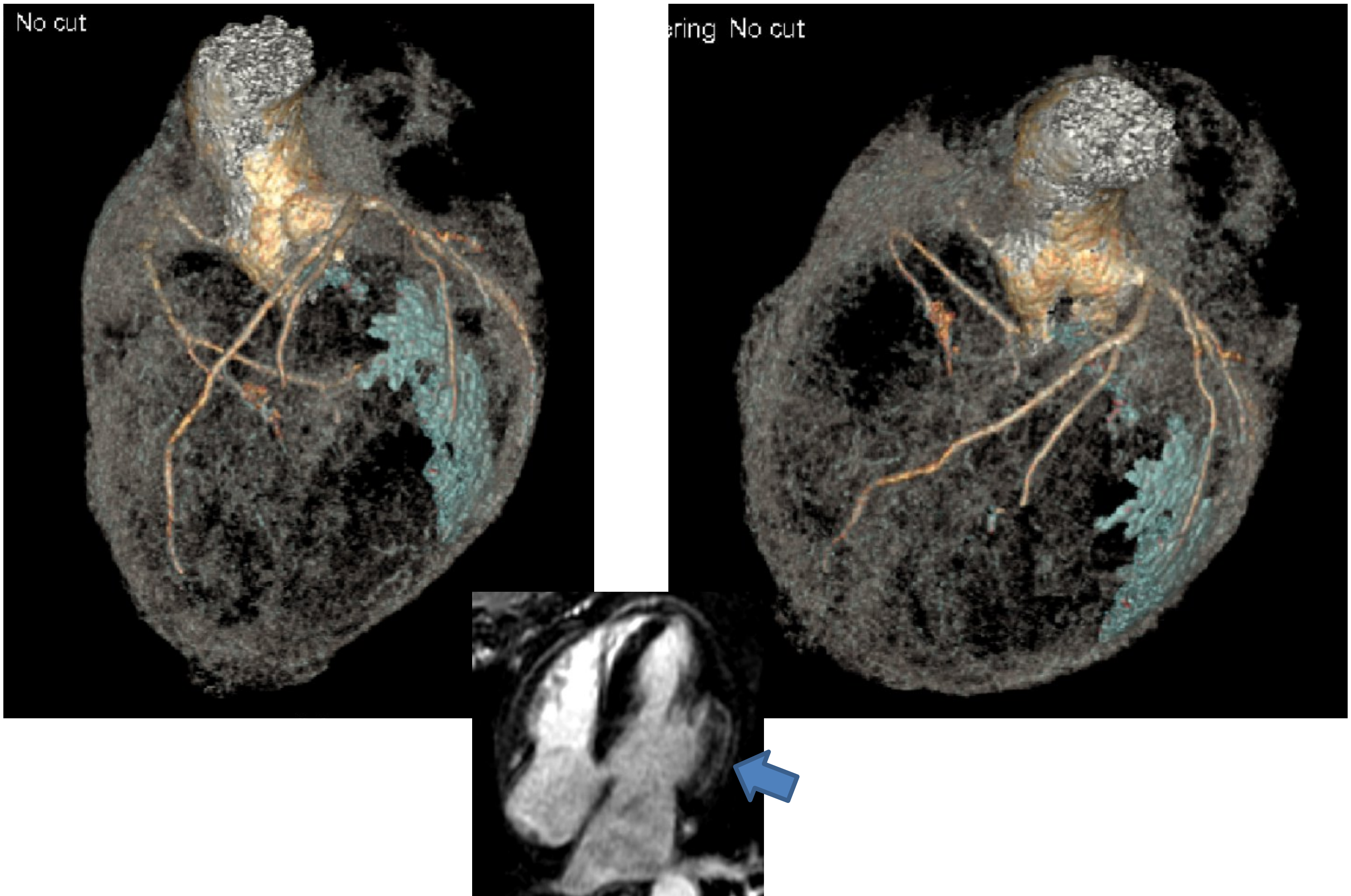
At sites without evidence for scar, epicardial bipolar voltage decreased significantly ($p < 0.001$) with increasing fat thickness

Epicardial fat >7 mm and the presence of coronary arteries are important reasons for epicardial ablation failure.

Visualization of fat thickness during the procedure may facilitate interpretation of bipolar electrograms and identification of ineffective ablation sites.

J Am Coll Cardiol Img 2013;6:42–52

Coronary arteries + epicardial fat + scar: fusion imaging with EAM



Contents lists available at ScienceDirect

Journal of Cardiovascular Computed Tomography

journal homepage: www.JournalofCardiovascularCT.com

Live integration of comprehensive cardiac CT with electroanatomical mapping in patients with refractory ventricular tachycardia

Edoardo Conte [a,b,1], Corrado Carbucicchio [a,1], Valentina Catto [a], Adriano Nunes Kochi [a], Saima Mushtaq [a], Pasquale Giovanni De Iuliis [c], Marco Guglielmo [a], Andrea Baggiano [a,b], Tommaso Sattin [a], Gianluca Pontone [a], Mauro Pepi [a], Claudio Tondo [a,d,2], Daniele Andreini [a,e,*,2]

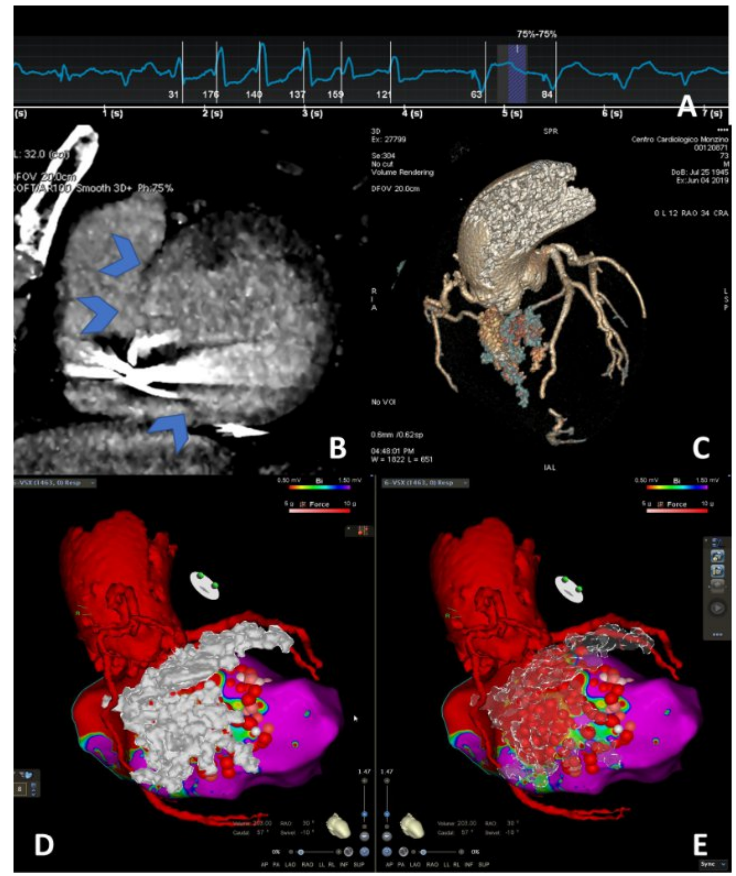
Table 2: Diagnostic Accuracy for fibrosis subtypes by CCT vs EAM with non-evaluable segments censored as negative.

Segments-based analysis for identification of ischemic pattern fibrosis (CCT vs EAM)

n	TN	TP	FN	FP	Sn (95%CI)	Sp (95%CI)	NPV (95%CI)	PPV (95%CI)	Accuracy (95%CI)
323	270	33	14	6	70.2 (55.1-82.6)	97.8 (95.3-99.1)	95.1 (92.6-96.8)	84.6 (70.9-92.6)	93.8 (90.6-96.2)

Segment-based analysis for identification for non-ischemic pattern fibrosis (CCT vs EAM)

n	TN	TP	FN	FP	Sn (95%CI)	Sp (95%CI)	NPV (95%CI)	PPV (95%CI)	Accuracy (95%CI)
323	221	70	19	13	78.7.7 (68.7-86.6)	94.4 (90.6-97.1)	92.1 (88.6-94.5)	84.4 (75.8-90.3)	90.1 (86.3-93.1)



E Conte, C Carbucicchio,…..C Tondo, D Andreini et al., JCCT 2022

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State of the Art in Cardiovascular CT'

State of the art paper: Cardiovascular CT for planning ventricular tachycardia ablation procedures

Edoardo Conte [a], Saima Mushtaq [a], Corrado Carbucicchio [a], Gaia Piperno [b], Valentina Catto [a], Maria Elisabetta Mancini [a], Alberto Formenti [a], Andrea Annoni [a], Marco Guglielmo [a], Andrea Baggiano [a], Giuseppe Muscogiuri [a], Marta Belmonte [a], Federica Cattani [c], Gianluca Pontone [a], Jereczek-Fossa Barbara Alicja [c,d], Roberto Orecchia [e], Claudio Tondo [a,f], Daniele Andreini [a,f,*]

Table 1
Cardiac CT vs Cardiac MR for evaluation of VT anatomical substrate.

