5ª CONFERENZA NAZIONALE DEL CLUB DELLE UTIC ANMCO
27 - 28 FEBBRAIO 2026

E

UTIC CLUB | ANMCO
CRITICAL CARE COMMUNITY

Fibrillazione atriale e tachicardiomiopatia

Massimo Grimaldi

Ente Ecclesiastico
Ospedale Generale Regionale
MIULLI

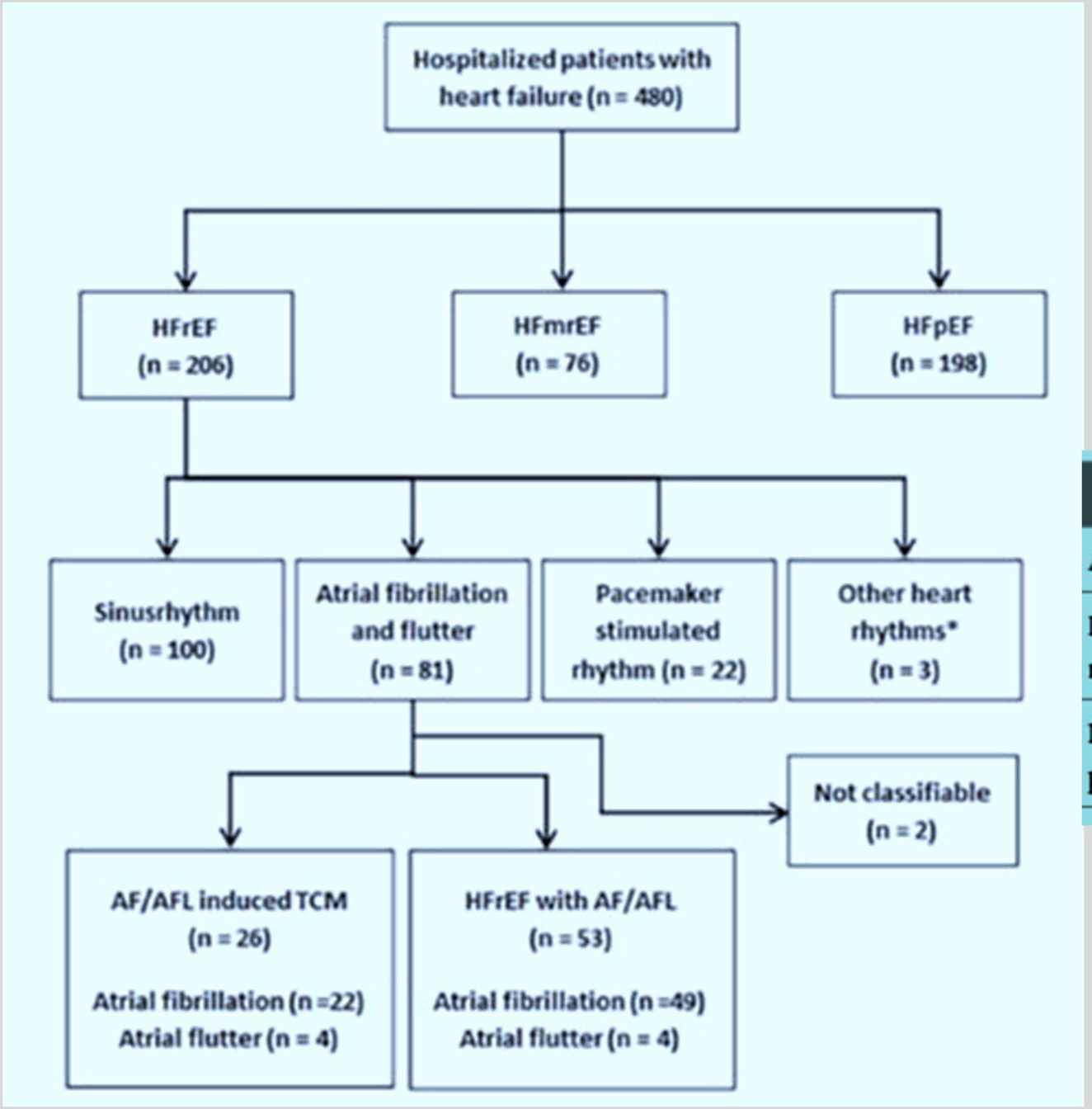
MASSIMO GRIMALDI

CONFLITTO DI INTERESSE

J&J Med Tech

Cardiogenic shock due to arrhythmia-induced cardiomyopathy and its recovery after radiofrequency ablation under extracorporeal membrane oxygenation support

Sanhueza , Heart Rhythm O_2 2022;3:874–878



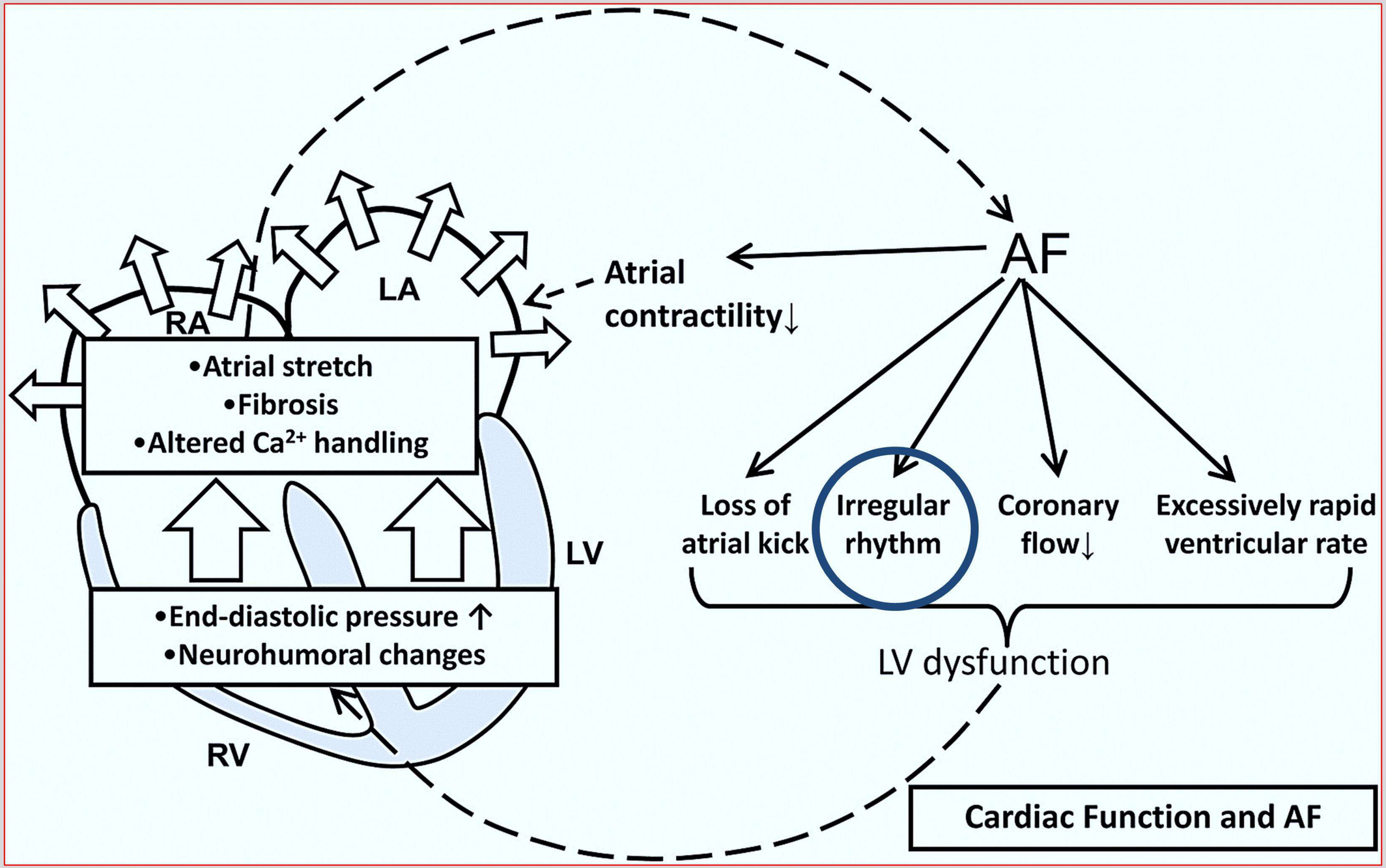
Rate of atrial fibrillation and flutter induced tachycardiomyopathy in a cohort of hospitalized patients with heart failure and detection of indicators for improved diagnosis

	Odds ratio	95% CI	*P*-value
Age < 79 years	5.887	1.999–17.339	<0.001
Heart rate at rest > 112 bpm	2.503	1.288–4.864	0.001
NT-pro-BNP < 5,419 pg/mL	2.327	1.141–4.746	0.004

Ermert, Frontiers in Cardiovascular Medicine 2023

F.V.M.: 111 b/m

F.V.M.: 111 b/m



Iwasaki Y et al. Circulation 2011;124:2264-2274

Effect of an Irregular Ventricular Rhythm on Cardiac Output

Emile G. Daoud, MD, Raul Weiss, MD, Marwan Bahu, MD, Bradley P. Knight, MD, Frank Bogun, MD, Rajiva Goyal, MD, Mark Harvey, MD, S. Adam Strickberger, MD, K. Ching Man, DO, and Fred Morady, MD

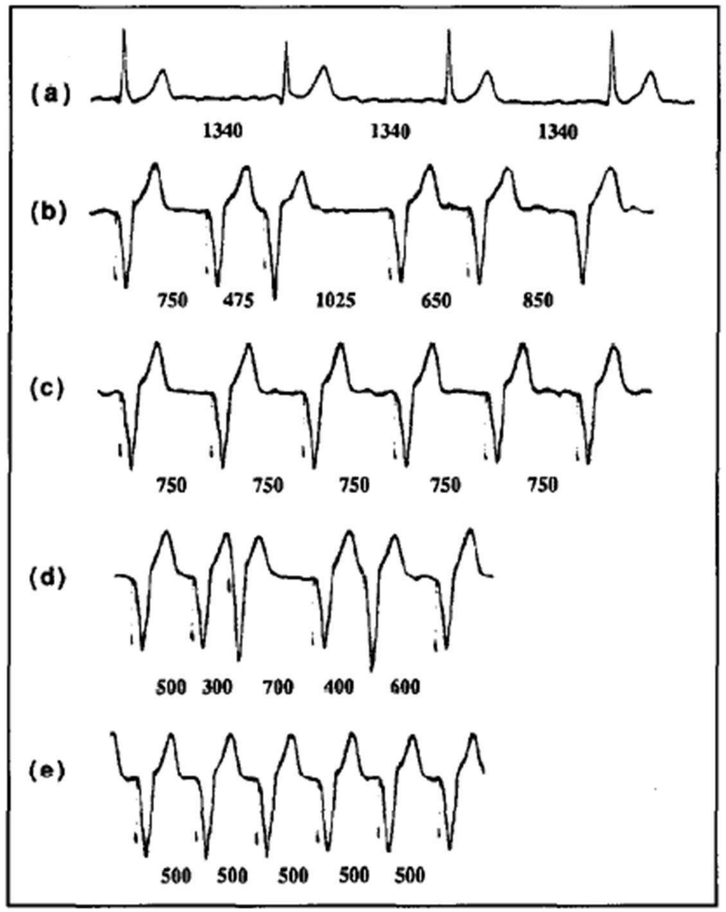


FIGURE 1. Recordings of atrial fibrillation during the 5 conditions in which hemodynamic measurements were obtained. See text for description. Numbers below each tracing represent the ventricular pacing cycle length in milliseconds.

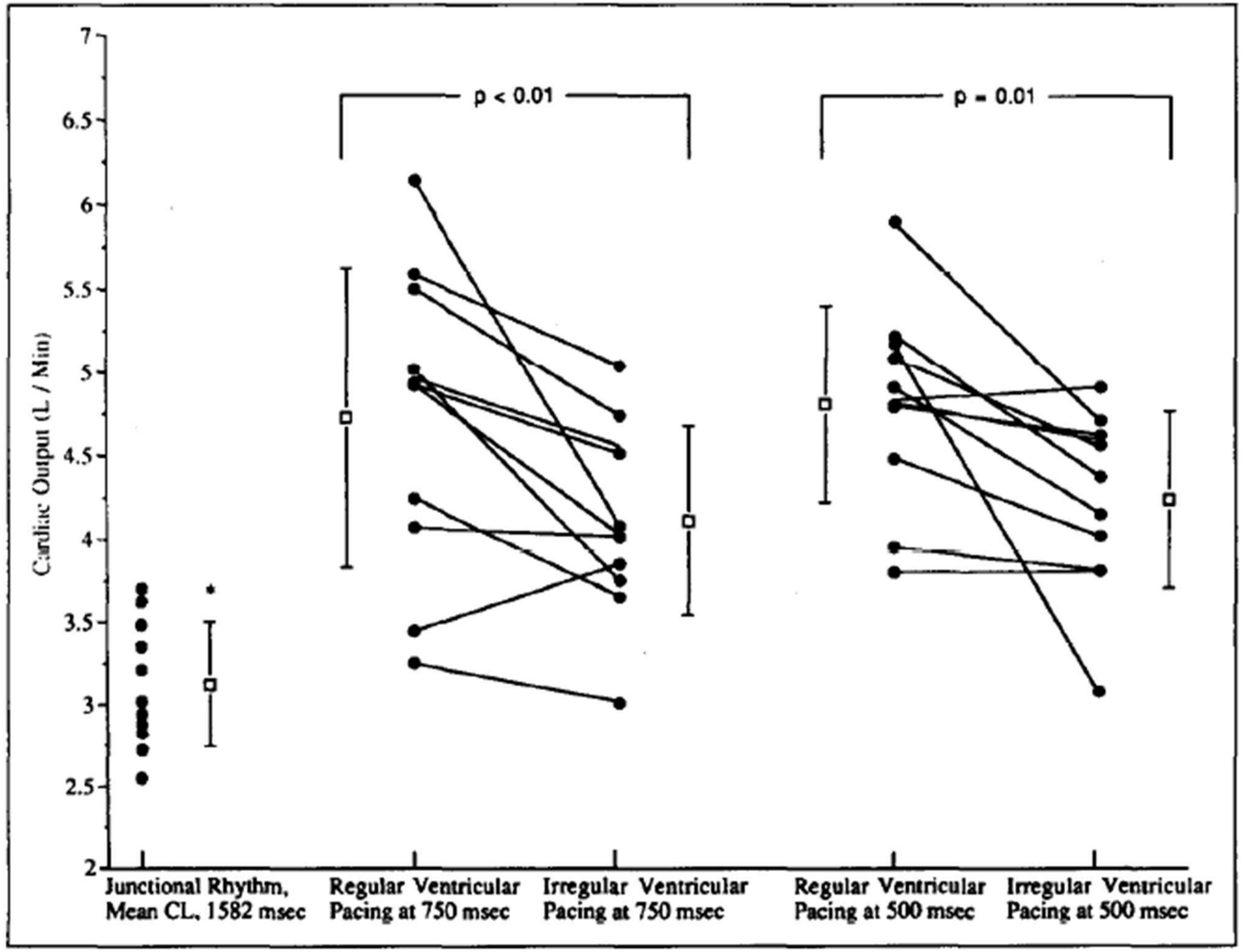
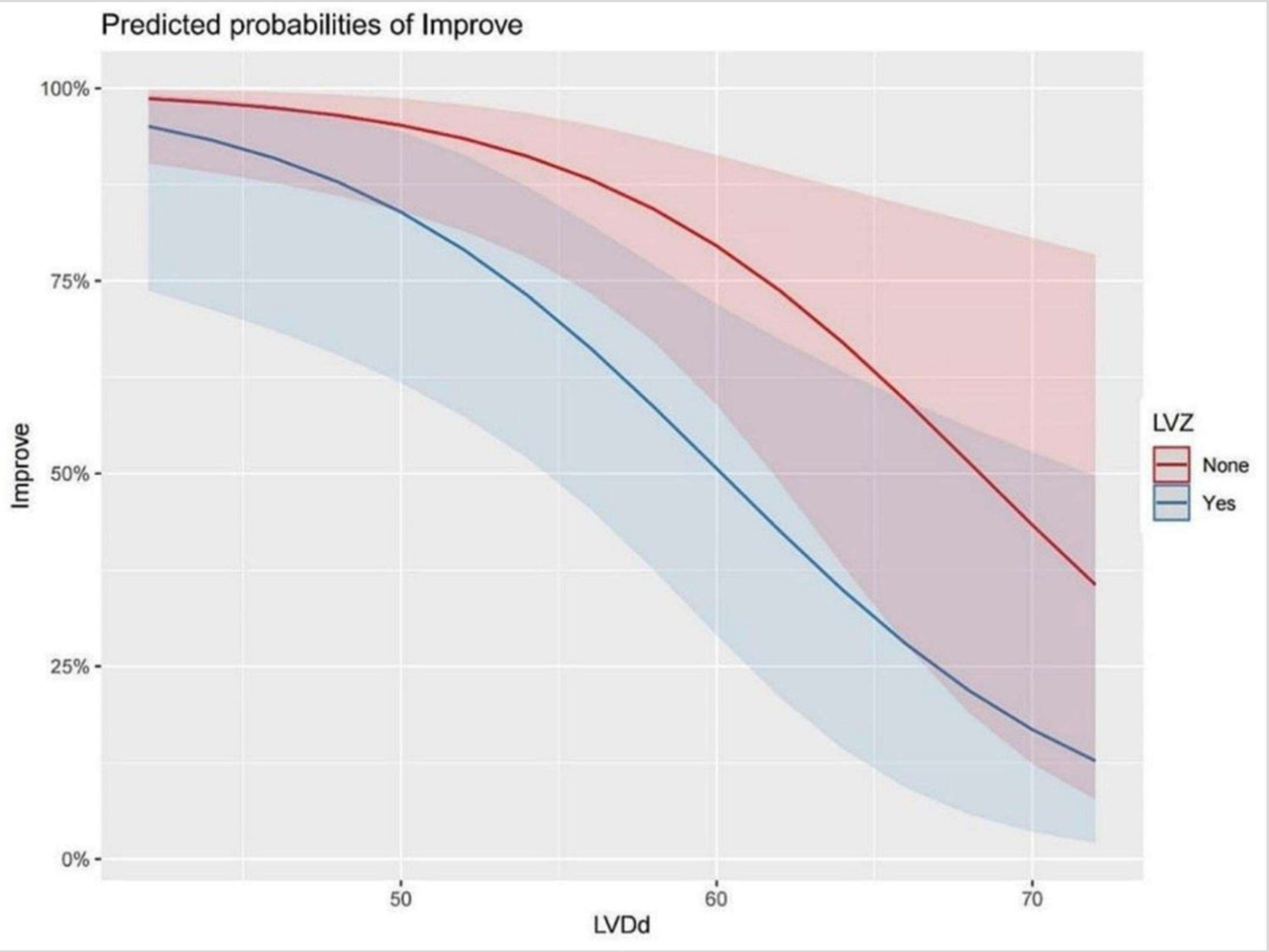


FIGURE 2. Fick cardiac outputs during regular and irregular ventricular pacing. *Solid circles,* individual values; *open squares,* the mean value; *error bars,* 1 SD. *p <0.01 versus each pacing protocol.



