



Ταχυκαρδία με ευρέα QRS – απινιδωτές - κολπική μαρμαρυγή

Απαρτιωμένη 2024

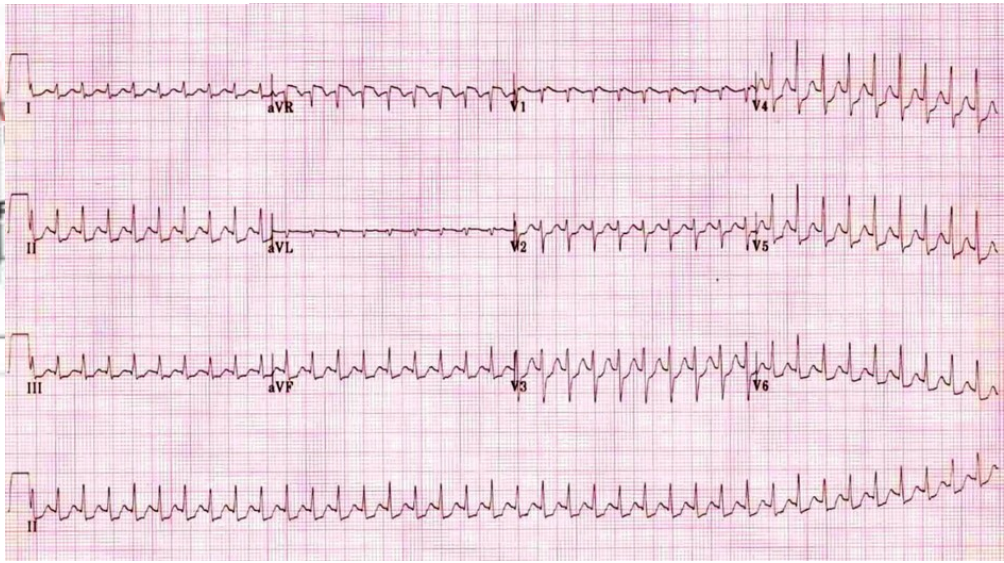
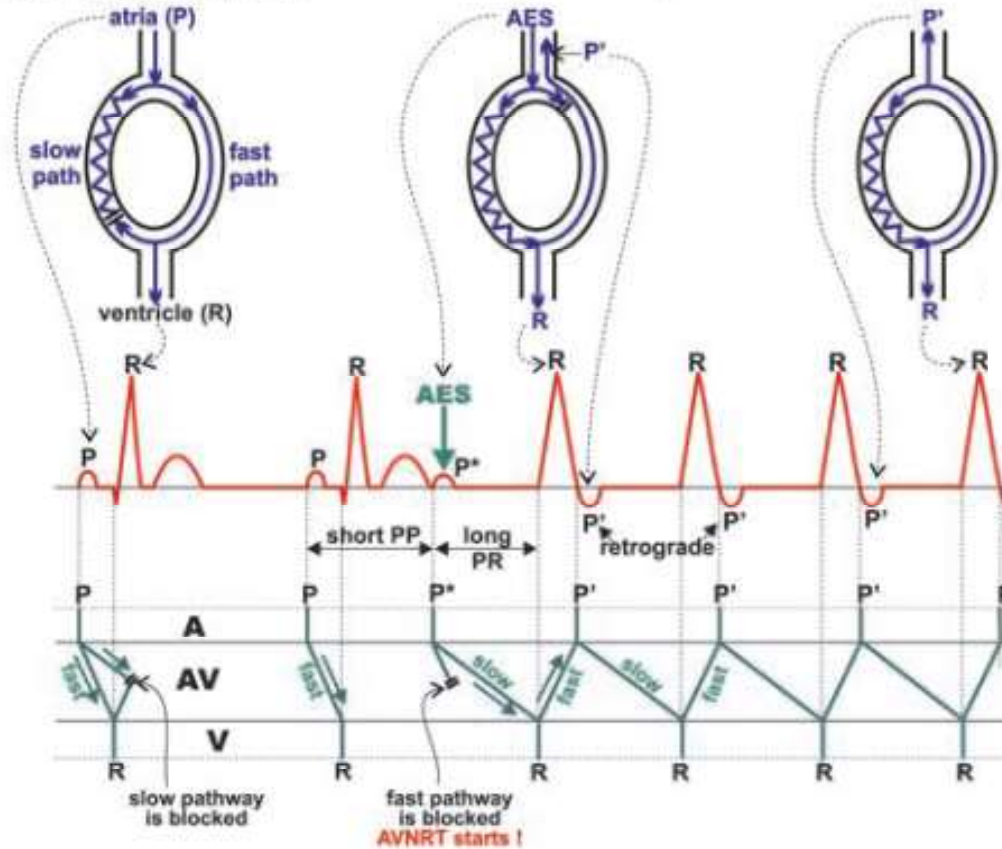
Γ Λεβεντόπουλος