	MRI	CT
Radiation dose	None	Could be high especially if biventricular volume and function are evaluated
ICD related artifacts	Extensive	Present but of mild consequence for images evaluability
Availability	Moderate	Wide
Safety for potentially unstable patients	Could be limited as ICD therapy for tachyarrhythmias must be switched off during MRI	Widely used in the emergency setting
Validation of myocardial fibrosis assessment	Extensive	Mild

Available literature on the use of Cardiac CT for the preparation and planning of VT radiofrequency catheter ablation.

Author	Year	N	Clinical setting	Type of CT scanner	Study Design	Primary Endpoint/ Objective	Main findings
van Huls van Taxis CF et al.	2013	28	Stable VT	64-s and 320-s CT	Prospective	To integrate CT-derived coronary anatomy and epicardial fat with EAM for VT ablation	Real-time image integration of pre-acquired MDCT information is feasible and accurate; Epicardial fat >7 mm and the presence of coronary arteries are important reasons for epicardial ablation failure
Esposito A et al.	2016	39	Stable VT	64-s CT	Prospective	To compare the characterization of VT Structural Substrate at DE-Cardiac CT vs. EAM	Overall segmental concordance between CT and EAM was good
Esposito A et al.	2018	48	Recurrent VT	64-s CT	Prospective	To assess Remote Myocardium Heterogeneity Using Texture Analysis of Late Iodine Enhancement at Cardiac Computed CT	Myocardial heterogeneity at identified with CT was associated with different patterns of structural remodeling characterizing patients with VT of different etiology
Jing Tian et al.	2010	11	Stable VT	64-s CT (no late enhancement evaluated)	Prospective	To compare the CT-derived characteristics of scar with standard voltage mapping	Three-dimensional reconstruction integrated into the clinical mapping system allowed prediction of homogenous abnormal voltage (<1.5 mV) in 81.7% of analyzed segments
Yuki Komatsu et al.	2013	13	Stable VT (only IHD)	64-s CT (no late enhancement evaluated)	Prospective	To quantify the relationship between the regional myocardial wall thinning (WT) at CT and voltage-defined scar	A significant correlation was found between the areas of WT < 5 mm and endocardial low voltage (correlation-R = 0.82; P = 0.001), but no such correlation was found in the epicardium.

VT: ventricular tachycardia; IHD: ischemic heart disease; EAM: electroanatomical mapping.

JCCT 2020

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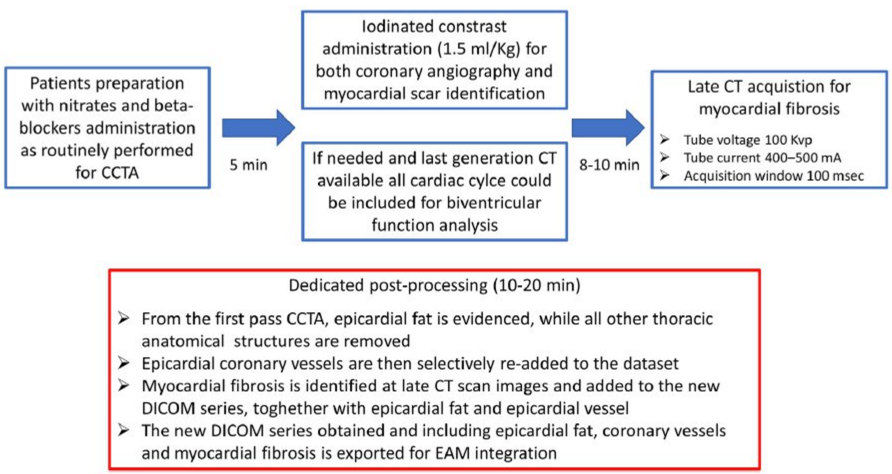

Fig. 1. Acquisition protocol for substrate evaluation.

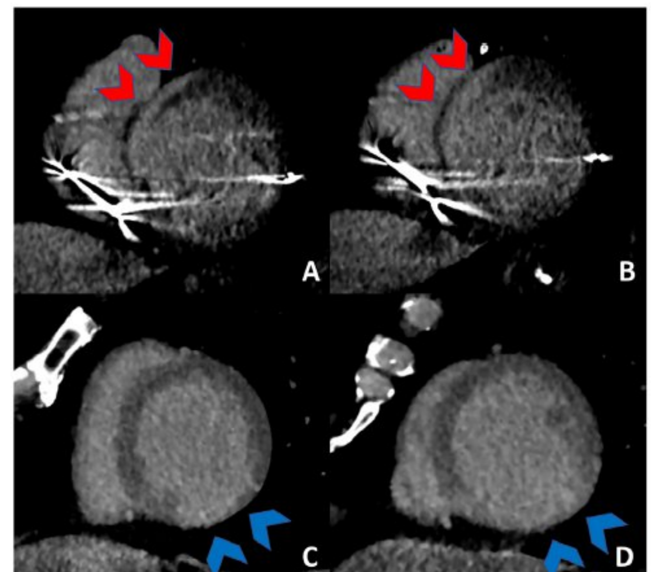

Fig. 2. Non-ischemic and ischemic myocardial scar patterns defined by CT Myocardial fibrosis with non-ischemic pattern at basal septum is well evident in panel A and B at late-phase post-contrast CT images; similarly, in a different subject (panel C and D), an ischemic pattern of infero-posterolateral wall fibrosis was identified with CT. Myocardial fibrosis at CT is defined by identification of hyperdense area into left ventricle wall (>6SD from HU at remote myocardium) and/or myocardial thinning (less than 5 mm of thickness).

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Fig. 3. CT for the thoracic anatomy CT is able to provide pre-procedural guidance for the approach to percutaneous subxiphoid pericardial access. In panel A cardiac profile in axial plane; in panel B and C sagittal plane in correspondence of subxiphoid process and of potential site for safe epicardial approach (red circle), respectively. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

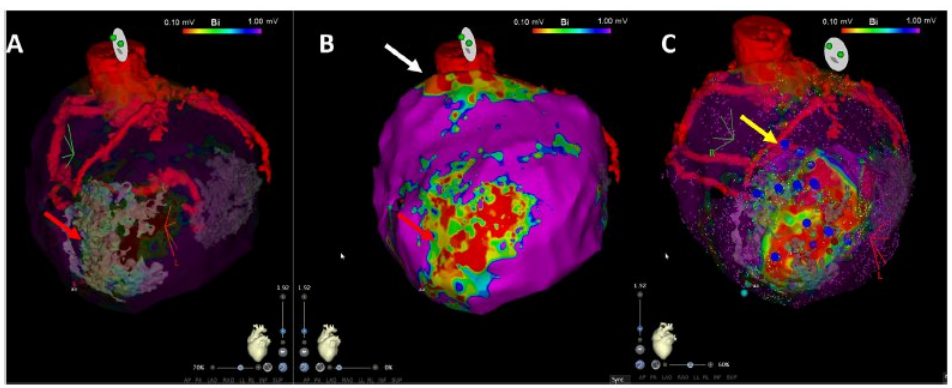

Fig. 4. Image integration In panel A, CT data for coronary anatomy and fibrosis are integrated with electroanatomical mapping (panel B), after dedicated onsite manual post-processing for coronary anatomy and myocardial fibrosis export, performed by expert cardiac imager. In panel C, representation of RFCA guided by both electrophysiological and anatomical substrate (blue spots, represent site of RFCA). In all panels, EAM mapping showed normal myocardial area in purple while dense scars were represented in red; it is well evident the optimal overlapping between CT and EAM in the identification of scar tissue at LV apex. Of note, ablation target (apical portion of the left ventricle) in this case was selected after both EAM and CT findings were taken into consideration. More precisely, EAM analysis evidenced pathological area at the base of left ventricle that was not evidenced at CT (white arrow in panel B), while both techniques identified apical scar (red arrows in panel A and B) that was then selected as the most appropriate ablation site. Of interest ablation target site was extended in this case beyond EAM pathological area to cover myocardial fibrosis identified at CT (yellow arrow in panel C), possibly improving long term success of the ablation procedure. . (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