Predictors of improvement in left ventricular systolic function after catheter ablation in patients with persistent atrial fibrillation complicated with heart failure

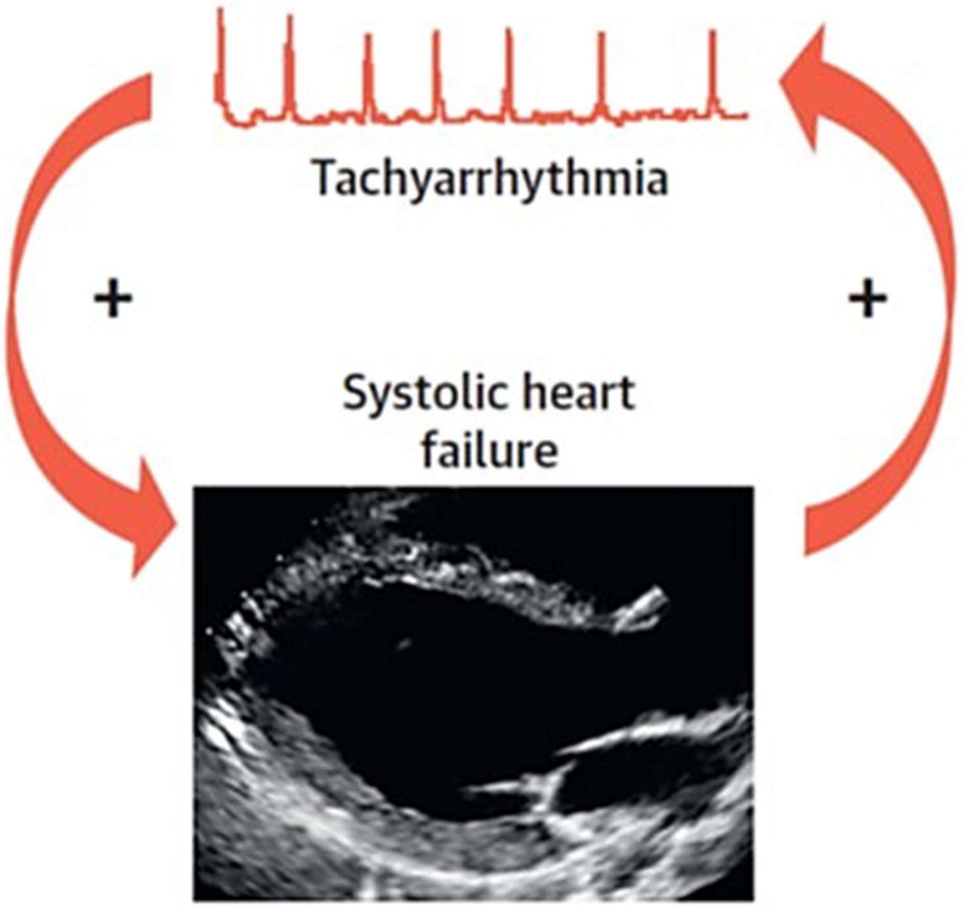
	TCM 60	Control 20	P value
Age (years)	59(50,66)	67(57,75)	0.013
e-GFR (ml/ min/1.73)	101.4	91.2(	0.008

Cutoff of 59 mm (sensitivity: 85.0%, specificity: 55.0%)

Zhao *et al. BMC Cardiovascular Disorders* (2024) 24:178
https://doi.org/10.1186/s12872-024-03840-z

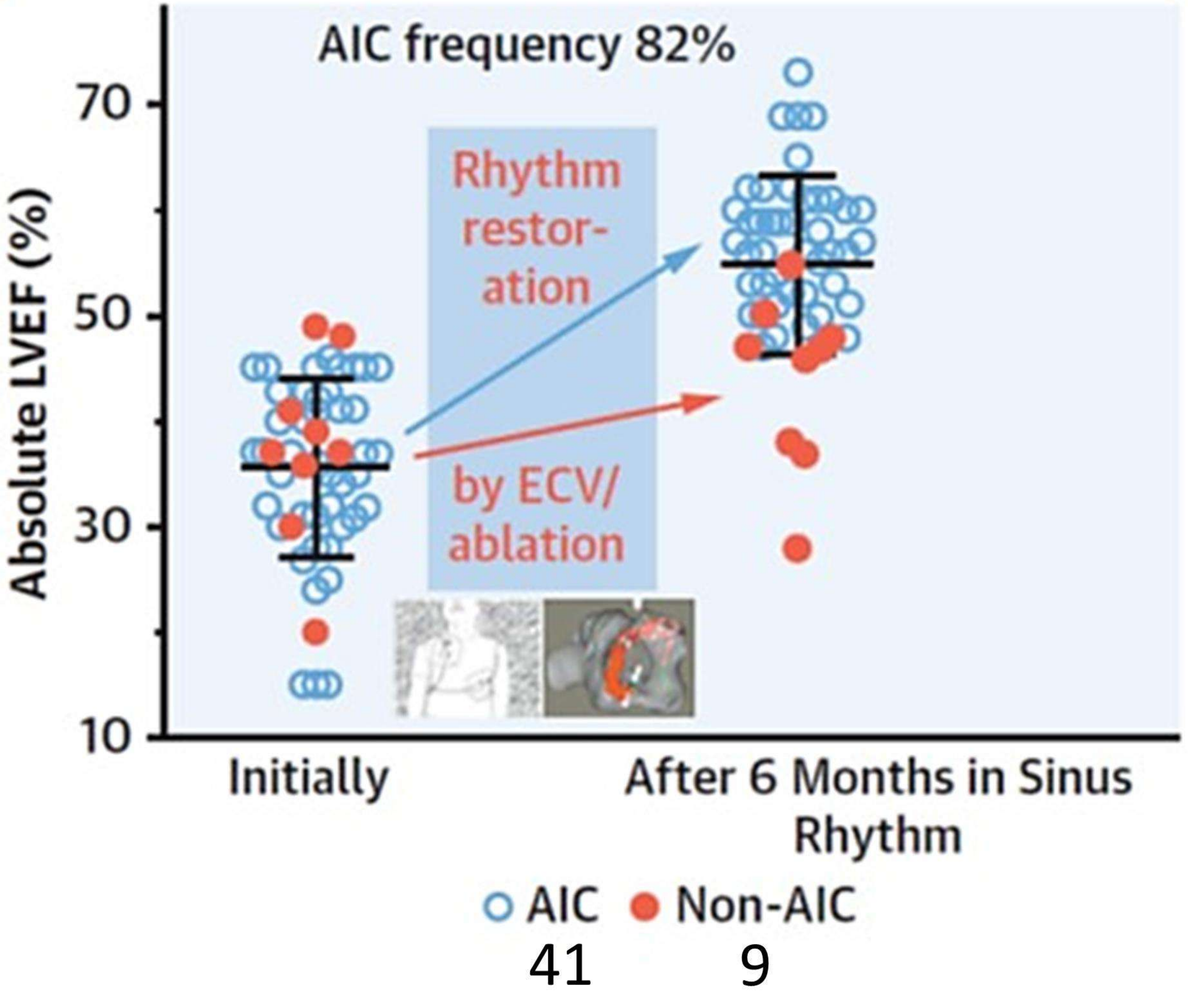
A

Development of Arrhythmia-Induced Cardiomyopathy (AIC)



B

Patients With Left Ventricular Systolic Dysfunction (LVSD)
LVEF <50% + AF/AFL + HR >100 beats/min + Exclusion of Other Reasons for LVSD

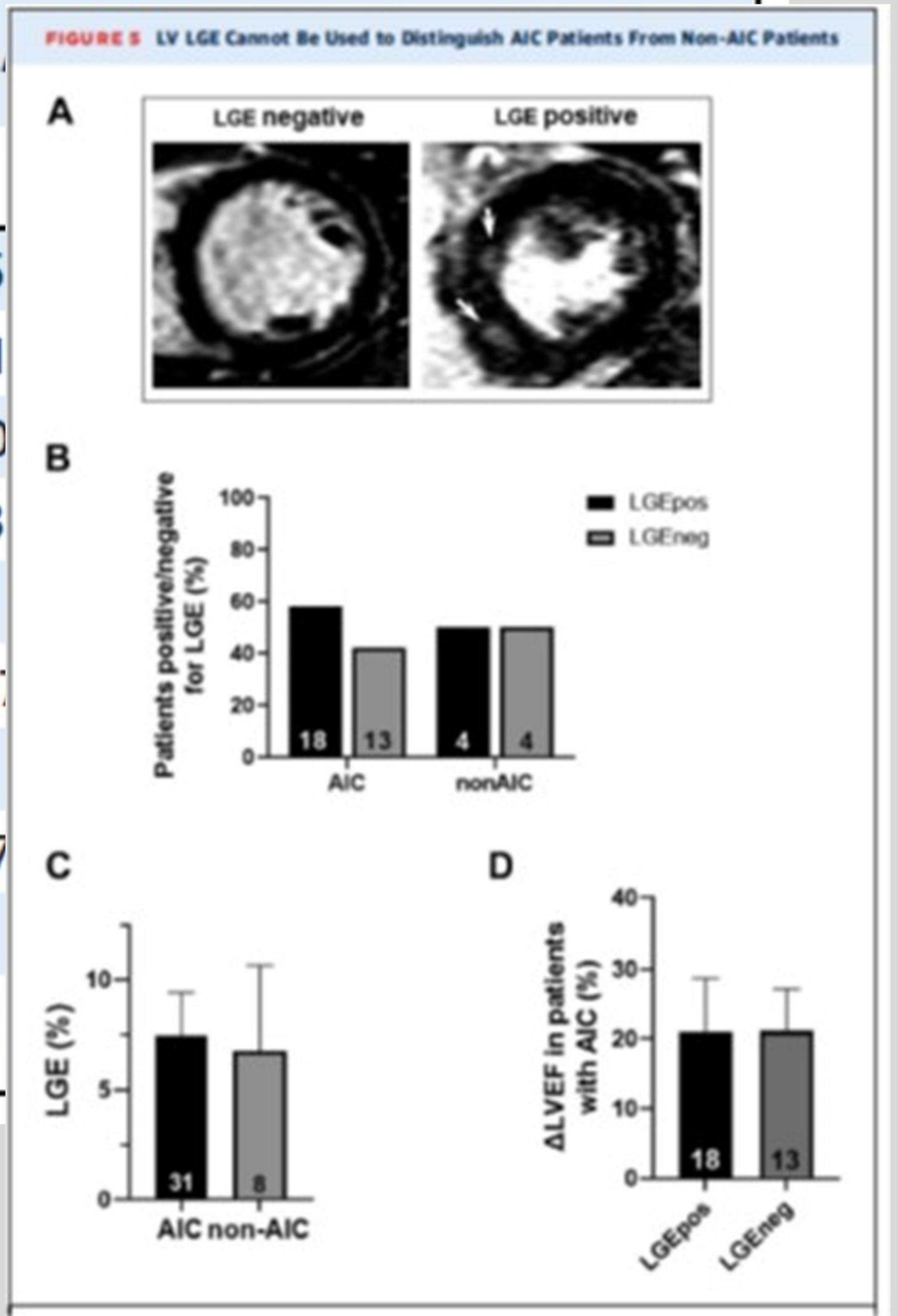


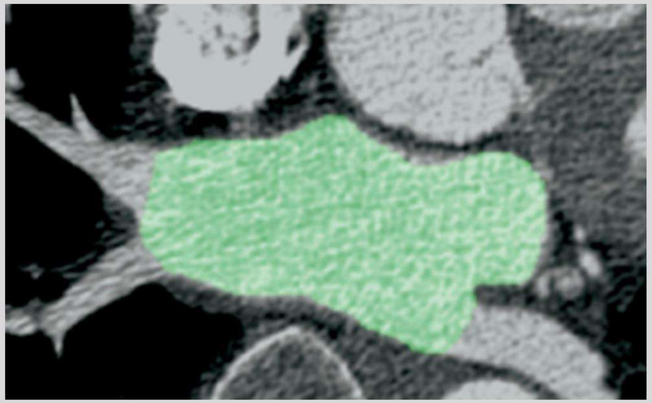
Schach C, et al. J Am Coll Cardiol EP. 2024;10(5):870-881.

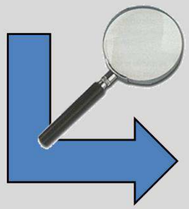
TABLE 2 Simple Logistic Regression Models on Outcome

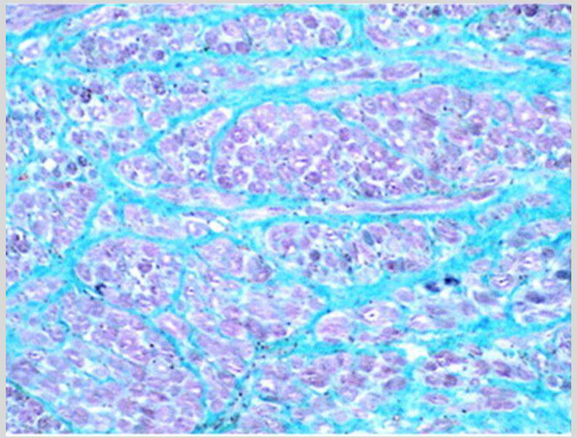
	AIC	Non-AIC
LVEF, %	35.4 ± 8.2	37.0 ± 9.5
LVEDD, mm	53.4 ± 6.1	60.4 ± 4.1
LVESD, mm	43.4 ± 6.9	49.8 ± 6.0
LA area, (cm^2)	27.0 ± 4.0	29.9 ± 7.3
Mitral regurgitation grade	1.5 ± 0.7	2.1 ± 1.0
NT-proBNP,[a] pg/mL	4,525 ± 4,536	4,794 ± 4,0
Log NT-proBNP	3.4 ± 0.5	3.5 ± 0.5
hs-cTnT, ng/L	27.0 ± 21.8	22.9 ± 15.7
LV LGE, %	5.8 ± 6.3	5.1 ± 5.6
NYHA functional class, (grade)	2.9 ± 0.7	3.0 ± 0.7

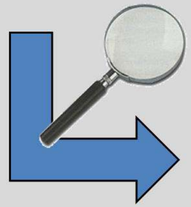
FIGURE 5 LV LGE Cannot Be Used to Distinguish AIC Patients From Non-AIC Patients

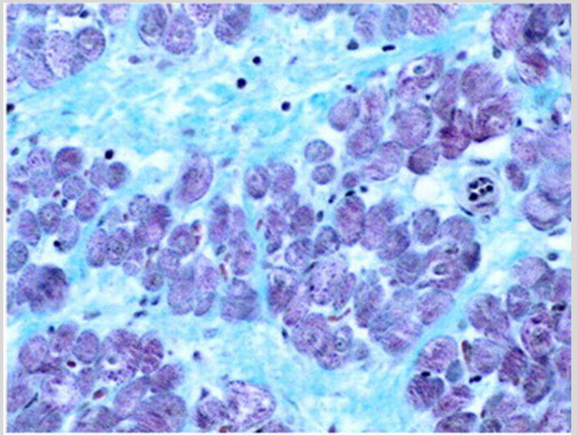




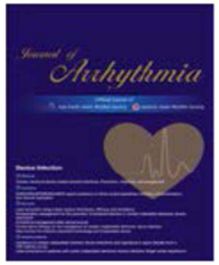








Journal of Arrhythmia 32 (2016) 247–278



Contents lists av

Journal o

journal homepage: w

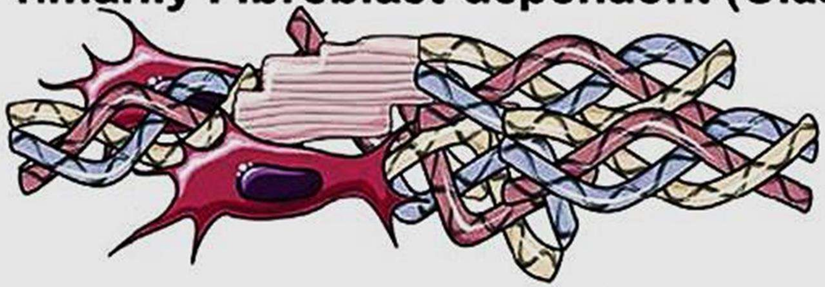
EHRA/HRS/APHRS/SOLAECE expert cor
Definition, characterisation, and clinic

Andreas Goette, (EHRA chair)[a,*], Jonathan M. Kal
Luis Aguinaga, (SOLAECE co-chair)[c,***,1], Joseph A
Sumeet S. Chugh[g], Domenico Corradi[h], Andre D'
Mario Gonzalez[l], Stephane N. Hatem[m], Robert H
Jose Jalife[r], Young-Hoon Kim[s], Gregory Y.H. Lip[t],
Katherine Murray[w], Akihiko Nogami[x], Prashanth
Stanley Nattel, (HRS co-chair)[ab,ac,****]

Primarily Cardiomyocyte-dependent (Class I)

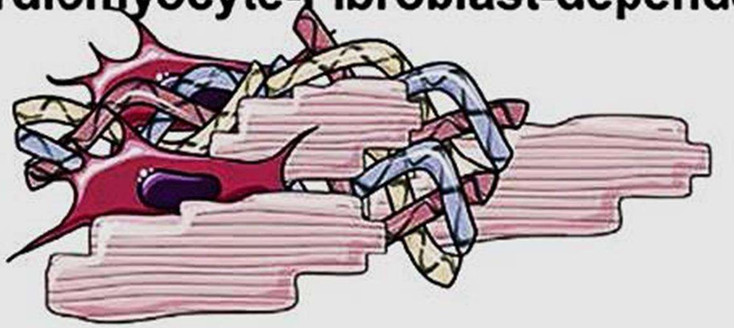
- lone AF
- genetic diseases
- diabetes mellitus

Primarily Fibroblast-dependent (Class II)



- aging
- cigarette smoking

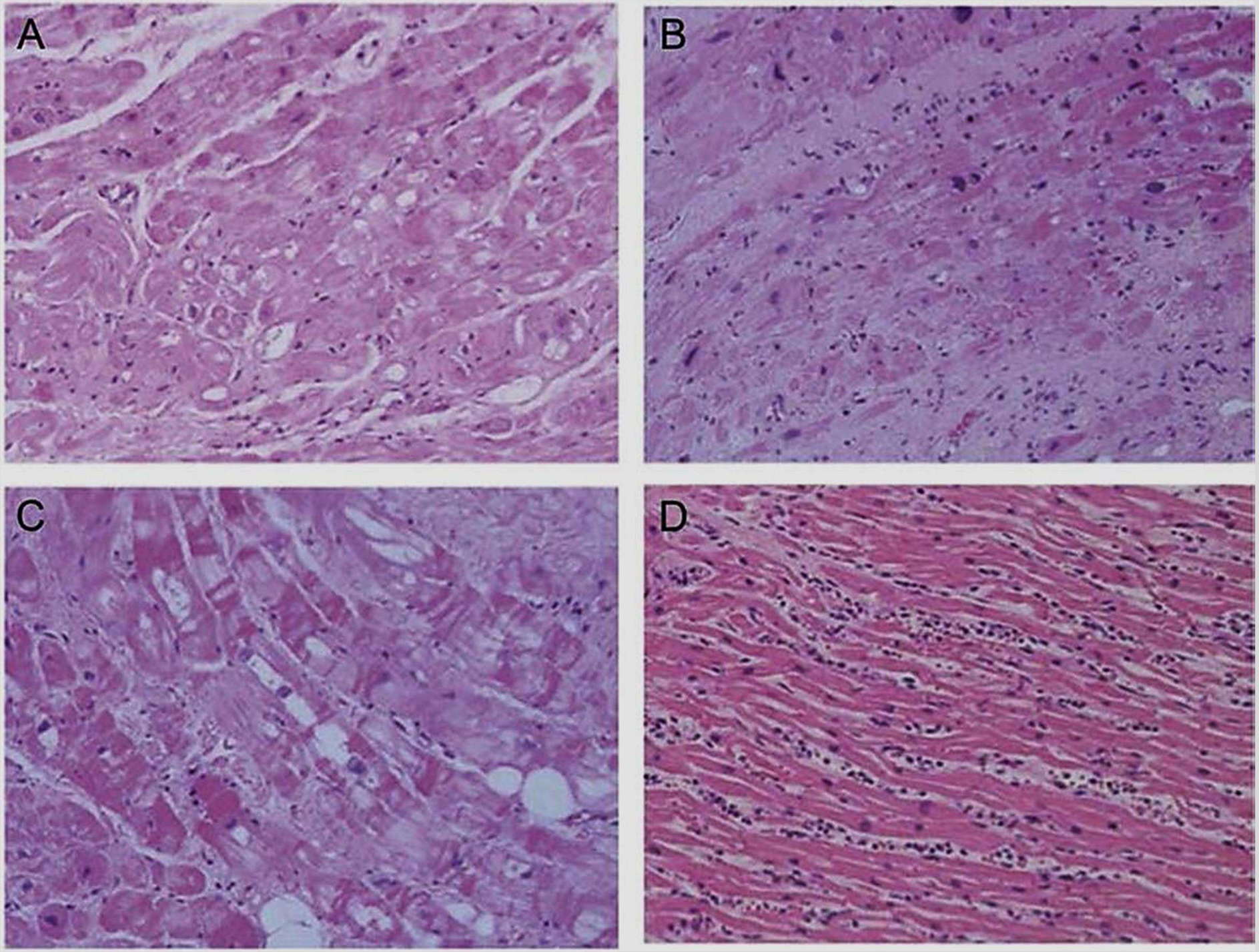
Mixed Cardiomyocyte-Fibroblast-dependent (Class III)



- CHF
- valvular diseases

Primarily Non-Collagen Deposits (Class IV)

- isolated atrial amyloidosis
- granulomatosis
- inflammatory Infiltrates
- glycosphingolipids

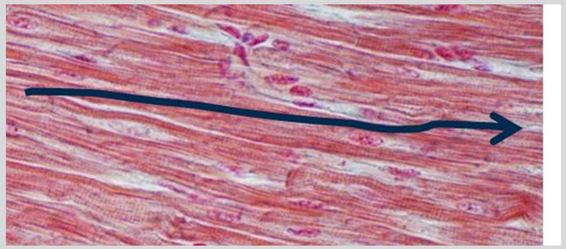

A
B
C
D

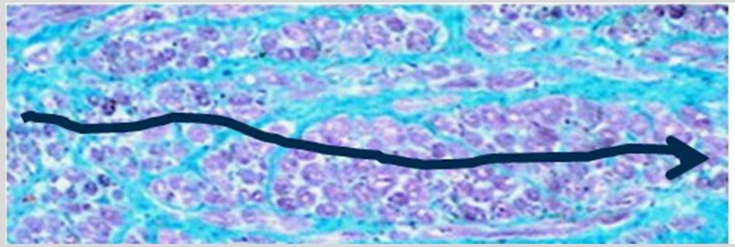
Miocardio sano

Danno tissutale medio

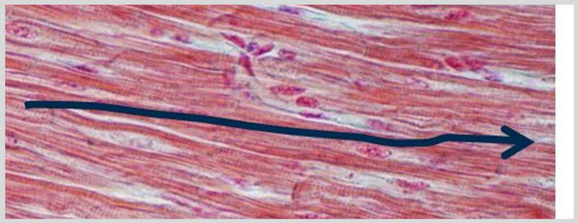
Danno tissutale elevato

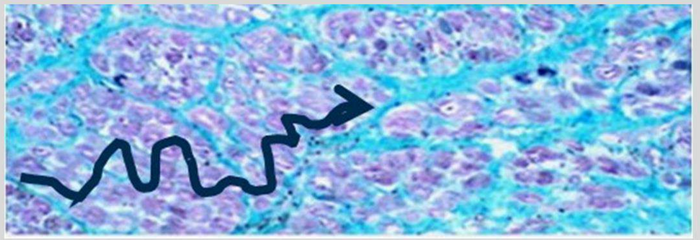
Ciclo 1000 ms
(60 b/m)

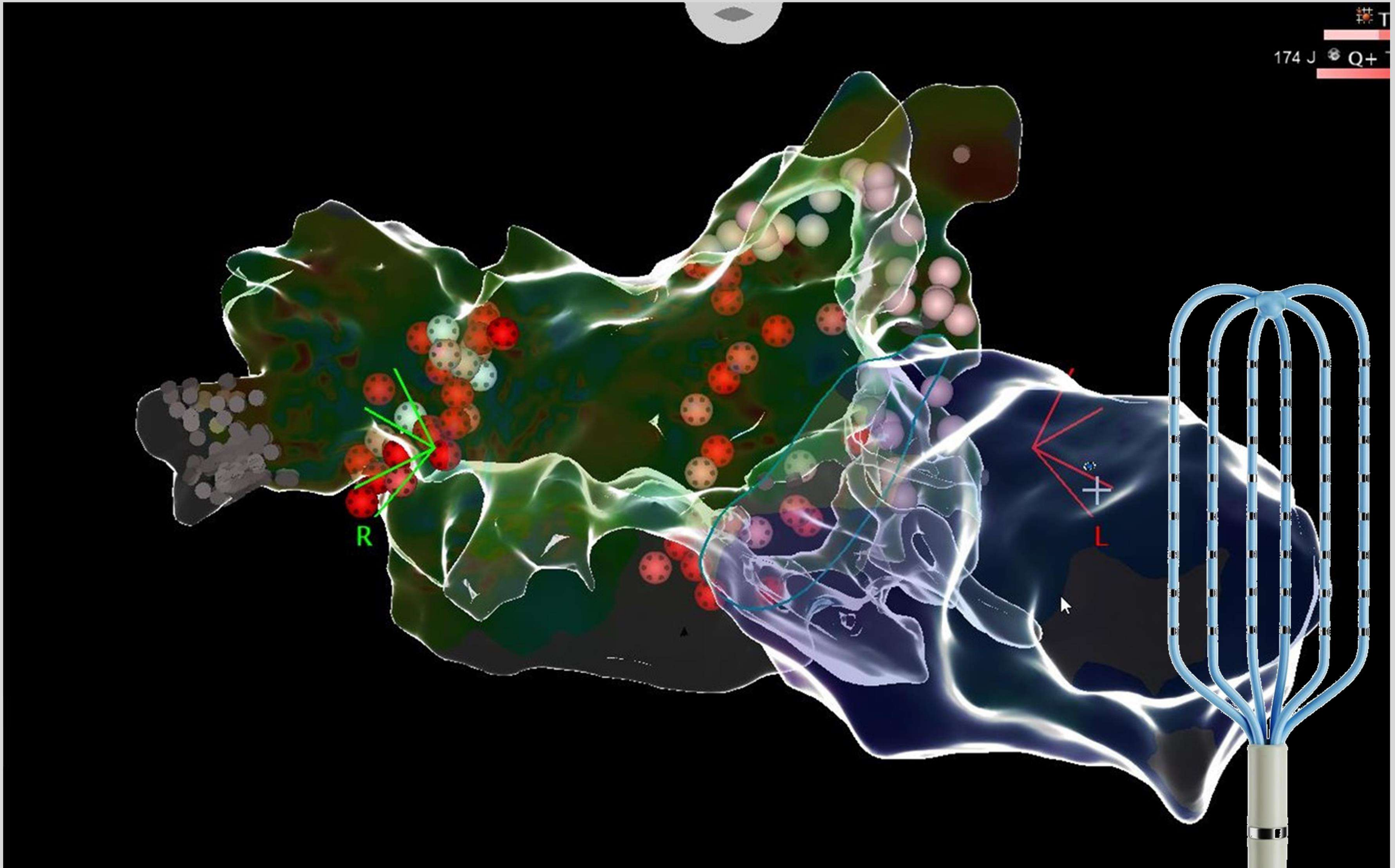


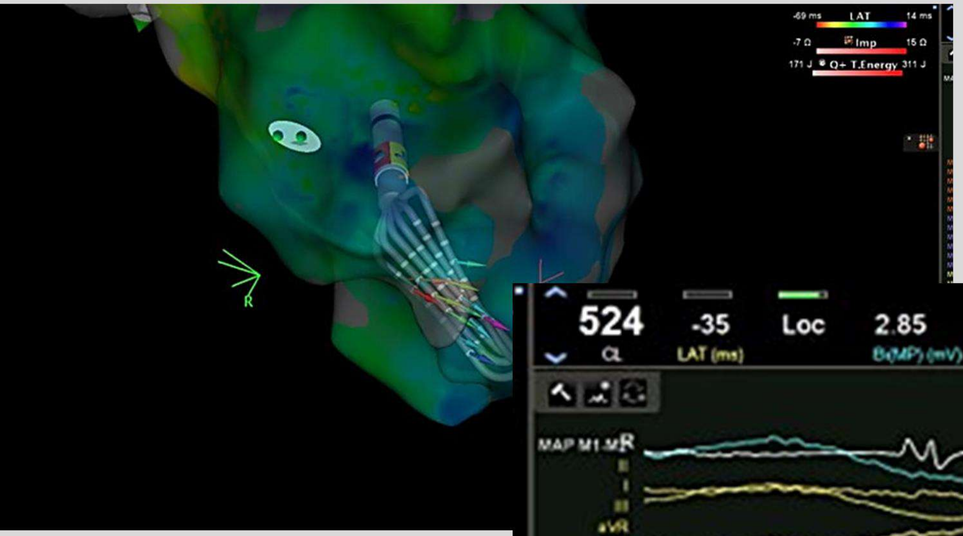


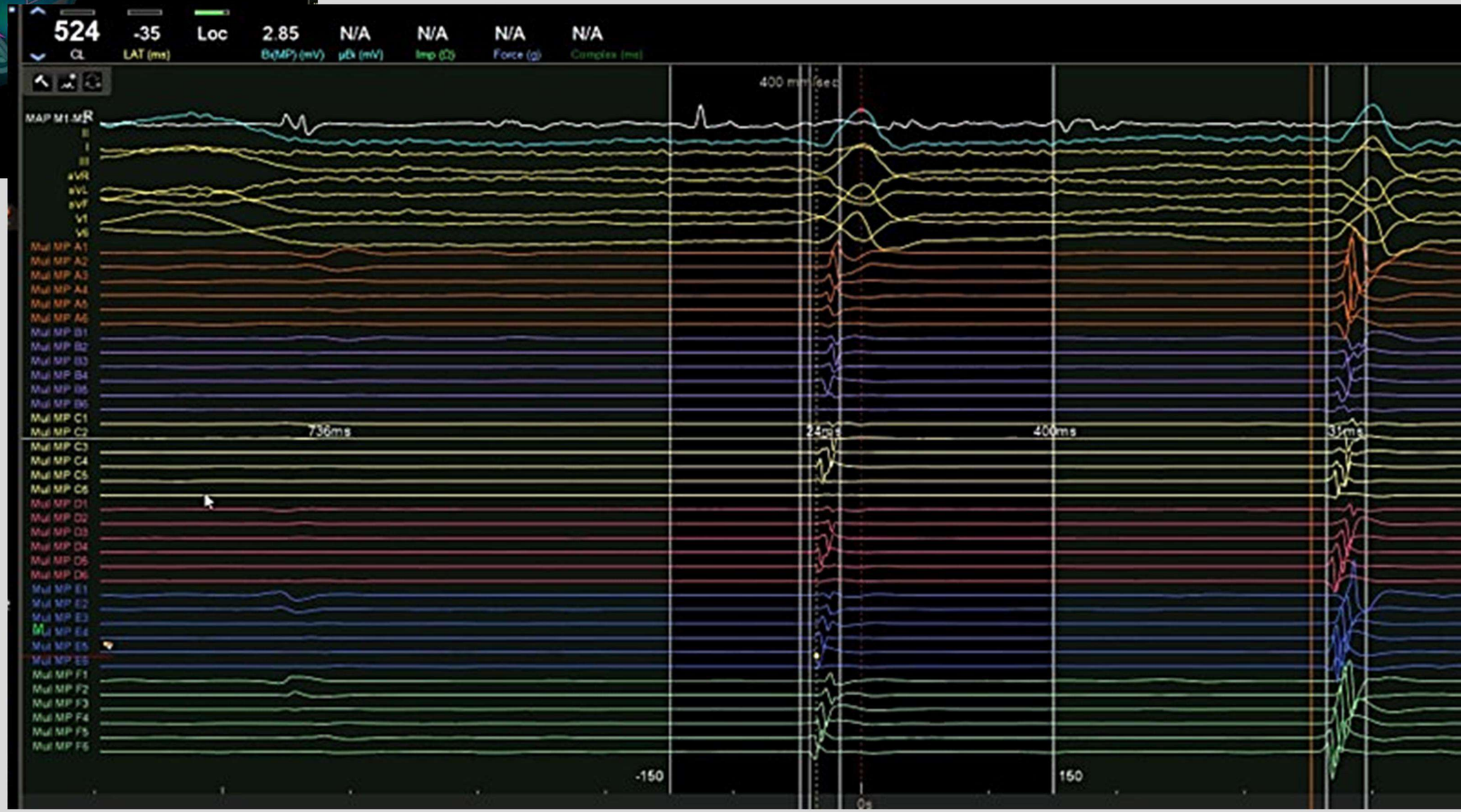
Ciclo 400 ms
(150 b/m)