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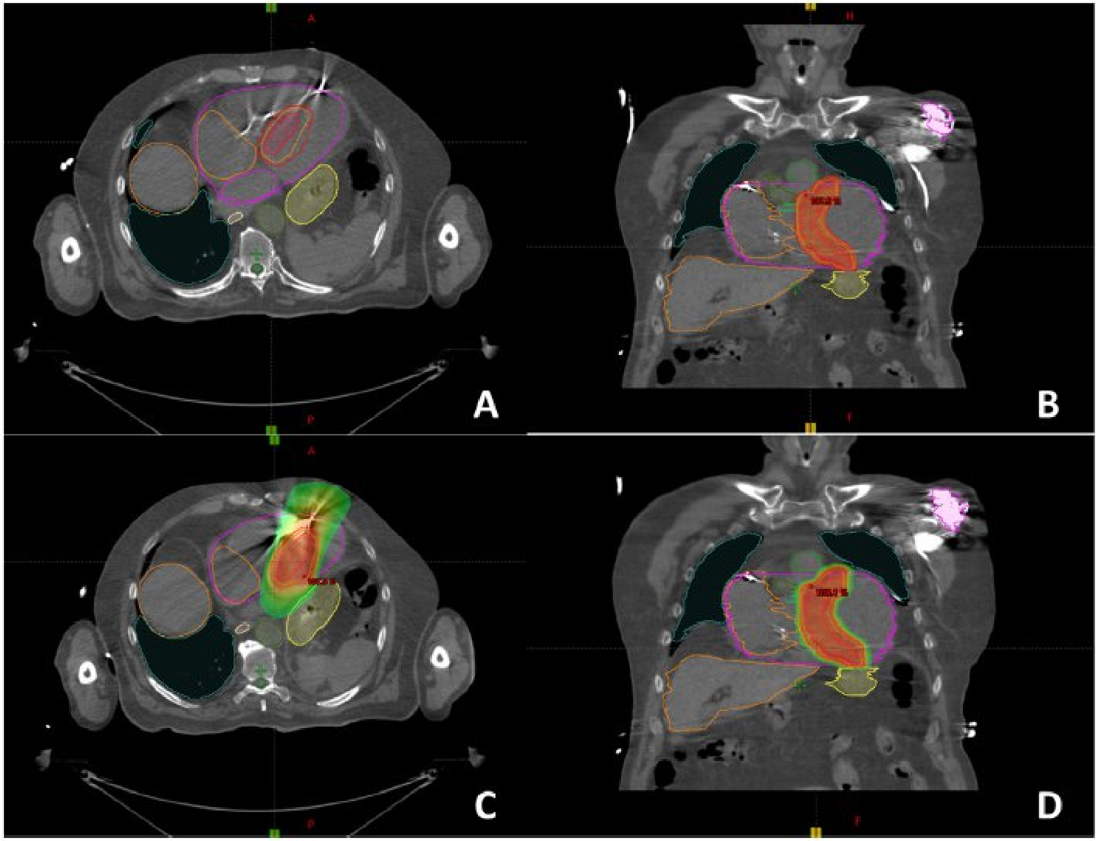

Fig. 5. External radioablation In all panels area of fibrosis were drawn on simulation CT to plan radio-ablation. Surrounding structure are highlighted to avoid unnecessary radiation exposure.

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Available literature on external beam radiotherapy ablation of VT.

Author	Year	N	Clinical setting	Study Design	Primary Endpoint/Objective	Main findings	Follow-up	Ref
Phillip S. Cuculich et al.	2017	5	treatment refractory VT	Prospective study	To describe safety and efficacy of external radiotherapy ablation	After the 6-week blanking period, there were 4 episodes of ventricular tachycardia over the next 46 patient-months, for a reduction from baseline of 99.9% that occurred in all 5 patients.	12 months	74
Clifford G. Robinson et al.	2018	19	treatment-refractory VT	Prospective Phase I/II study	Primary safety end point was treatment-related serious adverse events in the first 90 days. The primary efficacy end point was any reduction in VT episodes or any reduction in PVC burden comparing the 6 months before and after treatment	In the first 90 days, 2/19 patients (10.5%) developed a treatment-related serious adverse event. The median number of VT episodes was reduced from 119 (range, 4–292) to 3 (range, 0–31; P < 0.001)	12 months	73
Radek Neuwirth et al.	2019	10	treatment-refractory VT	Prospective study	Efficacy of external beam radiotherapy ablation determined as: VT burden, time to recurrence of ICD therapy, time to electric storm after 90-day blanking period, and time to death.	VT burden was reduced by 87.5% compared with baseline (P = 0.012); three patients suffered non-arrhythmic deaths. After the blanking period, VT recurred in eight of 10 patients (mean time to first ICD shock was 21 months)	28 months	75
Carola Gianni et al.	2020	5	treatment-refractory VT	Prospective study	To report clinical outcomes of external radiotheraphy in terms of: need of antharrhytmic therapy; appropriate ICD treatment, number VT episodes	All patients experienced clinically significant mid- to late-term ventricular arrhythmia recurrence	12 months	76

VT: ventricular tachycardia; ICD: internal cardiac defibrillator; PVC: premature ventricular complexes.

Contents lists available at ScienceDirect

Journal of Cardiovascular Computed Tomography

journal homepage: www.JournalofCardiovascularCT.com

State of the Art in Cardiovascular CT'

State of the art paper: Cardiovascular CT for planning ventricular tachycardia ablation procedures

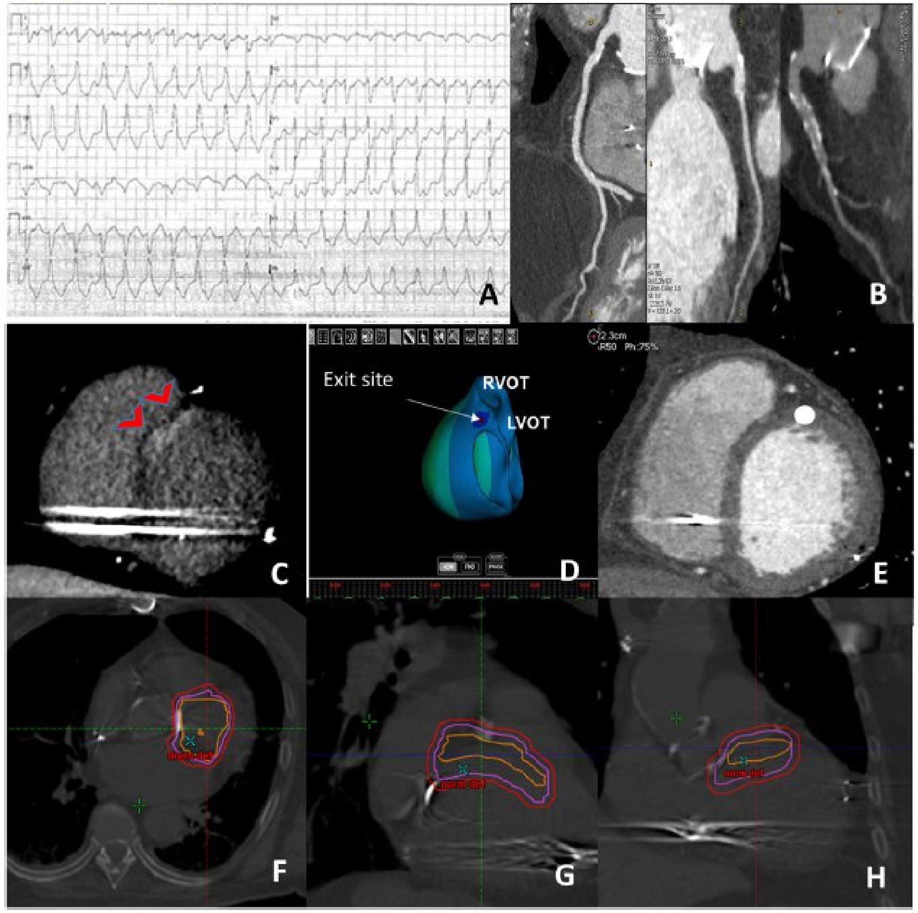
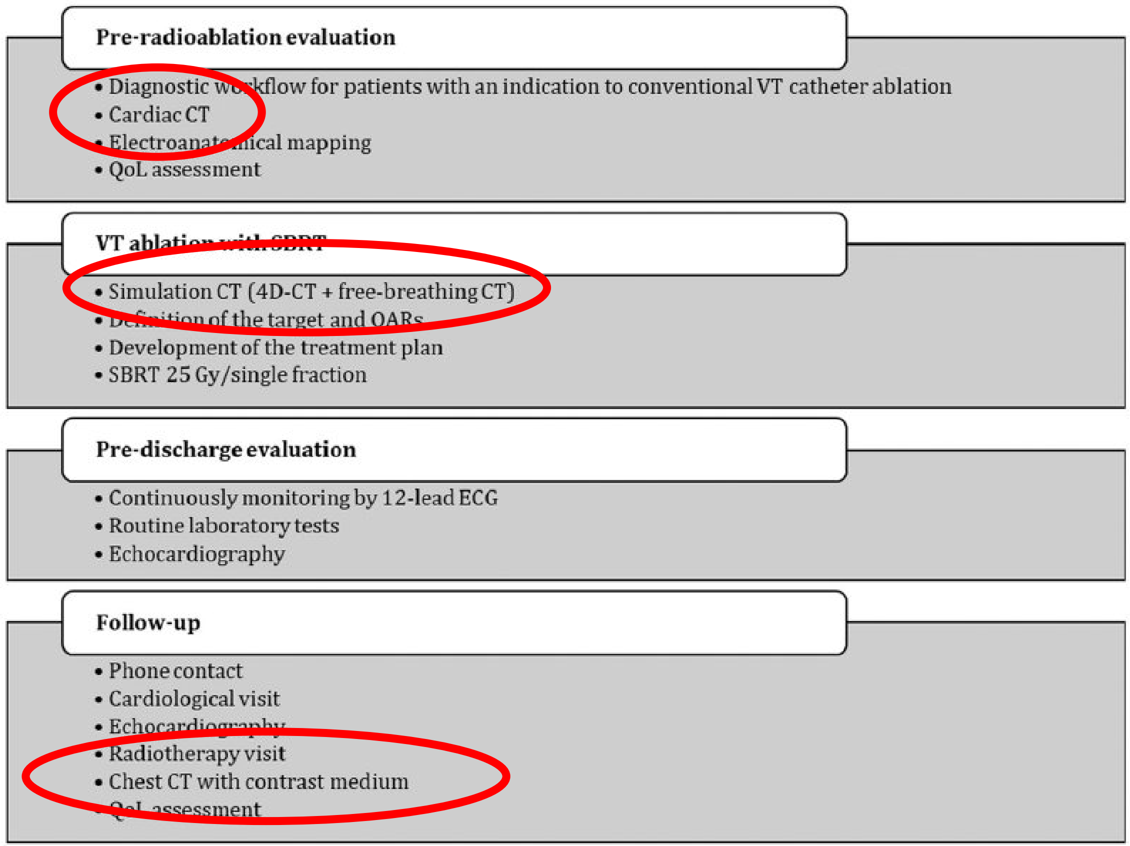