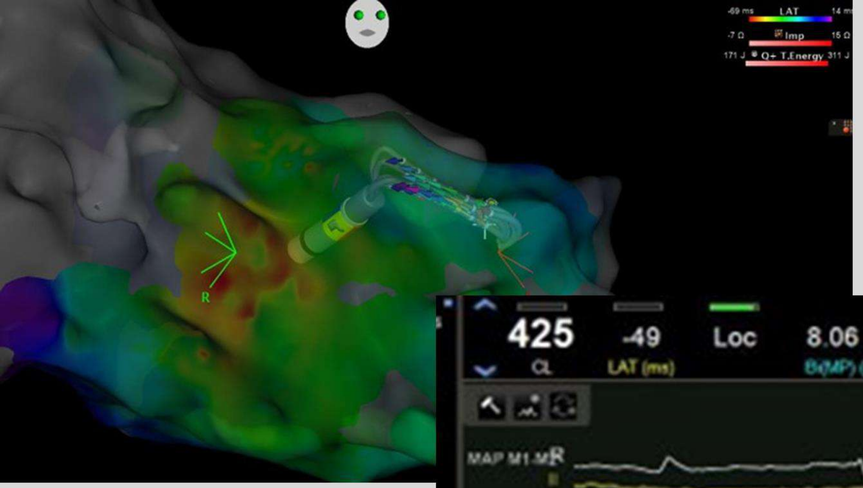


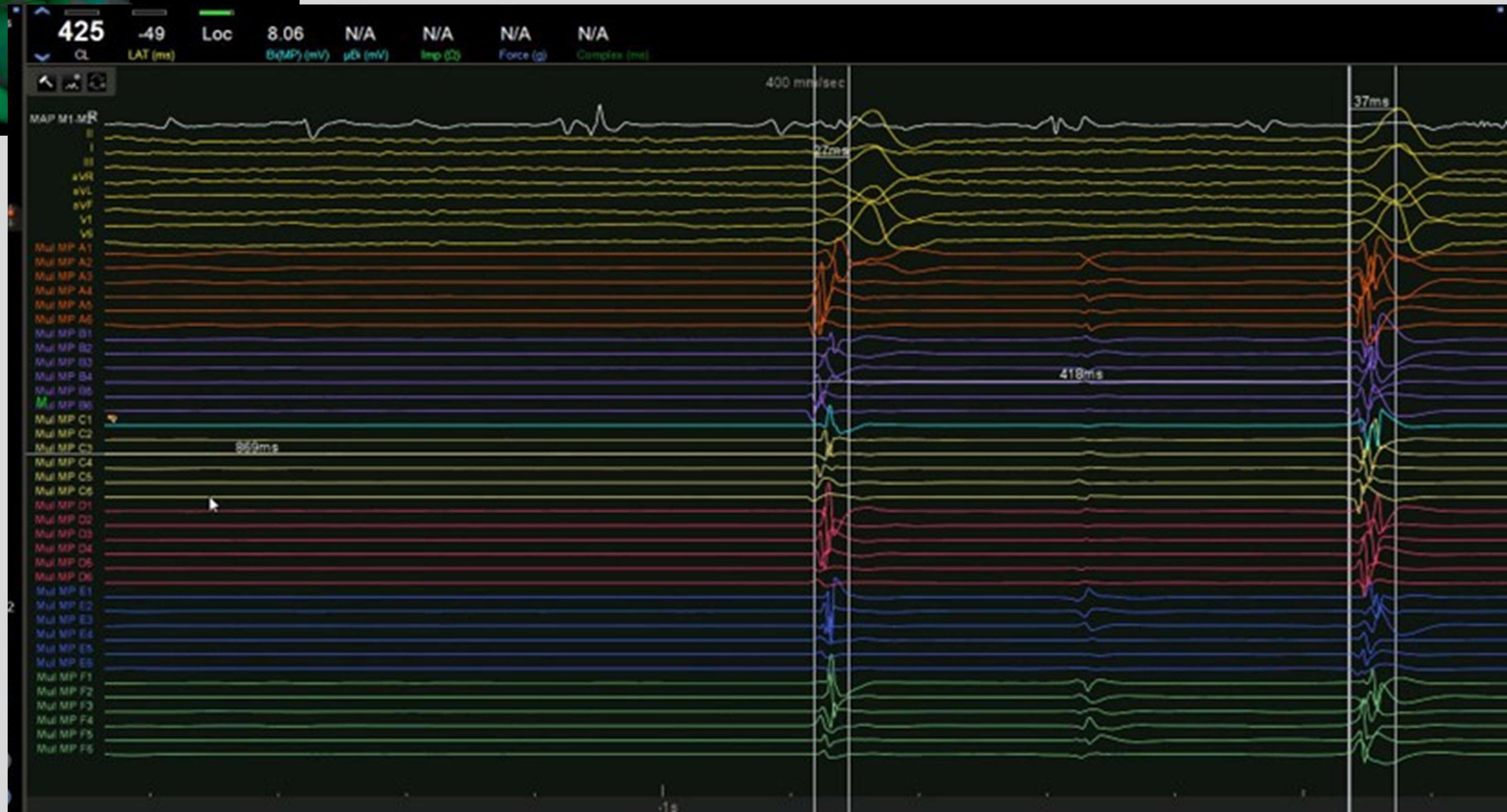



174 J
Q+
R
L


-69 ms
LAT
14 ms
-7 Ω
Imp
15 Ω
171 J
Q+ T.Energy
311 J
R


524
CL
-35
LAT (ms)
Loc
2.85
Bi(MP) (mV)
N/A
µBi (mV)
N/A
Imp (Ω)
N/A
Force (g)
N/A
Complex (ms)
400 milliSec
MAP M1:MR
I
II
III
aVR
aVL
aVF
V1
V6
Mul MP A1
Mul MP A2
Mul MP A3
Mul MP A4
Mul MP A5
Mul MP A6
Mul MP B1
Mul MP B2
Mul MP B3
Mul MP B4
Mul MP B5
Mul MP B6
Mul MP C1
Mul MP C2
Mul MP C3
Mul MP C4
Mul MP C5
Mul MP C6
Mul MP D1
Mul MP D2
Mul MP D3
Mul MP D4
Mul MP D5
Mul MP D6
Mul MP E1
Mul MP E2
Mul MP E3
Mul MP E4
Mul MP E5
Mul MP E6
Mul MP F1
Mul MP F2
Mul MP F3
Mul MP F4
Mul MP F5
Mul MP F6
736ms
24ms
400ms
31ms
-150
150


-69 ms
LAT
14 ms
-7 Ω
Imp
15 Ω
171 J
Q+ T.Energy
311 J
R


425
CL
-49
LAT (ms)
Loc
8.06
Bi(MP) (mV)
N/A
µBi (mV)
N/A
Imp (Ω)
N/A
Force (g)
N/A
Complex (ms)
400 mm/sec
MAP M1 MR
II
I
III
aVR
aVL
aVF
V1
V6
Mul MP A1
Mul MP A2
Mul MP A3
Mul MP A4
Mul MP A5
Mul MP A6
Mul MP B1
Mul MP B2
Mul MP B3
Mul MP B4
Mul MP B5
Mul MP B6
Mul MP C1
Mul MP C2
Mul MP C3
Mul MP C4
Mul MP C5
Mul MP C6
Mul MP D1
Mul MP D2
Mul MP D3
Mul MP D4
Mul MP D5
Mul MP D6
Mul MP E1
Mul MP E2
Mul MP E3
Mul MP E4
Mul MP E5
Mul MP E6
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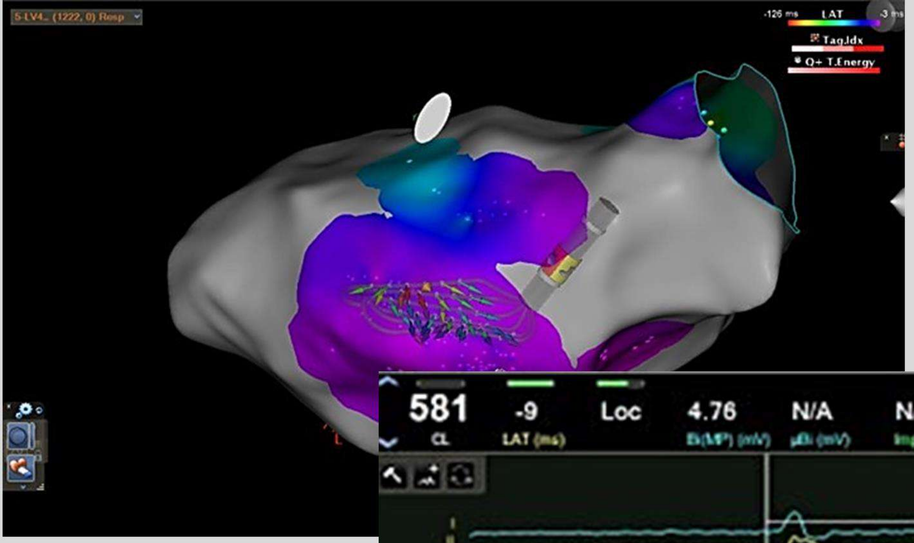
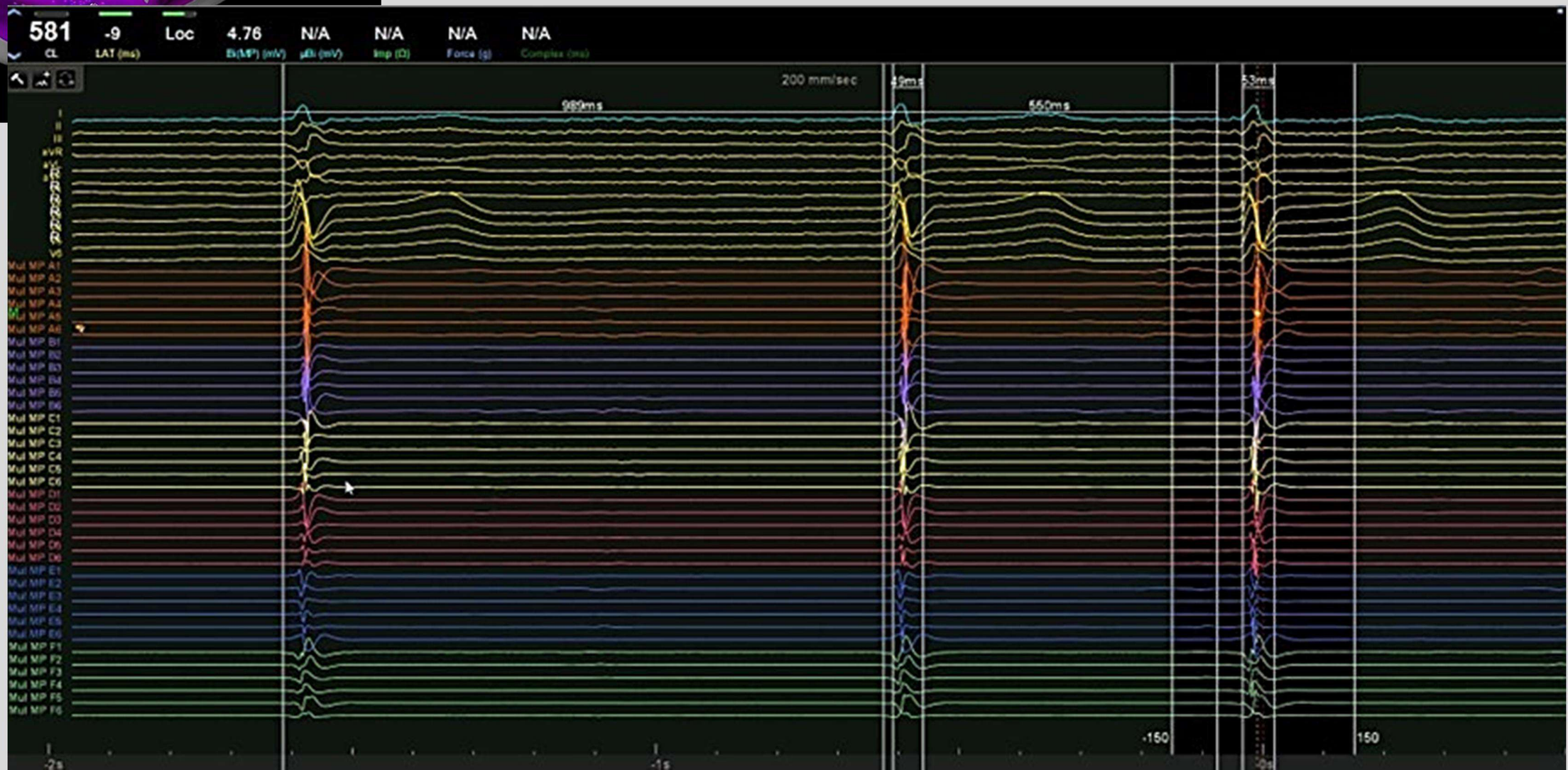
Mul MP F2
Mul MP F3
Mul MP F4
Mul MP F5
Mul MP F6
37ms
418ms
869ms