Fig. 6. (Central Illustration) A 72-years old man with non-ischemic dilated CM with severe reduction of ejection fraction and previous aortic and mitral valve surgical replacement with mechanical prosthesis, admitted for frequent ventricular tachycardia (VT) with possible basal septal origin (panel A). Invasive RFCA was contra-indicated by the presence of mechanical heart valves, previous left ventriculoplasty with diffuse pericardial adherence and considered at very high risk. Thus (SBRT) was planned after cardiac CT that excluded severe coronary stenosis (panel B) and identified non-ischemic myocardial fibrosis at basal anterior-septum (panel C), that was concordant with non-invasive electrophysiological study findings (panel D), performed using a multichannel Amycard 01C EP system (EP Solutions SA, Switzerland) that enabled to automatically import information on VT breakthrough (exit site of VT) on CT images (panel E). All information obtained, both at CT and at non-invasive electrophysiological study, were used to identify target volume for SBRT (shown in panels F-G-H). After 6 months from CT-guided radio-ablation, no relevant clinical events were recorded, with no need of hospital admission due to VT relapse.

Journal of Interventional Cardiac Electrophysiology
https://doi.org/10.1007/s10840-020-00855-2

STRA-MI-VT (STereotactic RadioAblation by Multimodal Imaging for Ventricular Tachycardia): rationale and design of an Italian experimental prospective study

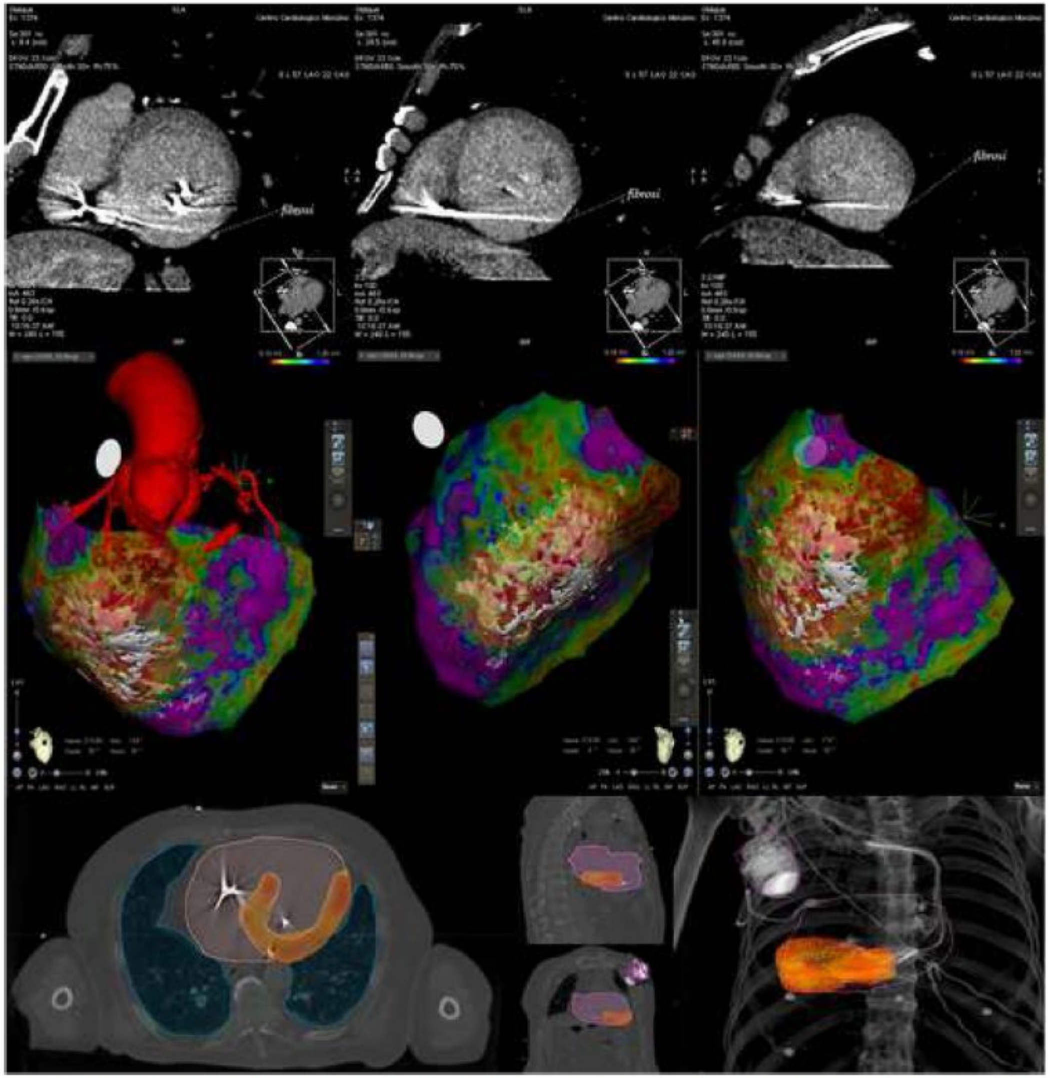
C. Carbucicchio[1] · B. A. Jereczek-Fossa[2,3] · D. Andreini[4,5] · V. Catto[1] · G. Piperno[3] · E. Conte[4] · F. Cattani[6] · E. Rondi[6] · S. Vigorito[6] · C. Piccolo[6,7] · A. Bonomi[8] · A. Gorini[2,9] · M. Pepa[3] · S. Mushtaq[4] · G. Fassini[1] · M. Moltrasio[1] · F. Tundo[1] · G. Marvaso[2,3] · F. Veglia[8] · R. Orecchia[10] · E. Tremoli[11] · C. Tondo[1,5]



J of interventional cardiac electrophysiology 2019

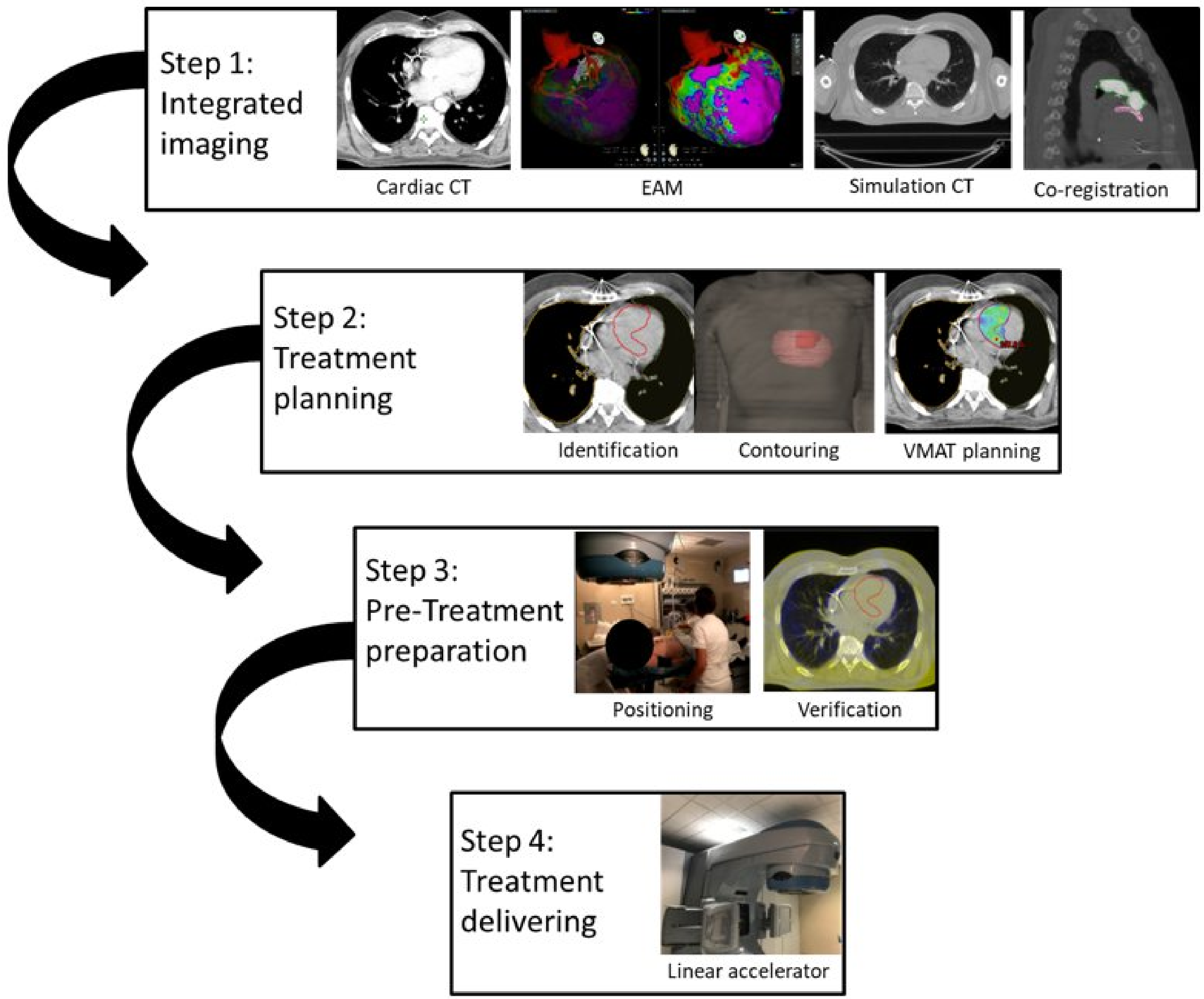
Diagnostic imaging obtained by cardiac CT combined with EAM to guide patient's SBRT treatment

J Interv Card Electrophysiol



J of interventional cardiac electrophysiology 2019

Figure 1 / Graphical abstract

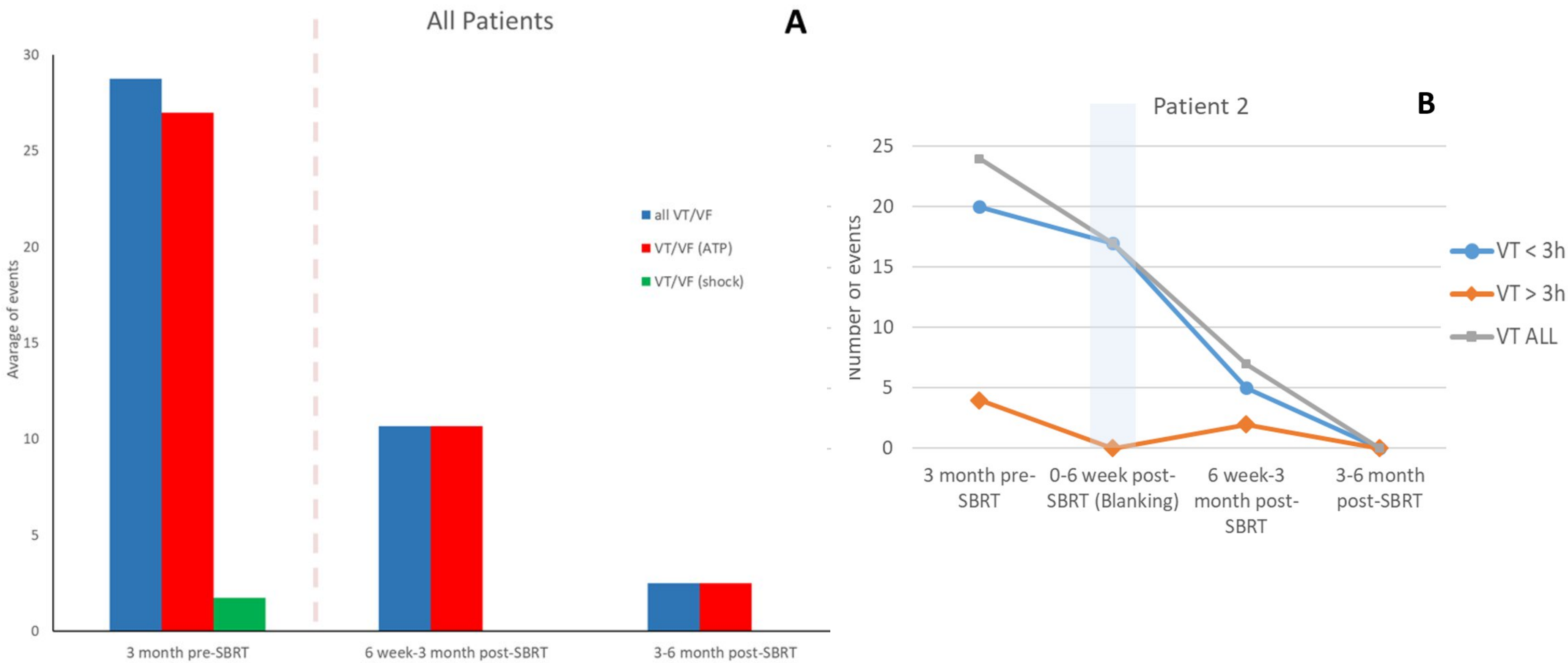


J of interventional cardiac electrophysiology 2019

Journal of Interventional Cardiac Electrophysiology (2021) 62:427–439
https://doi.org/10.1007/s10840-021-01060-5

Stereotactic radioablation for the treatment of ventricular tachycardia: preliminary data and insights from the STRA-MI-VT phase Ib/II study

Corrado Carbucicchio[1] · Daniele Andreini[2,3] · Gaia Piperno[4] · Valentina Catto[1] · Edoardo Conte[2] · Federica Cattani[5] · Alice Bonomi[6] · Elena Rondi[5] · Consiglia Piccolo[5] · Sabrina Vigorito[5] · Annamaria Ferrari[4] · Matteo Pepa[4] · Mattia Giuliani[7] · Saima Mushtaq[2] · Antonio Scarà[8] · Leonardo Calò[8] · Alessandra Gorini[7,9] · Fabrizio Veglia[6] · Gianluca Pontone[2] · Mauro Pepi[10] · Elena Tremoli[11] · Roberto Orecchia[12] · Giulio Pompilio[13,14] · Claudio Tondo[1,14] · Barbara Alicja Jereczek-Fossa[4,9]



ClinicalTrials.gov PRS
Protocol Registration and Results System

ID: R 918/19 - CCM968 STereotactic RadioAblation by Multimodal Imaging for VT (STRA-MI-VT) [NCT ID not yet assigned]

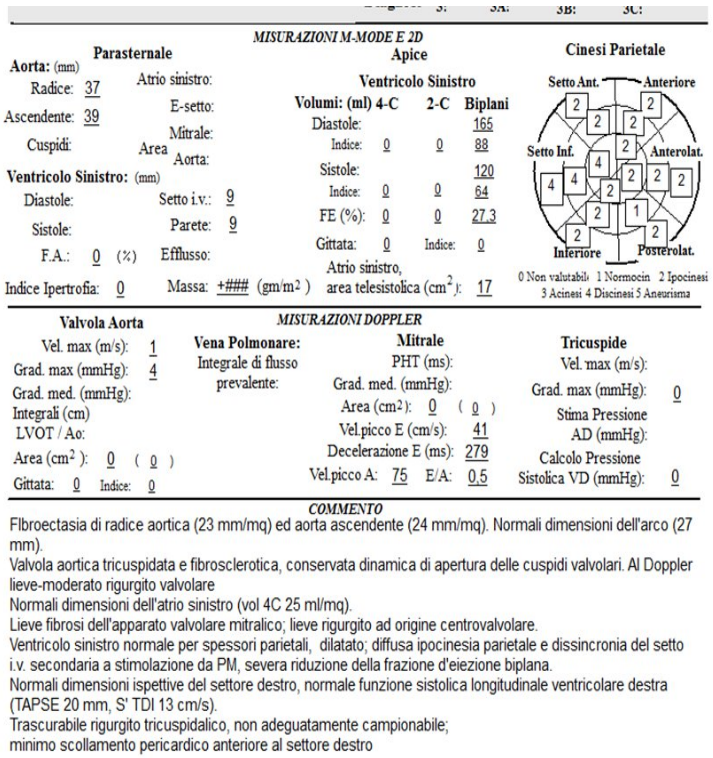
Carbucicchio C, Andreini D et al. JICE 2021

Clinical case: assessment of arrhytmic substrate with CCTA: Planning of VT ablation

Hystory

- Male 73 YO.
- DCM , non-ichemic form, HFrEF. ICD/CRT since 2010 (not MRI safe)
- Known since 2016 for VT storm.
- Recent admission of storm refractory to medical therapy
- June 2019 admitted in our Centre for ablation

TT
Echocardiography



3: 3A: 3B: 3C:

MISURAZIONI M-MODE E 2D

Parasternale

Aorta: (mm)
Radice: 37
Ascendente: 39
Cuspidi:

Atrio sinistro:
E-setto:
Area Mitrale:
Area Aorta:

Ventricolo Sinistro: (mm)
Diastole: Setto i.v.: 9
Sistole: Parete: 9
F.A.: 0 (%) Efflusso:
Indice Ipertrofia: 0 Massa: +### (gm/m2)

Apice

Ventricolo Sinistro

Volumi: (ml)	4-C	2-C	Biplani
Diastole:			165
Indice:	0	0	88
Sistole:			120
Indice:	0	0	64
FE (%):	0	0	27.3
Gittata:	0	Indice:	0

Atrio sinistro, area telesistolica (cm²): 17

Cinesi Parietale

Setto Ant. Anteriore Setto Inf. Anterolat. Inferiore Posterolat.