5 LV4_ (1222, 0) Resp
-126 ms
LAT
-3 ms
Tag.Idx
Q+ T.Energy


581
CL
-9
LAT (ms)
Loc
4.76
Bi(MP) (mV)
N/A
µBi (mV)
N/A
Imp (Ω)
N/A
Force (g)
N/A
Complex (ms)
200 mm/sec
989ms
550ms
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Mul MP A1
Mul MP A2
Mul MP A3
Mul MP A4
Mul MP A5
Mul MP A6
Mul MP B1
Mul MP B2
Mul MP B3
Mul MP B4
Mul MP B5
Mul MP B6
Mul MP C1
Mul MP C2
Mul MP C3
Mul MP C4
Mul MP C5
Mul MP C6
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Mul MP D3
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Mul MP D5
Mul MP D6
Mul MP E1
Mul MP E2
Mul MP E3
Mul MP E4
Mul MP E5
Mul MP E6
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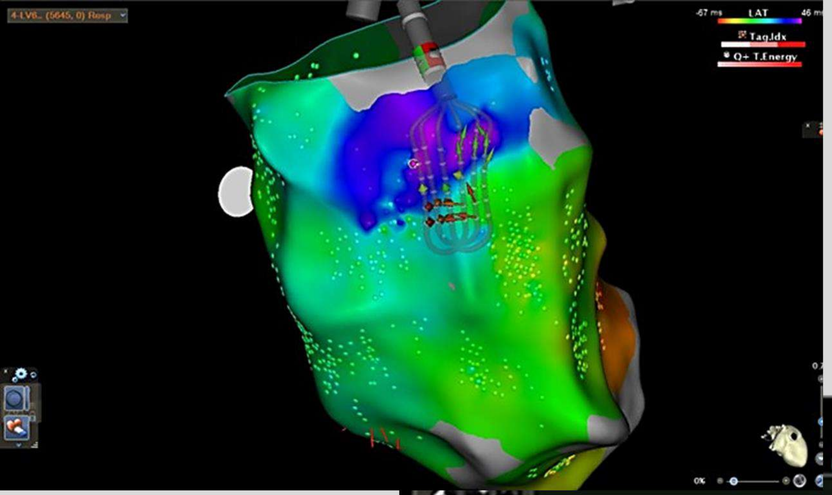
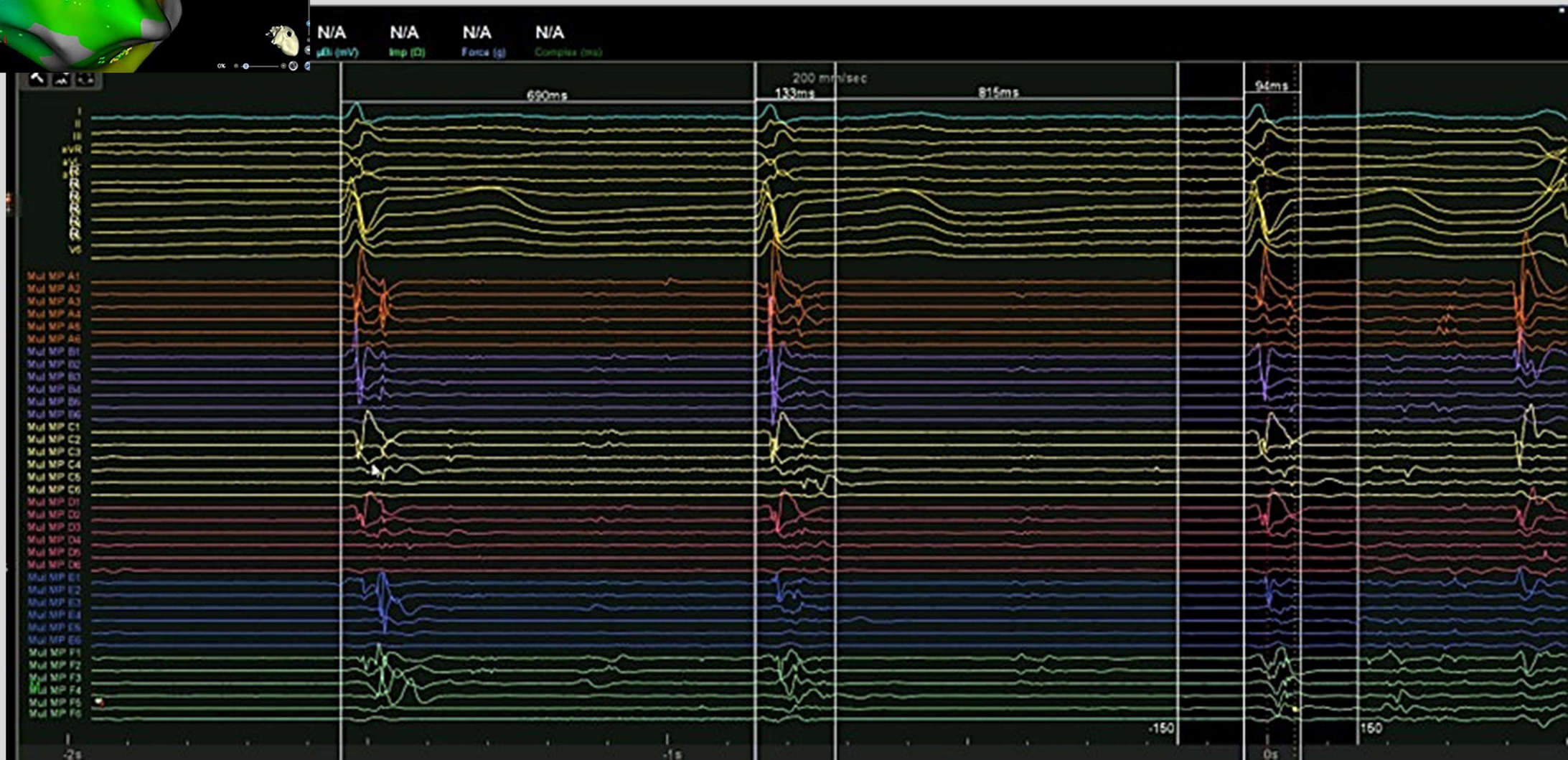
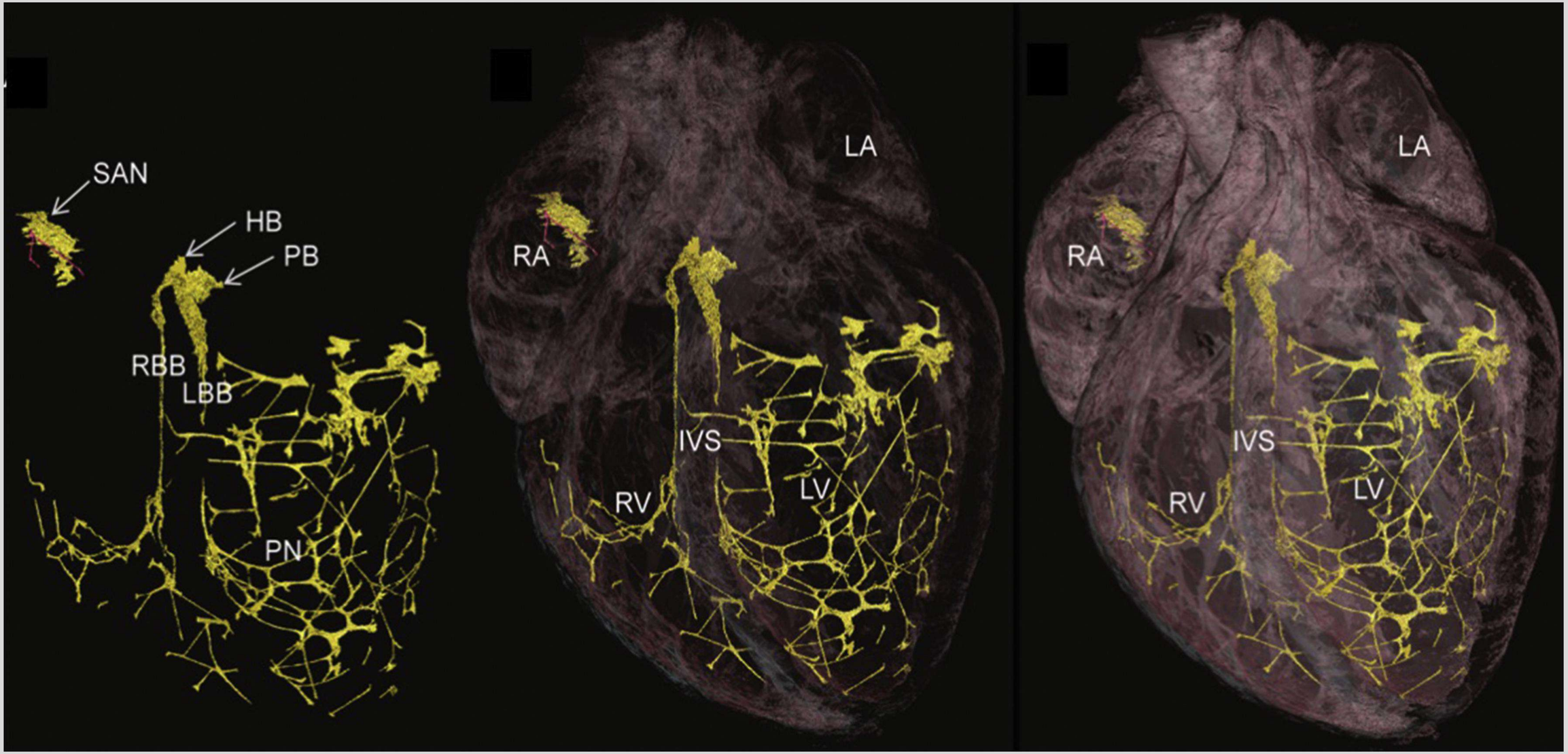
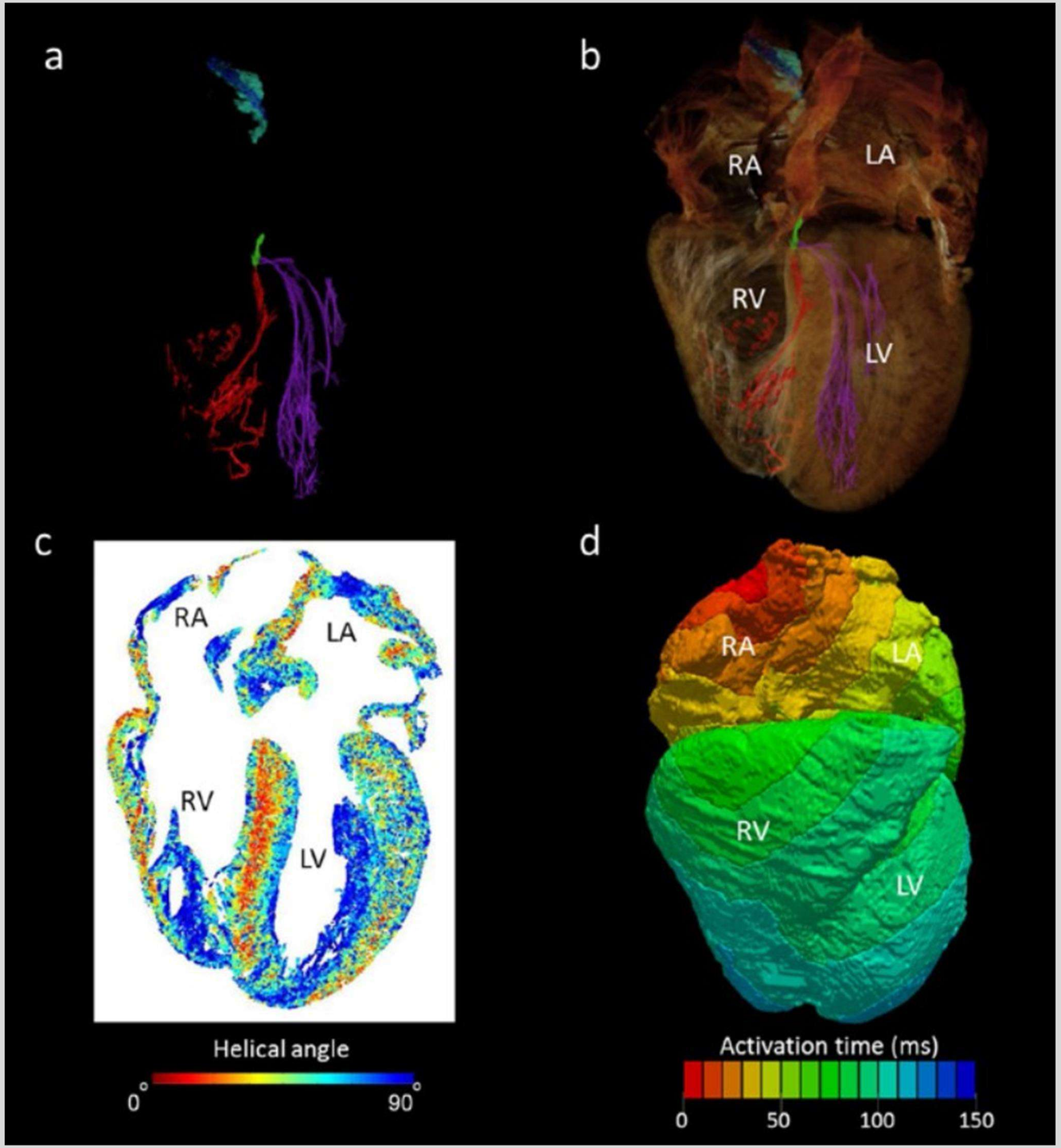
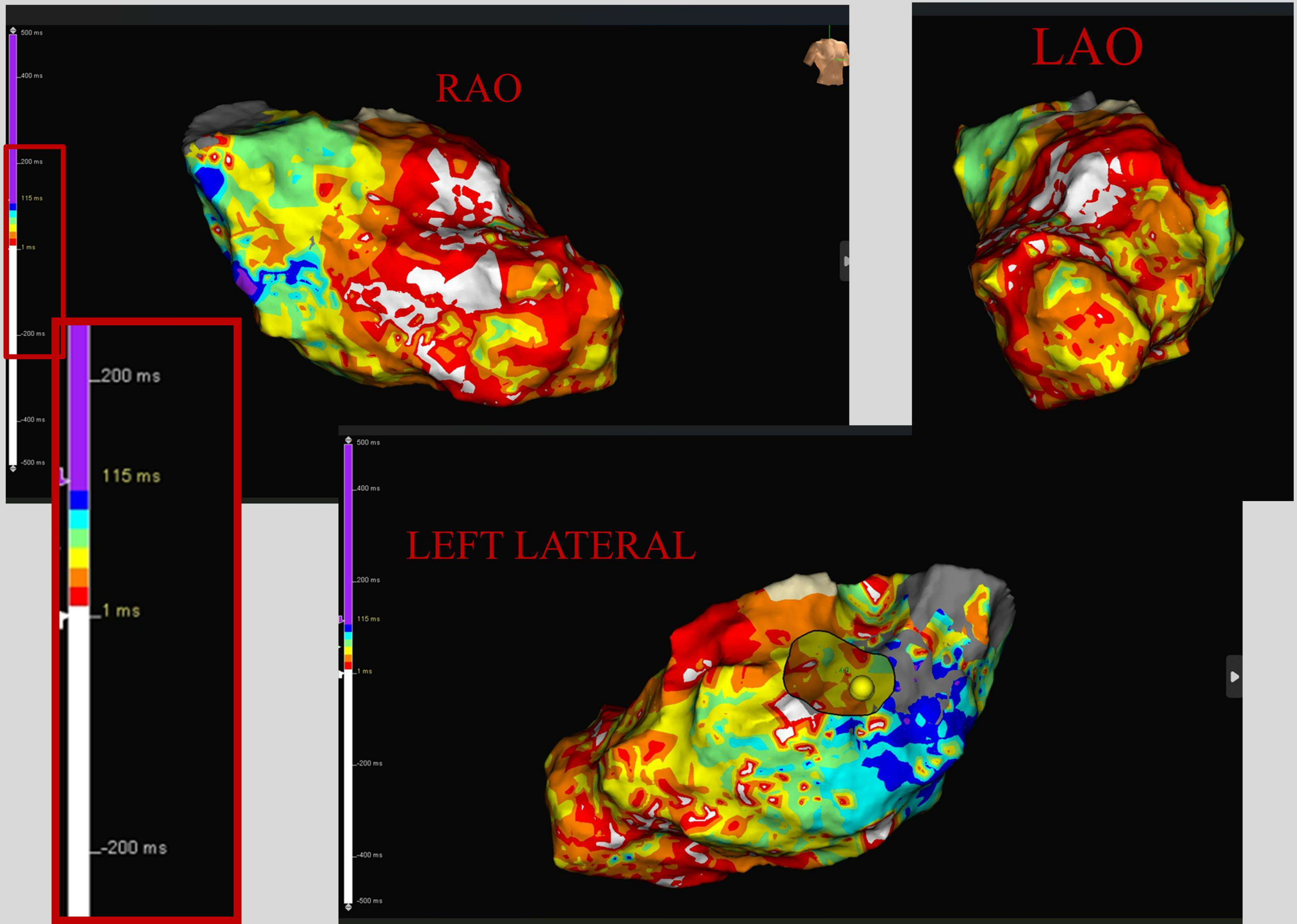
Mul MP F5
Mul MP F6
-150
150
-2s
-1s