0 Non valutabil 1 Normocin 2 Ipocinesi 3 Acinesi 4 Discinesi 5 Aneurisma

MISURAZIONI DOPPLER

Valvola Aorta
Vel. max (m/s): 1
Grad. max (mmHg): 4
Grad. med. (mmHg):
Integrali (cm) LVOT / Ao:
Area (cm2): 0 (0)
Gittata: 0 Indice: 0

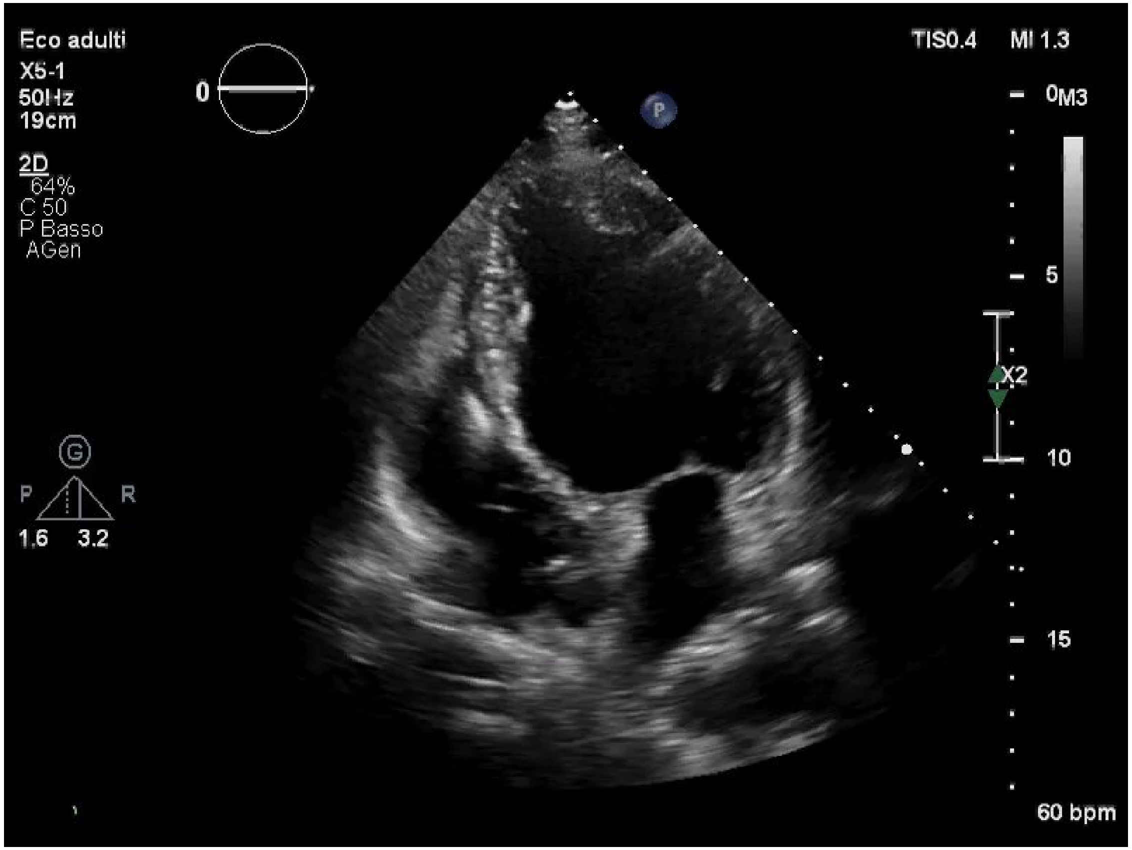
Vena Polmonare:
Integrale di flusso prevalente:

Mitrale
PHT (ms):
Grad. med. (mmHg):
Area (cm2): 0 (0)
Vel.picco E (cm/s): 41
Decelerazione E (ms): 279
Vel.picco A: 75 E/A: 0,5

Tricuspide
Vel. max (m/s):
Grad. max (mmHg): 0
Stima Pressione AD (mmHg):
Calcolo Pressione Sistolica VD (mmHg): 0

COMMENTO

FIbroectasia di radice aortica (23 mm/mq) ed aorta ascendente (24 mm/mq). Normali dimensioni dell'arco (27 mm).
Valvola aortica tricuspidata e fibrosclerotica, conservata dinamica di apertura delle cuspidi valvolari. Al Doppler lieve-moderato rigurgito valvolare
Normali dimensioni dell'atrio sinistro (vol 4C 25 ml/mq).
Lieve fibrosi dell'apparato valvolare mitralico; lieve rigurgito ad origine centrovalvolare.
Ventricolo sinistro normale per spessori parietali, dilatato; diffusa ipocinesia parietale e dissincronia del setto i.v. secondaria a stimolazione da PM, severa riduzione della frazione d'eiezione biplana.
Normali dimensioni ispettive del settore destro, normale funzione sistolica longitudinale ventricolare destra (TAPSE 20 mm, S' TDI 13 cm/s).
Trascurabile rigurgito tricuspidalico, non adeguatamente campionabile;
minimo scollamento pericardico anteriore al settore destro



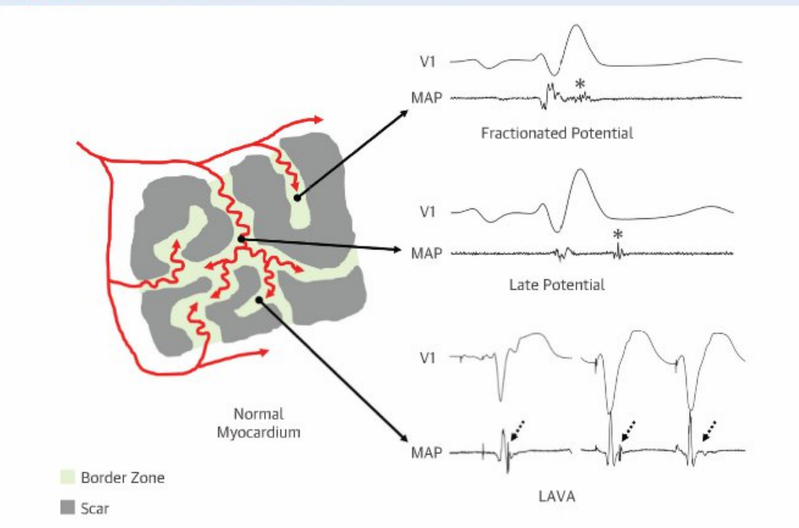
STATE-OF-THE-ART REVIEW

Catheter Ablation of Ventricular Tachycardia in Structural Heart Disease

Indications, Strategies, and Outcomes—Part II

Srinivas R. Dukkipati, MD, Jacob S. Koruth, MD, Subbarao Choudry, MD, Marc A. Miller, MD, William Whang, MD, Vivek Y. Reddy, MD

FIGURE 1 Myocardial Scar and Substrate for Re-Entrant VT



J Am Coll Cardiol 2017;70:2924–41

Pre-procedural imaging is useful in identifying individuals that may benefit from an epicardial approach. The presence of midmyocardial or subepicardial scar on CMR identifies patients that are likely to require epicardial mapping for successful abolition of VT (25). The use of pre-procedural CMR has been shown to be independently associated with improved procedural success and the composite endpoint of VT recurrence, heart transplantation, or death in DCM patients undergoing VT ablation (88).

Accepted Manuscript

Association of Pre-Procedural Cardiac Magnetic Resonance Imaging with Outcomes of Ventricular Tachycardia Ablation in Patients with Idiopathic Dilated Cardiomyopathy

Konstantinos C. Siontis, MD, Hyungjin Myra Kim, ScD, Ghaith Sharaf Dabbagh, MD, Rakesh Latchamsetty, MD, Jadranka Stojanovska, MD, Krit Jongnarangsin, MD, Fred Morady, MD, Frank M. Bogun, MD

• Bad friends to cMRI

- Electronic devices (endocardial systems or not): safety / artifacts
- Rhythm disorders impacting on quality
- Comfort and safety for unstable patients

Role of cCT in LV scar-related VTs

- **Scar characterization:**
- endo vs. epicardial / transmural; segments involved (of particular relevance in non-ICM patients)

- **Mapping in an integrated modality**

- As anatomical guide for a transpericardial approach
- Coronary arteries location and assessment
- Intracavitary thrombi detection
- Epicardial fat evaluation (thickness and distribution)

CT Protocol

Patient preparation with BB/ivabradine and nitrates before CT to improve image quality

1.5 ml/kg contrast medium injection (single o double bolus) followed by saline

0-100% ECG-gated cardiac CT scan

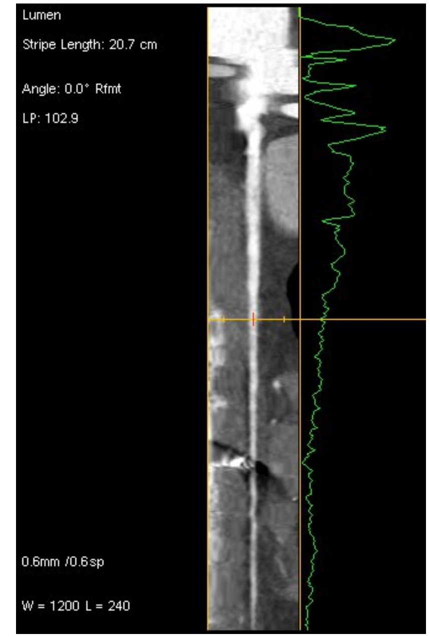
Coronary anatomy evaluation
Biventricular volume and function

8-10 min after contrast injection

ECG-gated cardiac CT scan

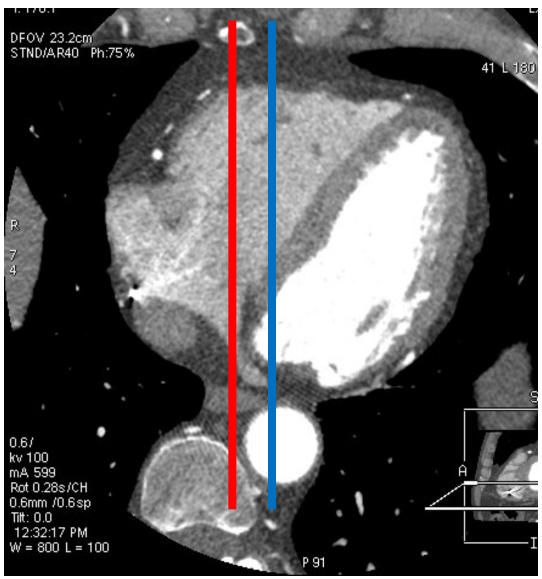
Myocardial fibrosis evaluation

Dedicated post-processing to obtain a new DICOM including only myocardial fibrosis, epicardial fat and coronary anatomy



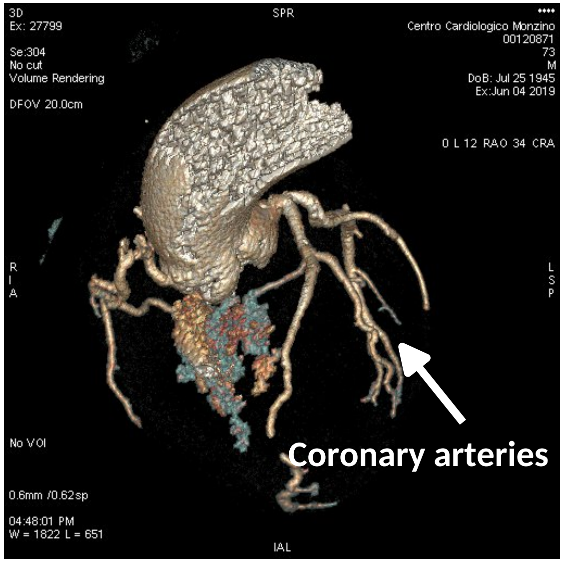
Cardiac CT was performed: normal coronary arteries

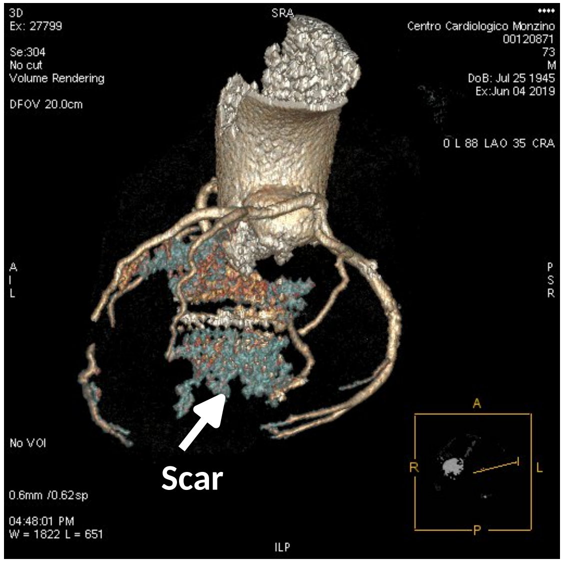
Cardiac CT was performed: important insights for a safe epicardial approach