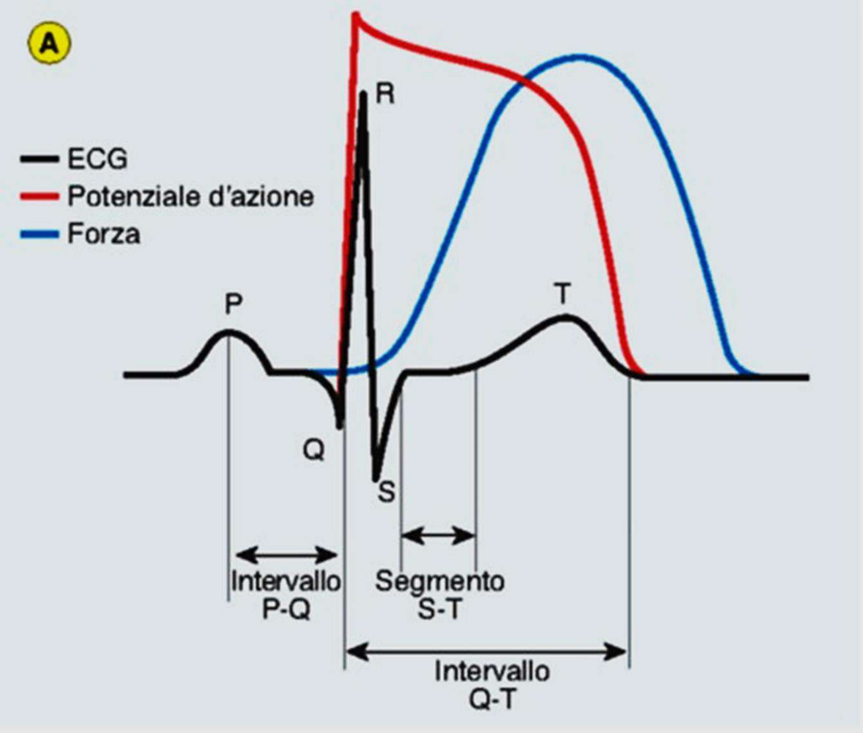

4-LV6... (5645, 0) Resp
-67 ms
LAT
46 ms
TagIdx
Q+ T.Energy


N/A
N/A
N/A
N/A
200 mm/sec
690ms
133ms
815ms
94ms
-150
150
-2s
-1s
0s

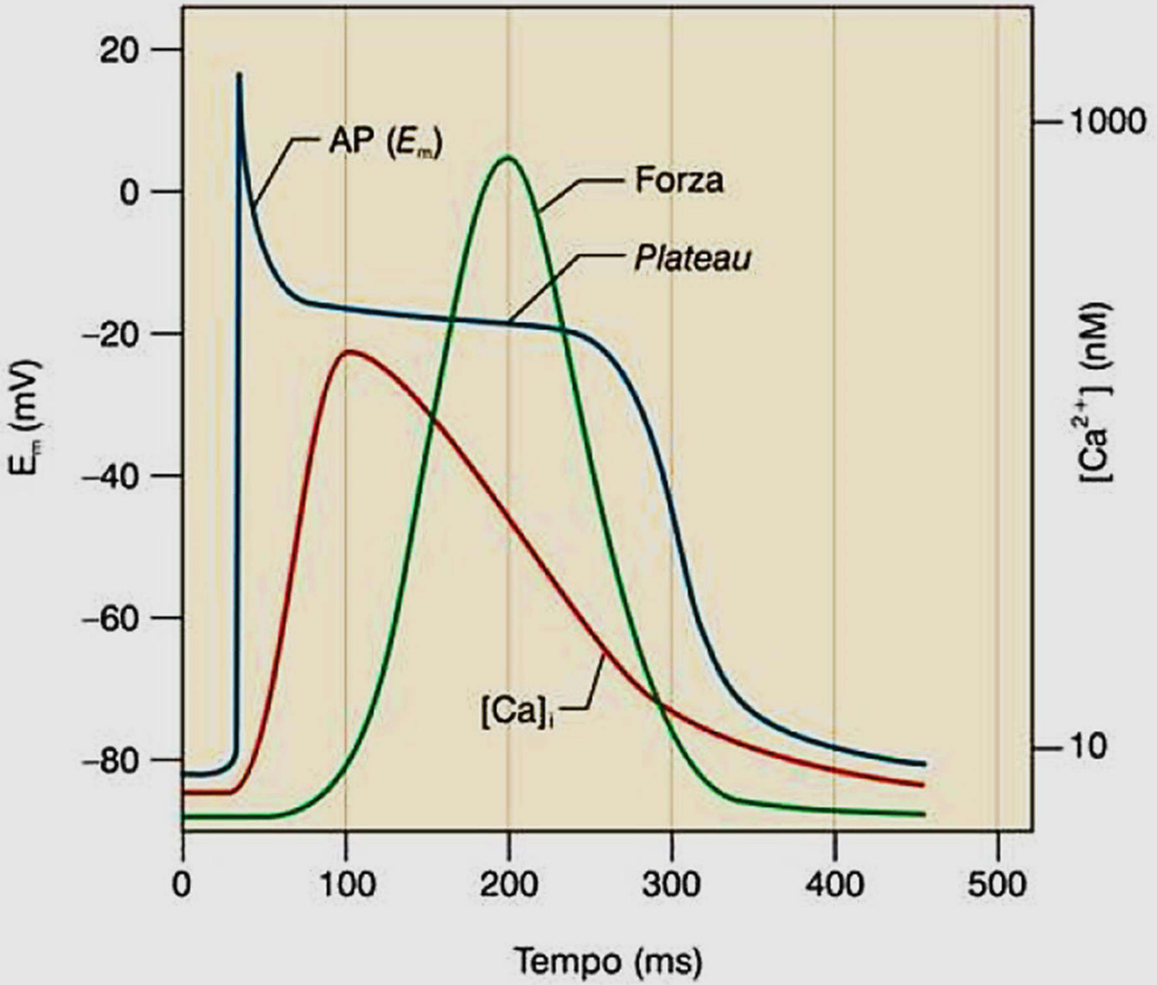

SAN
HB
PB
RBB
LBB
PN
RA
LA
IVS
RV
LV
RA
LA
IVS
RV
LV

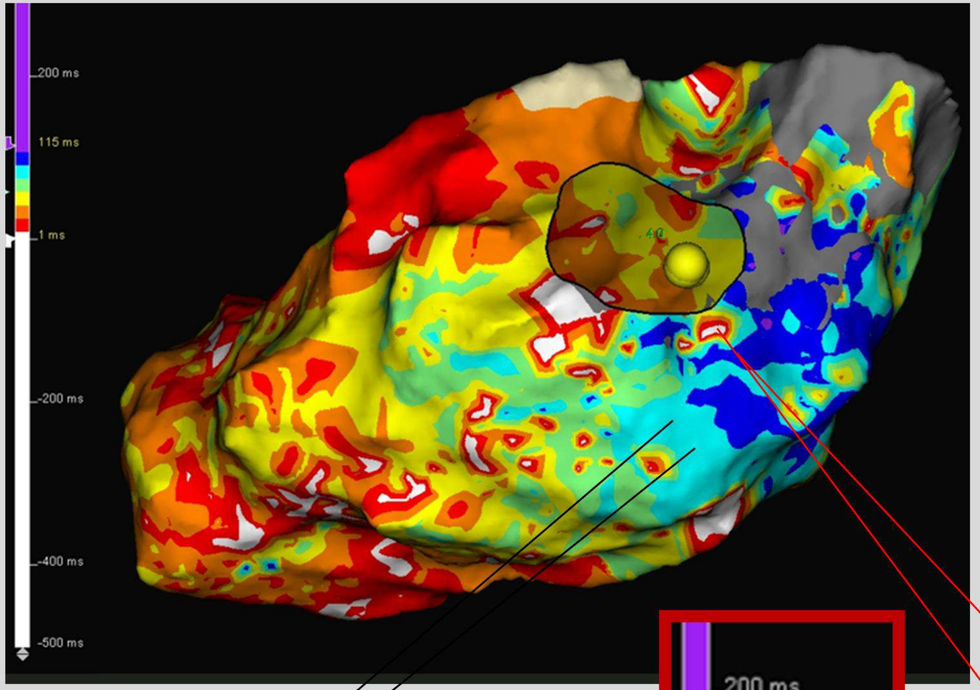

a
b
RA
LA
RV
LV
c
RA
LA
RV
LV
Helical angle
0°
90°
d
RA
LA
RV
LV
Activation time (ms)
0
50
100
150


RAO
LAO
LEFT LATERAL
500 ms
400 ms
200 ms
115 ms
1 ms
-200 ms
-400 ms
-500 ms



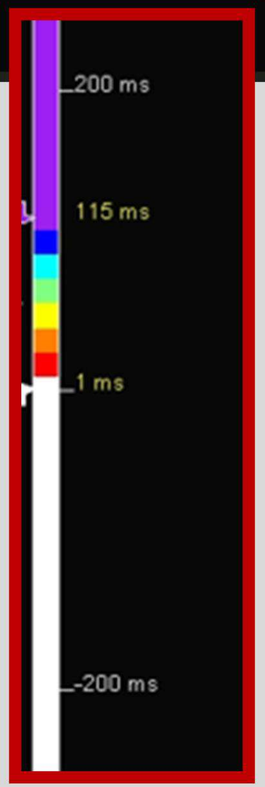
Relazione nella cellula cardiaca tra PA, transienti di Ca^{2+} ed attività meccanica