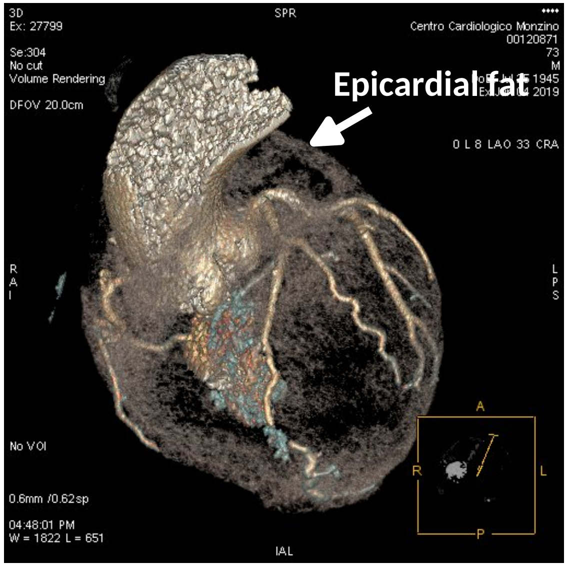


EPI Approach: left lateral subxiphoid

Cardiac CT was performed: non ischemic fibrosis on LV mid-basal septum

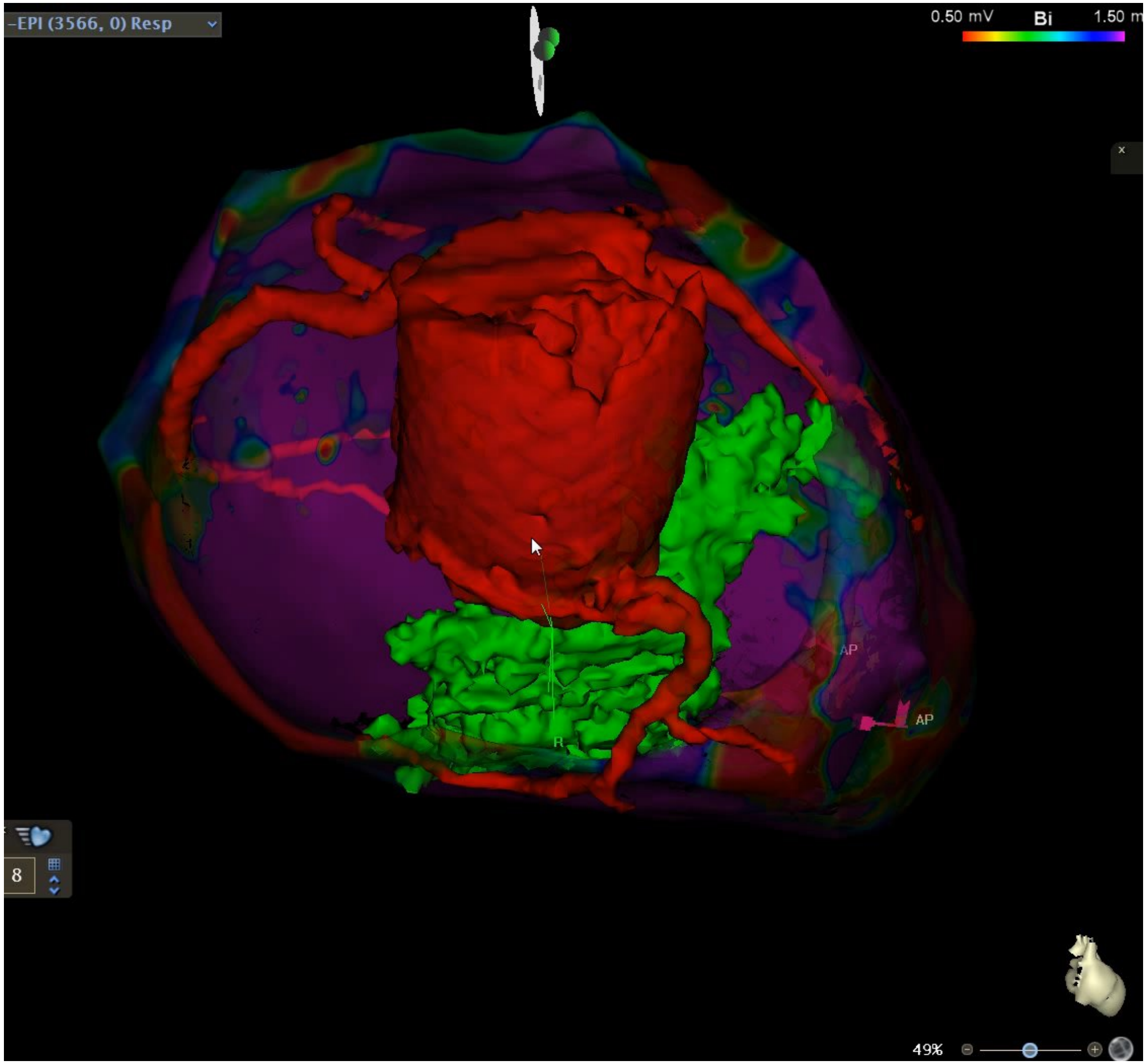




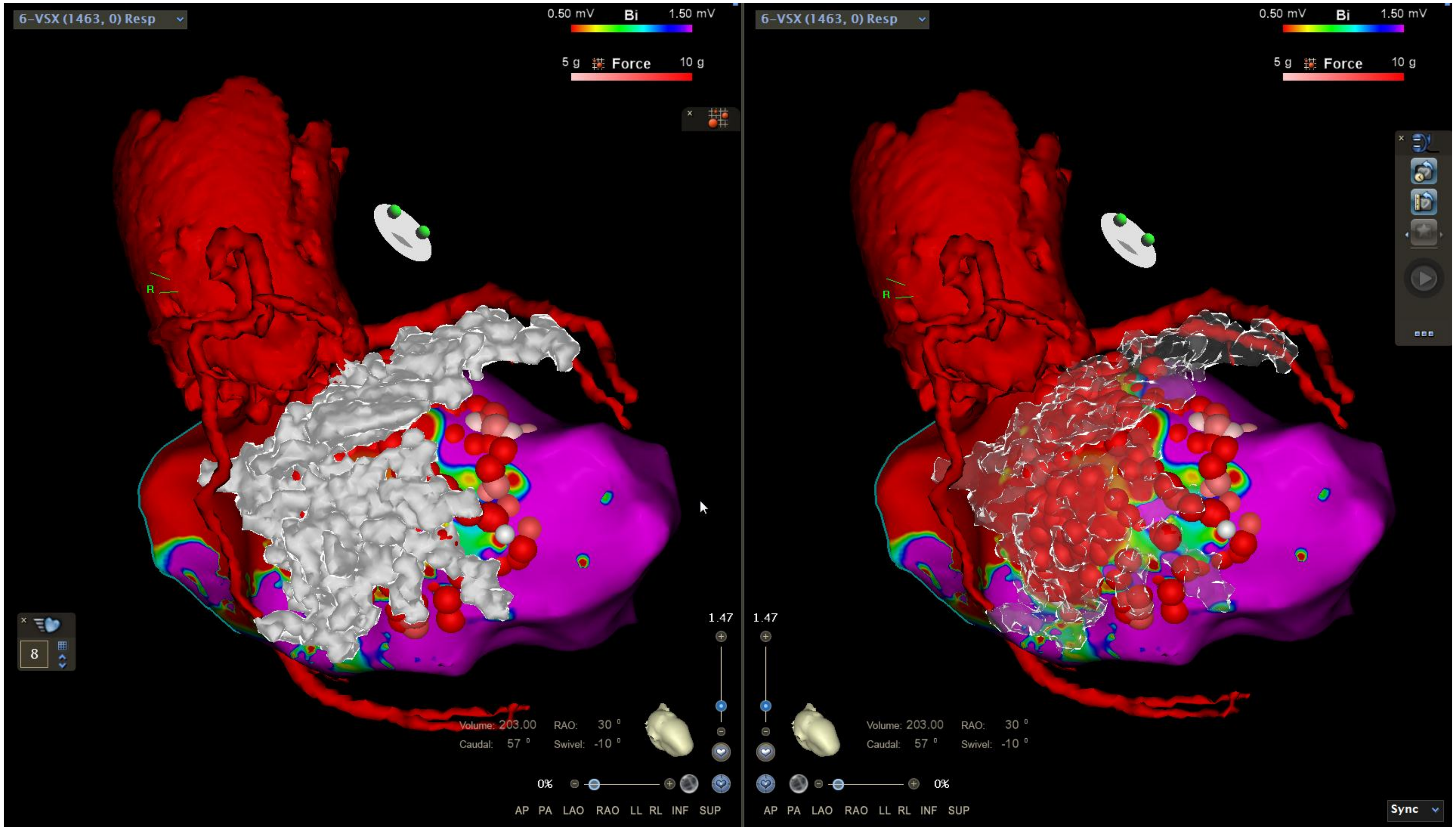


3-Dimensional reconstruction for integration with invasive electroanatomical mapping

EAM Epi : scar at CTA



EAM Endo scar at CTA



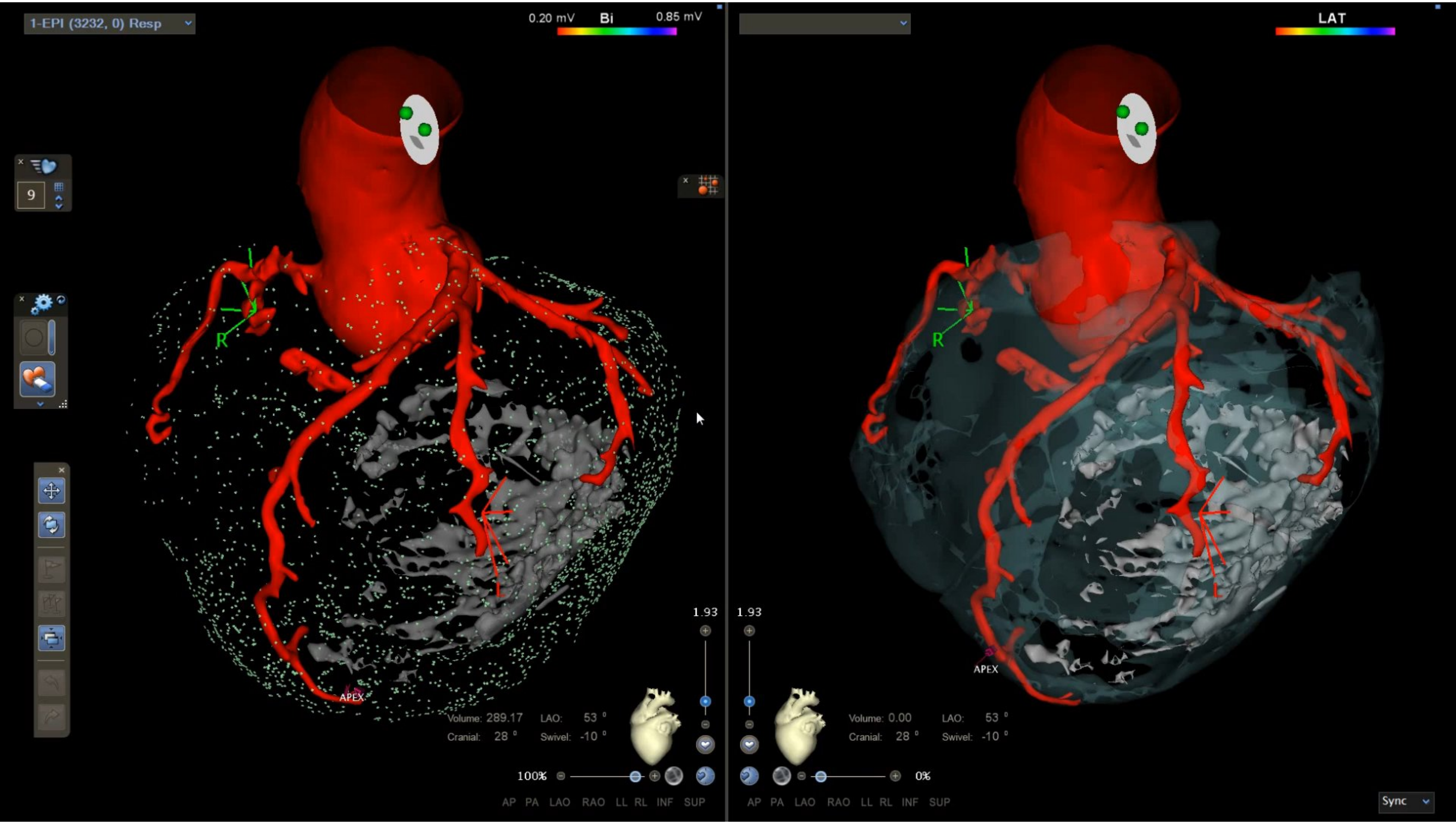
cCT - image-integration in VT ablation: practical benefits

- Supporting the right approach and strategy
- Clues for pericardial puncture

- Relevant information for endo-epicardial mapping (anatomical landmarks, fat)
- Avoiding intraprocedural coronary angiography

- **Combined information for navigation (real anatomy) and ablation (more accurate target)**

Combined information for navigation (real anatomy) and ablation (more accurate target)



Thank you for the attention !!

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