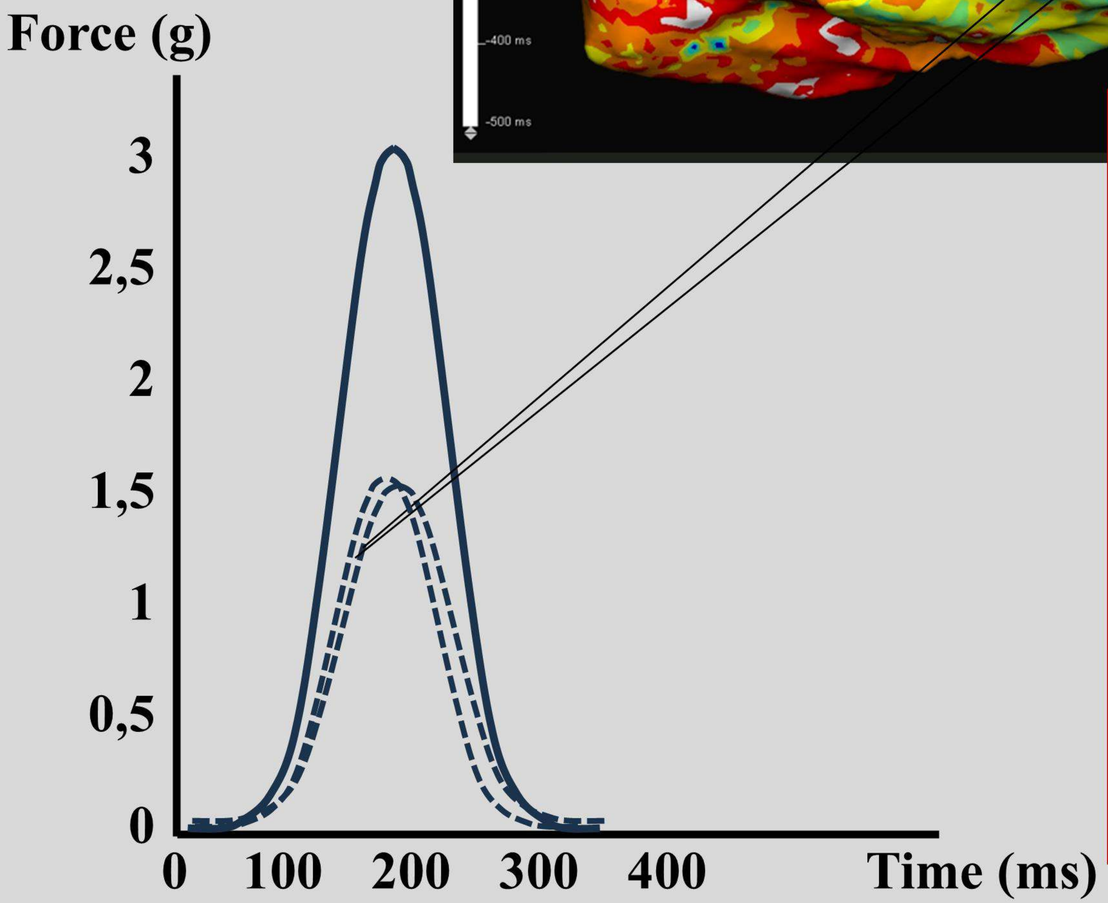


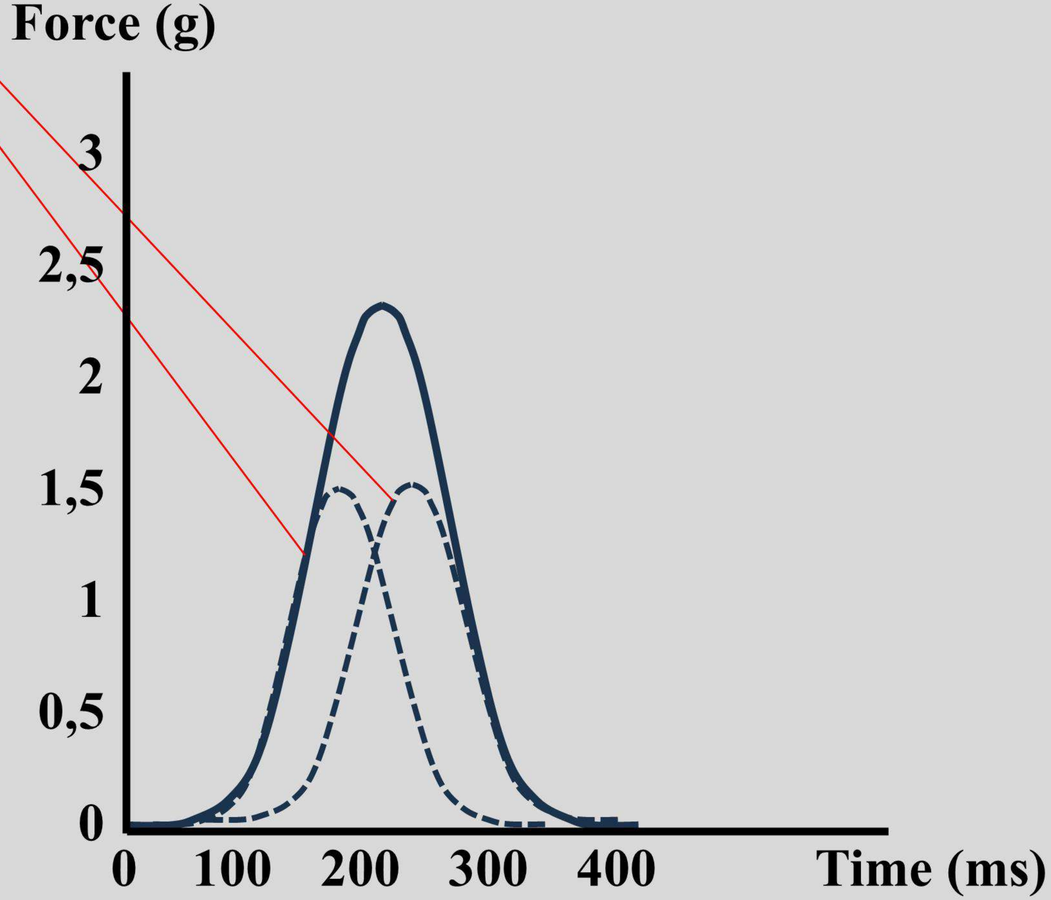


80 ms delay → -20% force

↓ **Efficiency**







The NEW ENGLAND JOURNAL of MEDICINE

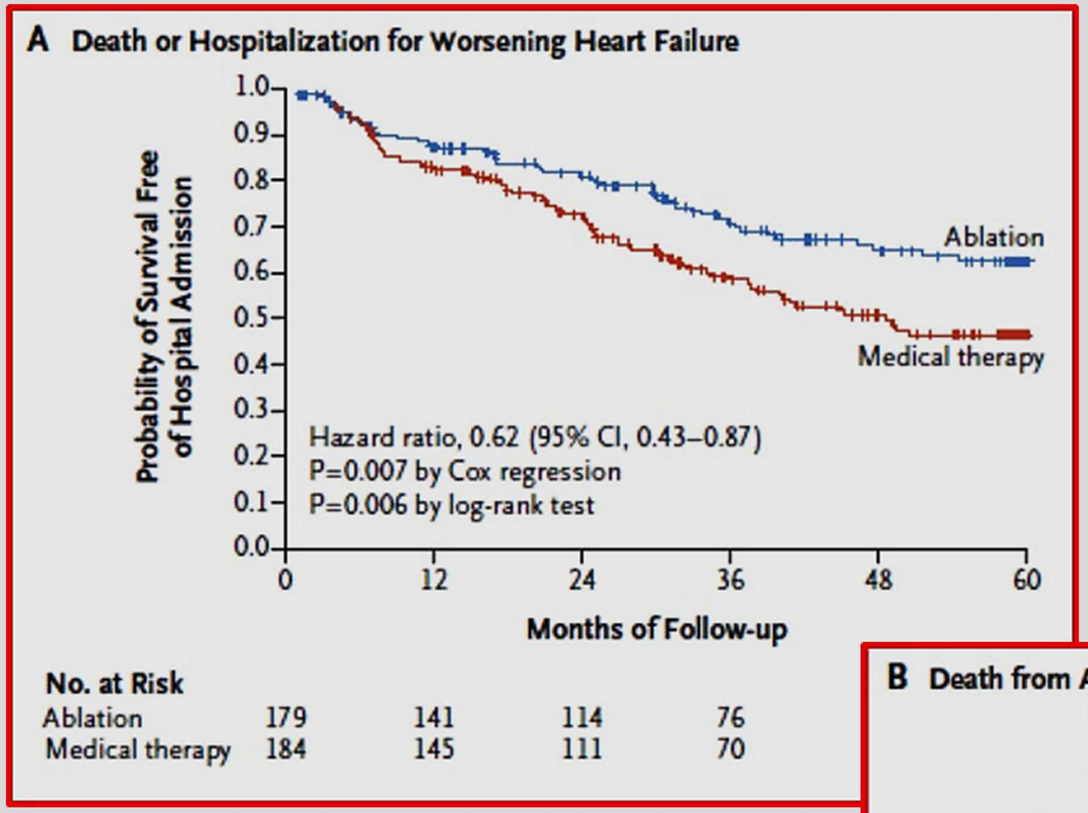
ESTABLISHED IN 1812 FEBRUARY 1, 2

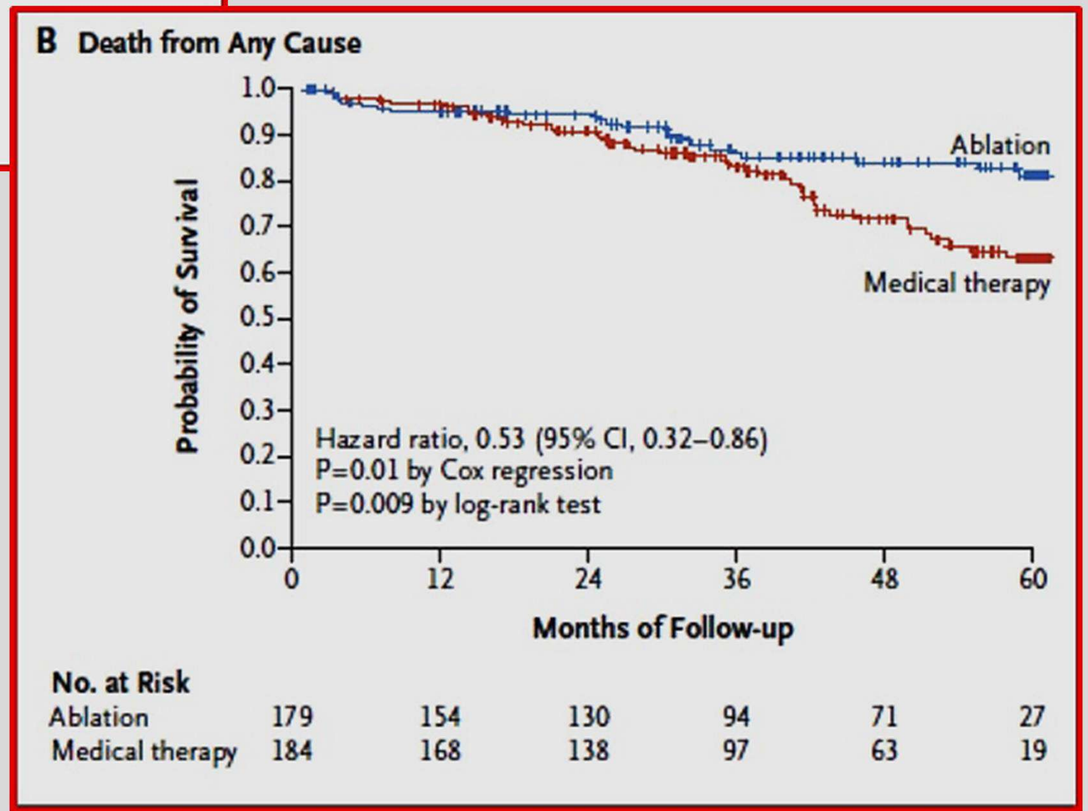
Catheter Ablation for Atrial Fibrill

Nassir F. Marrouche, M.D., Johannes Brachmann, M.D., Die
Lucas Boersma, M.D., Luc Jordaens, M.D., Béla Merk
Prashanthan Sanders, M.D., Jochen Proff, B.S., Heribert S
Jürgen Vogt, M.D., and Dietmar Bänsch, M.D., fo

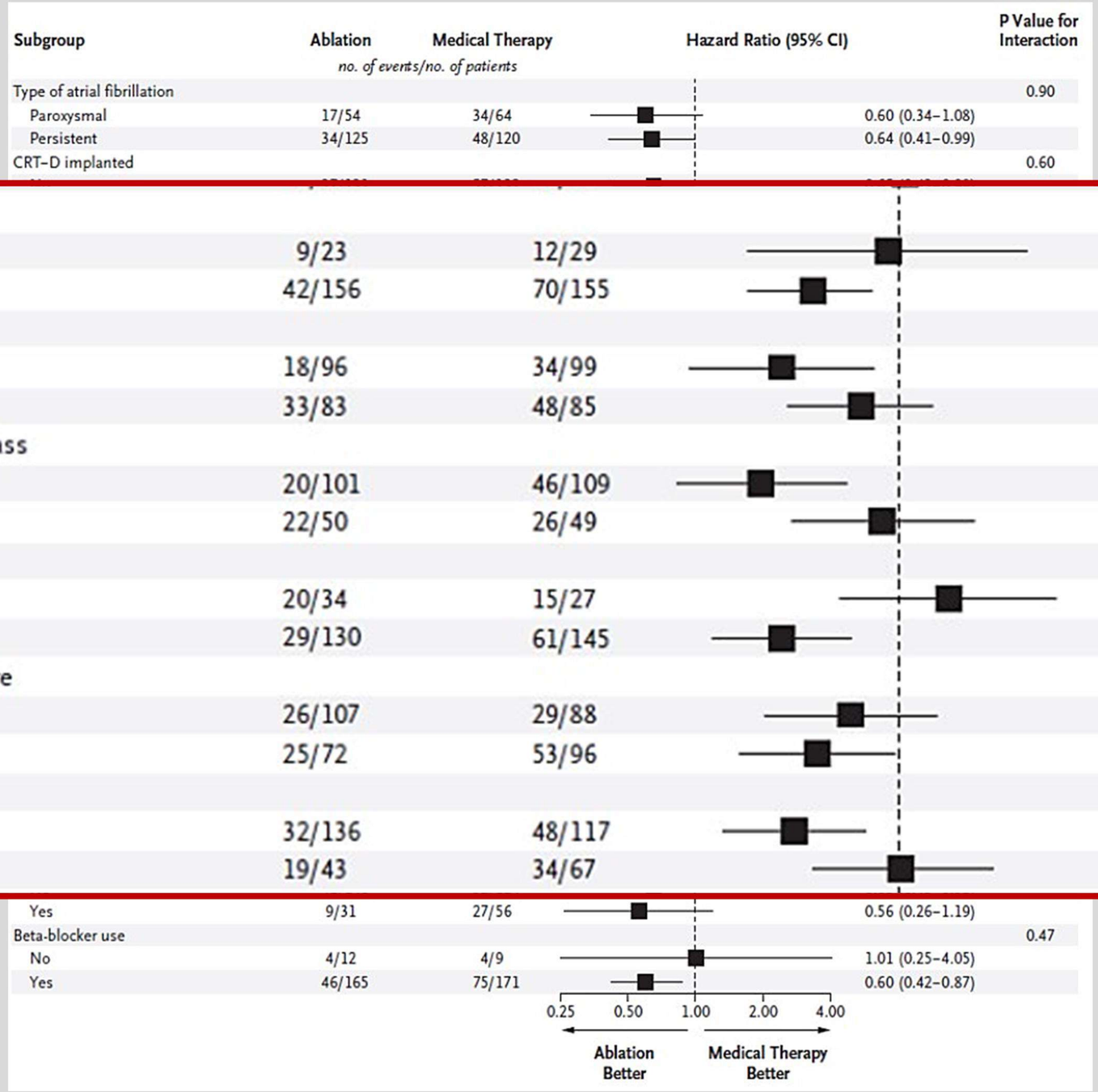
Table 1. Characteristics of the Patients at Baseline.*

Characteristic	Treatment Type	
	Ablation (N=179)	Medical Therapy (N=184)
Age — yr		
Median	64	64
Range	56–71	56–73.5
Male sex — no. (%)	156 (87)	155 (84)
Body-mass index†		
Median	29.0	29.1
Range	25.9–32.2	25.9–32.3
New York Heart Association class — no./total no. (%)		
I	20/174 (11)	19/179 (11)
II	101/174 (58)	109/179 (61)
III	50/174 (29)	49/179 (27)
IV	3/174 (2)	2/179 (1)
Cause of heart failure — no. (%)‡		
Ischemic	72 (40)	96 (52)
Nonischemic	107 (60)	88 (48)
Type of atrial fibrillation — no. (%)		
Paroxysmal	54 (30)	64 (35)
Persistent	125 (70)	120 (65)
Long-standing persistent (duration >1 year)	51 (28)	55 (30)





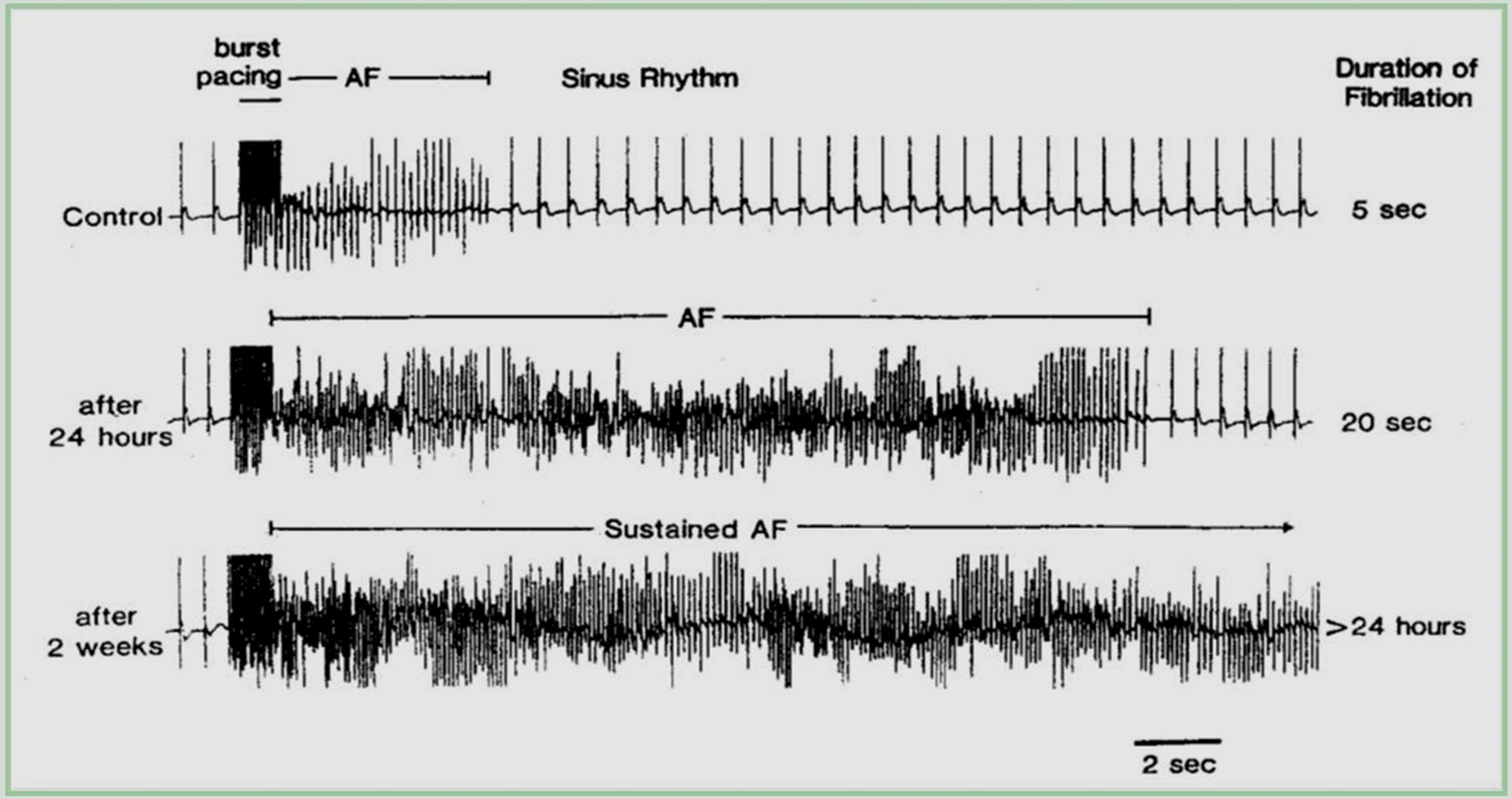
N Engl J Med 2018



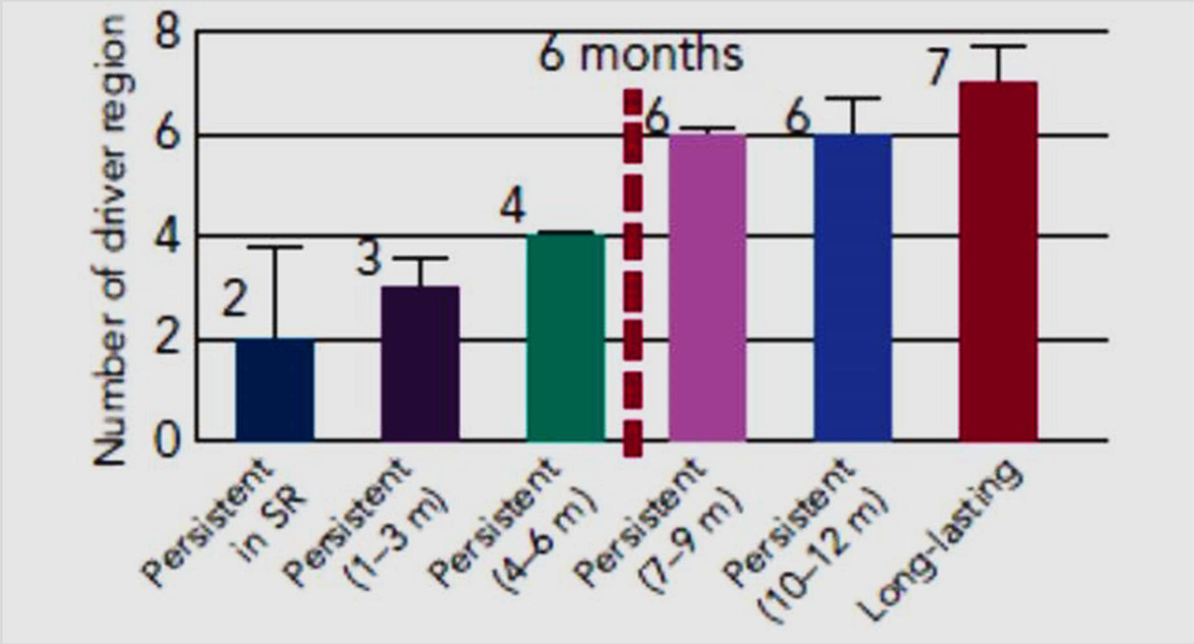
Marrouche, NEJM 2018

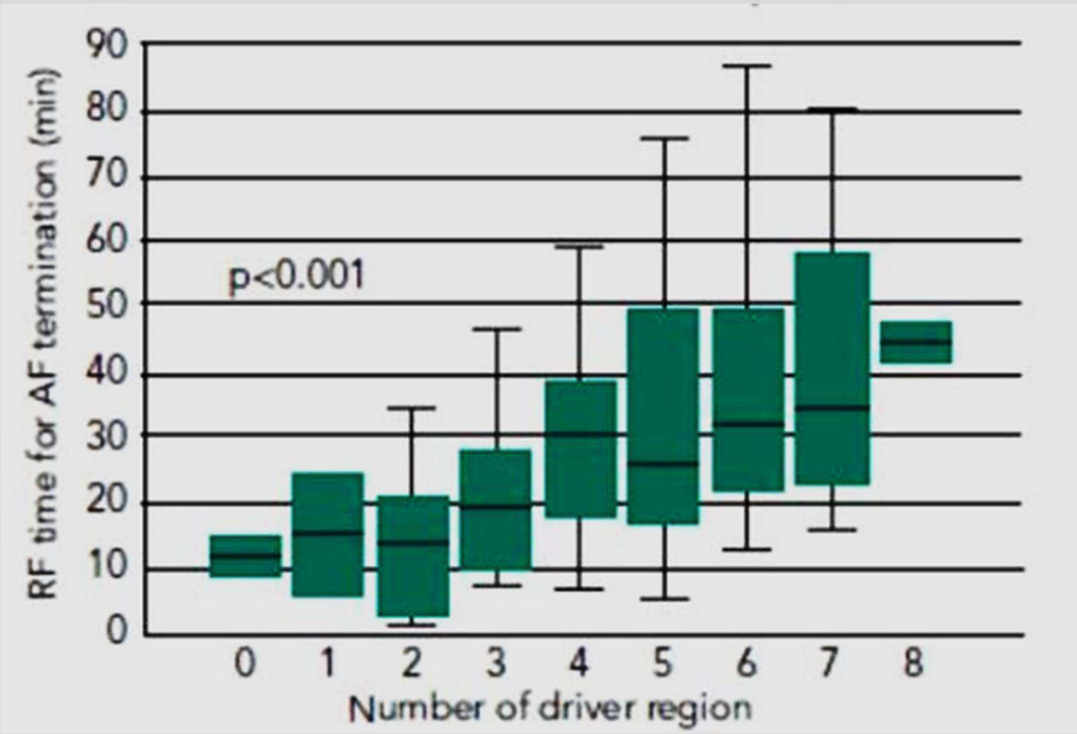
"Atrial Fibrillation Begets Atrial Fibrillation"

A study in awake chronically instrumented goats



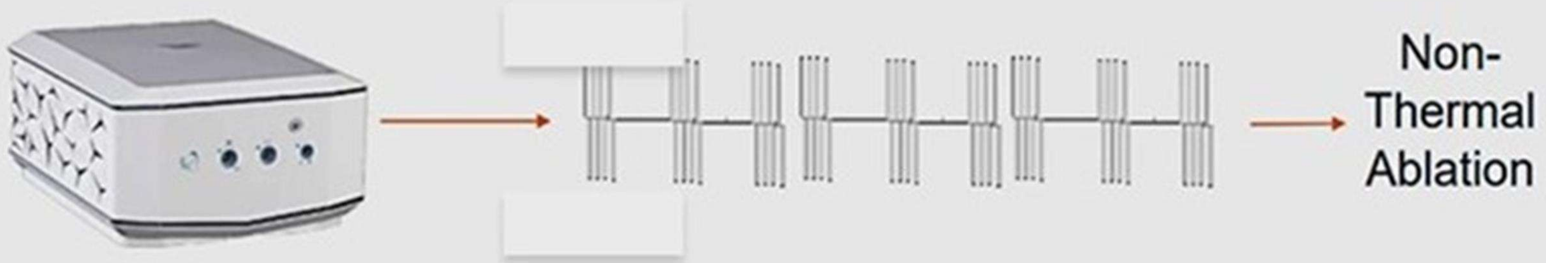
Wijffels, Circulation 1995



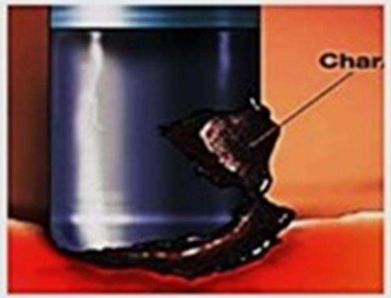


Yamashita, Haissaguerre, arrhythmia & electrophysiology review 2015

PEF Energy is delivered in a series of short, high-voltage, bipolar, biphasic pulses lasting fractions of a second

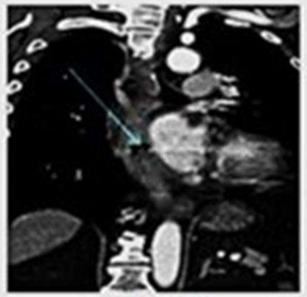


Non-Thermal ablation minimizes the risk of typically thermal induced risks and harms



Char

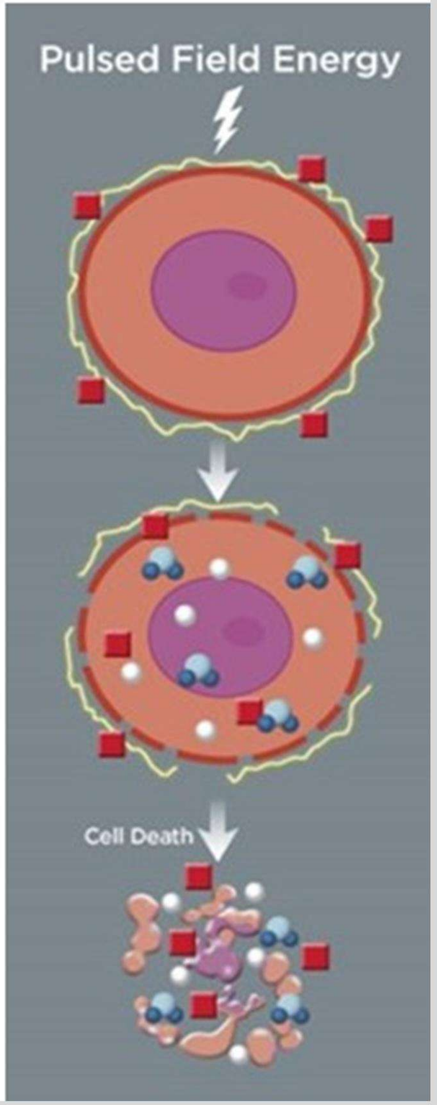
Steam Pop



AEF

Phrenic Nerve Palsy

PV Stenosis



Circulation: Arrhythmia and Electrophysiology

DOI: 10.1161/CIRCEP.122.011780

Paroxysmal AF Ablation Using a Novel Variable-Loop Biphasic Pulsed Field Ablation Catheter Integrated With a 3D Mapping System: 1-Year Outcomes of the Multicenter inspIRE Study

Running title: *Duytschaever et al.; 1-Year Outcomes of inspIRE: PFA for PAF*

Mattias Duytschaever, MD, PhD[1]; Tom De Potter, MD[2]; Massimo Grimaldi, MD, PhD[3]; Ante Anic, MD[4]; Johan Vijgen, MD[5]; Petr Neuzil, MD, PhD[6]; Hugo Van Herendael, MD[7]; Atul Verma, MD[8]; Allan Skanes, MD[9]; Daniel Scherr, MD[10]; Helmut Pürerfellner, MD[11]; Gediminas Rackauskas, MD[12]; Pierre Jais, MD[13]; Vivek Y. Reddy, MD[6,14] on behalf of the *inspIRE* trial investigators

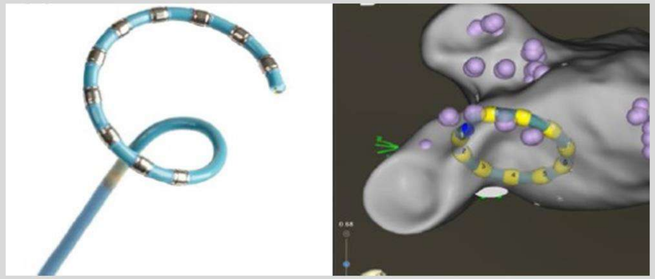


Table 3. Summary of Primary Adverse Events

Adverse events*	Wave I (N=40)	Wave II (N=186)
Primary adverse events†	0 (0)	0 (0)
Atrio-esophageal fistula	0 (0)	0 (0)
Cardiac tamponade/perforation	0 (0)	0 (0)
Pulmonary vein stenosis	0 (0)	0 (0)
Device- or procedure-related death	0 (0)	0 (0)
Major vascular access complication/bleeding	0 (0)	0 (0)
Myocardial infarction	0 (0)	0 (0)
Pericarditis	0 (0)	0 (0)
Phrenic nerve paralysis (permanent)	0 (0)	0 (0)
Stroke/cerebrovascular accident	0 (0)	0 (0)
Thromboembolism	0 (0)	0 (0)
Transient ischemic attack	0 (0)	0 (0)
Pulmonary vein stenosis sub-analysis‡		
Mild	0 (0)	N/A
Moderate	0 (0)	N/A
Severe	0 (0)	N/A

ESC European Society of Cardiology
Europace (2025) 27, euaf182
https://doi.org/10.1093/europace/euaf182

CLINICAL RESEARCH

Real-world experience with the pentaspline pulsed field ablation system: one-year outcomes of the FARAD

Lucas V.A. Boersma [1]*, Gábor Széplaki

FARADISE Global Registry
1-year outcomes with the pentaspline PFA Catheter

Study design

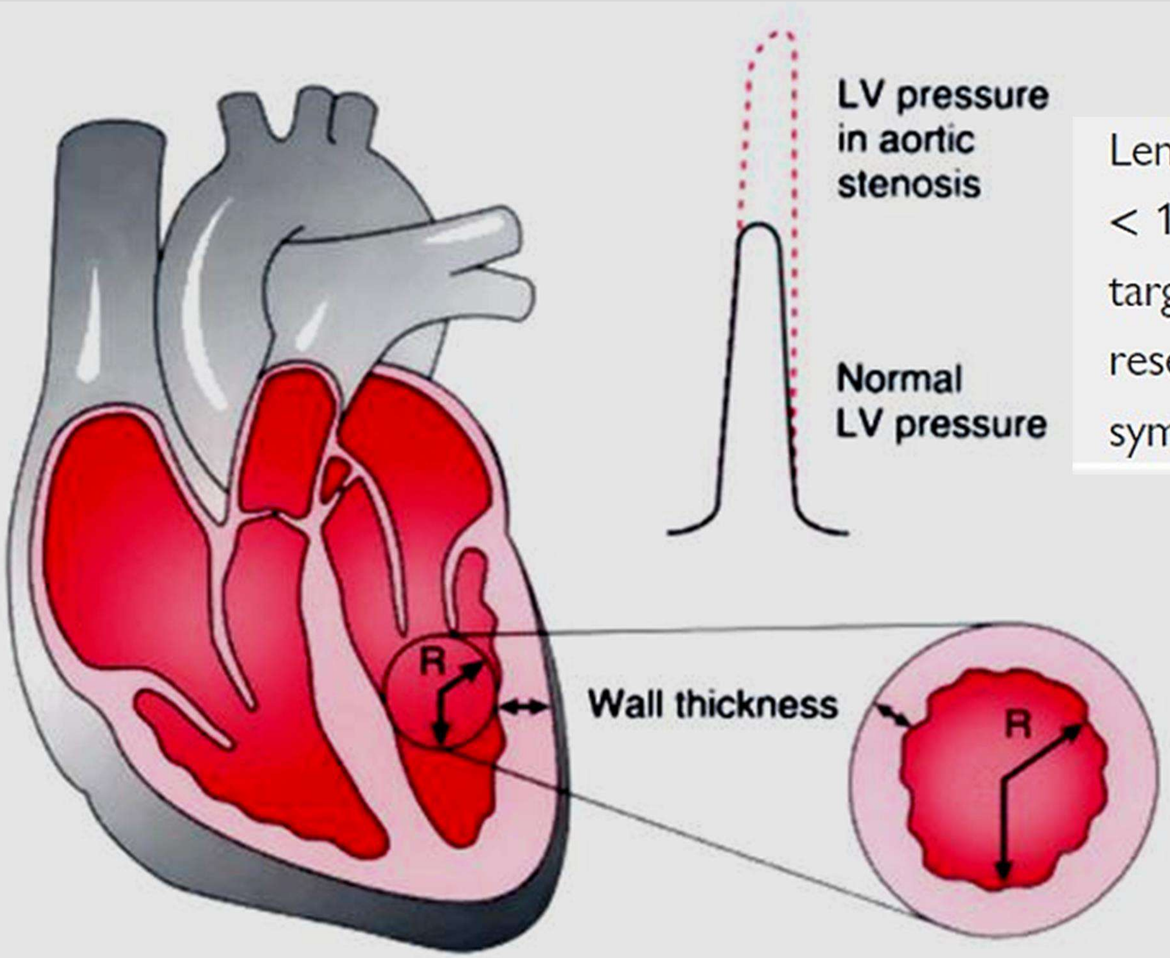
- **1158** AF patients
- **48** Centers
- **21** Countries
- **Real-World Registry**

Safety
1.5%
Serious adverse event rate

Learning Curve
- Procedure times
- Extra-PV ablations
- 1-year outcomes

Clinical effectiveness
80.8%
Paroxysmal AF
67.7%
Non-paroxysmal AF

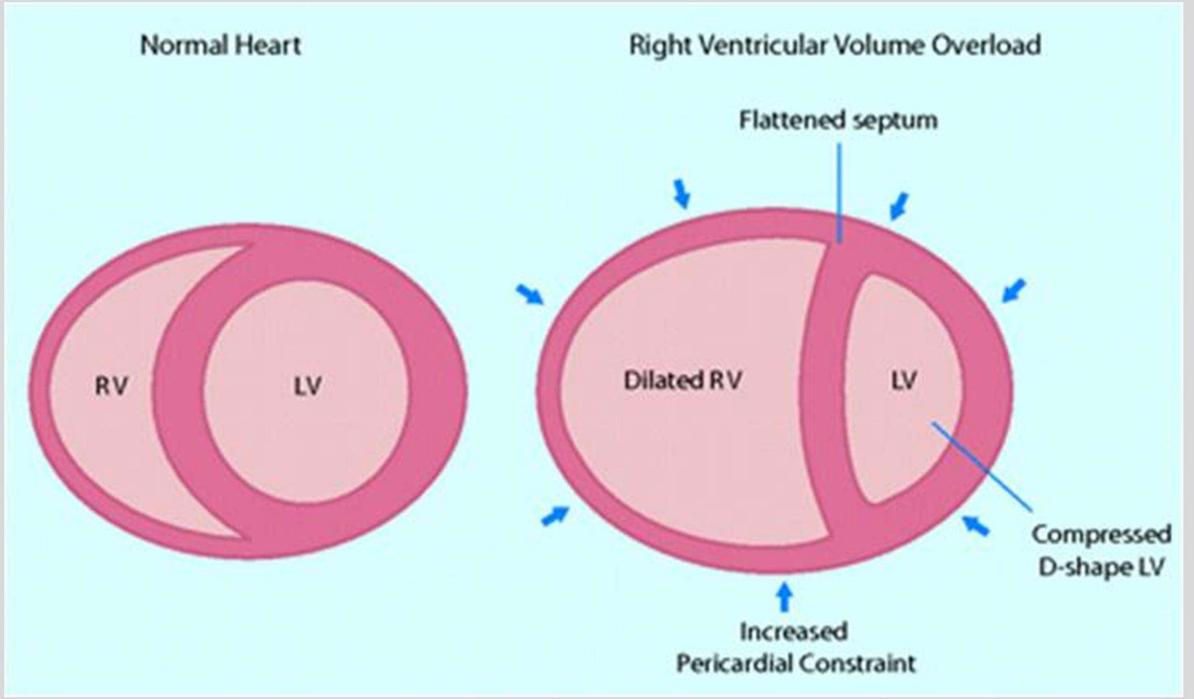
Predictors of success
- ✓ AF Indication (PAF)
- ✓ De Novo ablation
- ✓ Age (<65 yrs)
- ✓ Biological sex (male)
- ✗ Lesion set



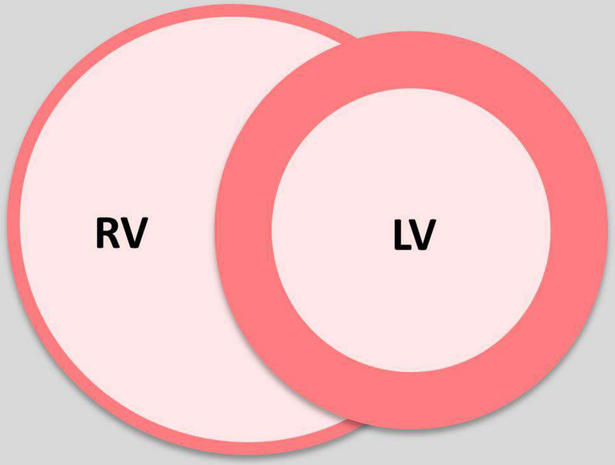
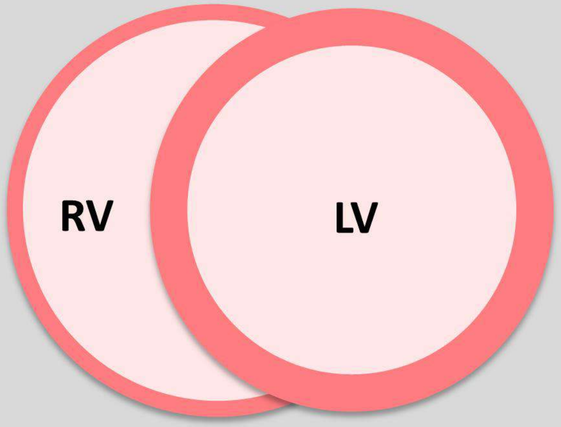
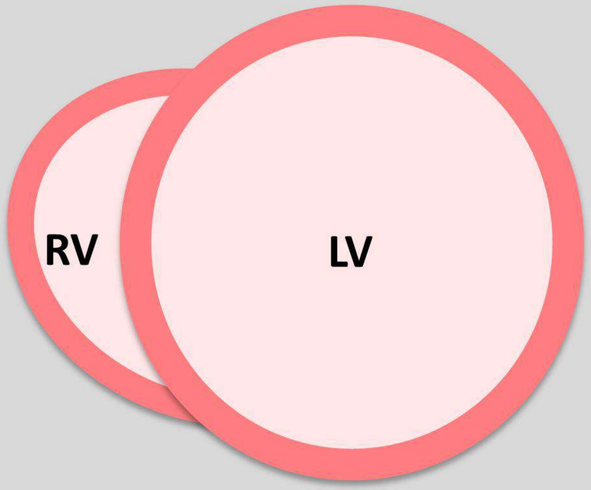
Laplace Law

$$\text{Wall stress} = \frac{\text{pressure} \times \text{radius}}{2(\text{wall thickness})}$$

Lenient rate control with a resting heart rate of < 110 b.p.m. should be considered as the initial target for patients with AF, with stricter control reserved for those with continuing AF-related symptoms.[459,460,466]	IIa	B



I tempi del cuore

	Allegro	Andante	Adagio
			
F.V.M.	80-110 b/m	80-90 b/m	70-80 b/m