Επιμ Α' Καρδιολογίας ΠΓΝΠ

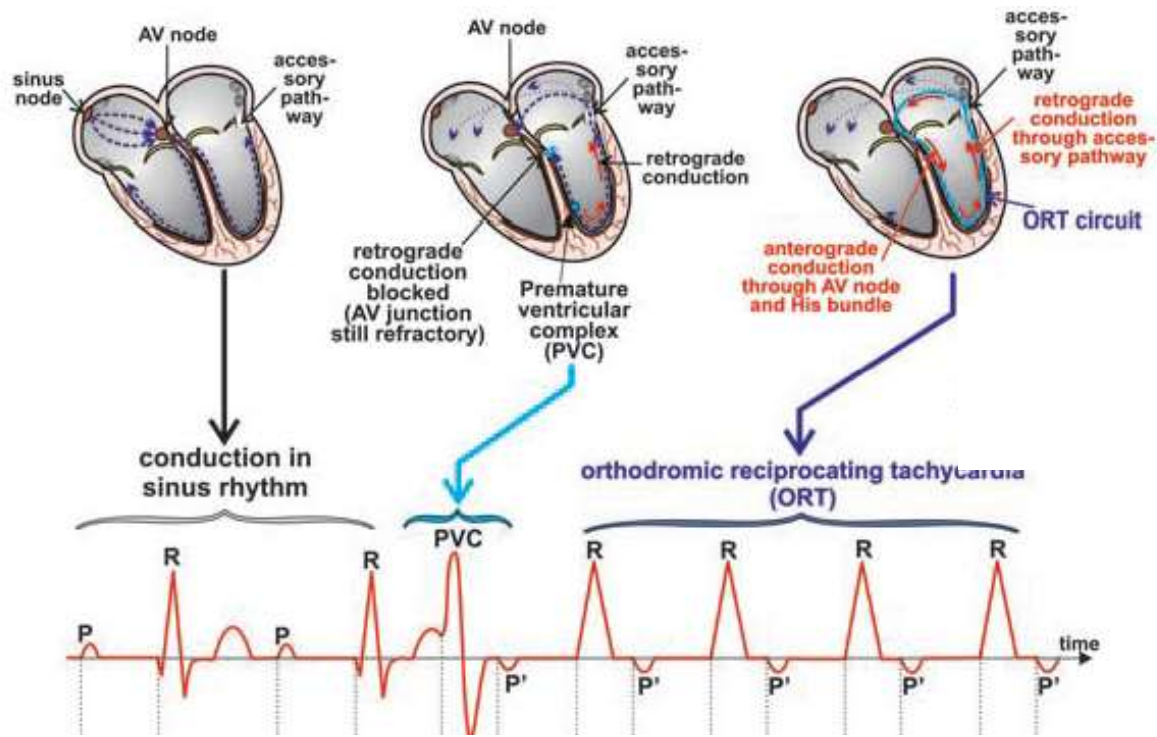
Sinus rhythm : the antegrade conduction over the slow pathway is blocked by retrograde invasion of the impulse.

An *early atrial extrasystole* is only conducted over the slow pathway since the fast one is still refractory.

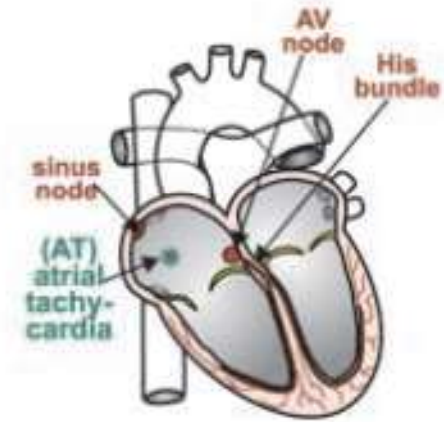
The slow path is the antegrade limb and the fast one is the retrograde limb of the tachycardia circuit.



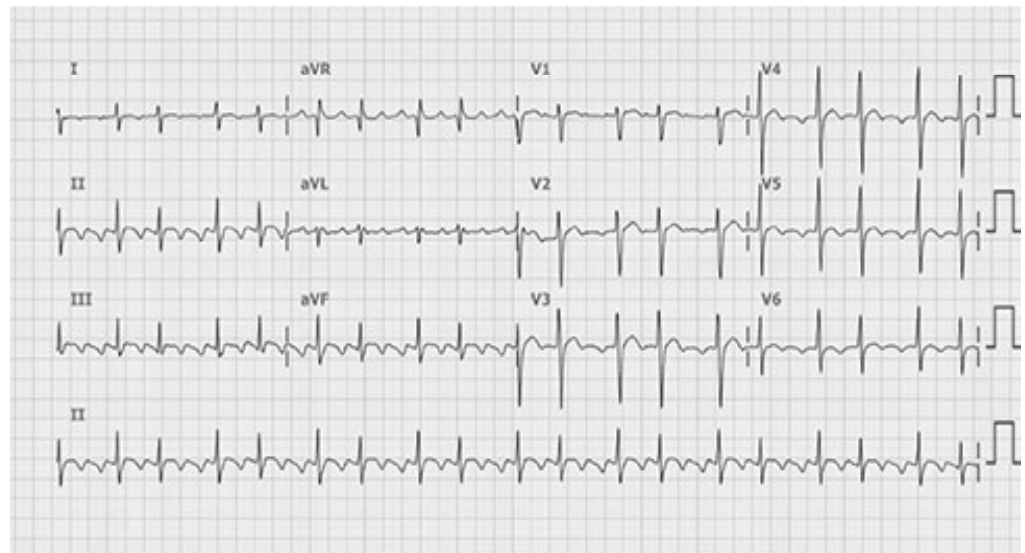
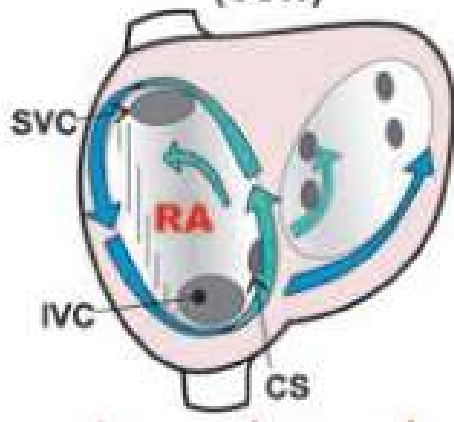
AVRT



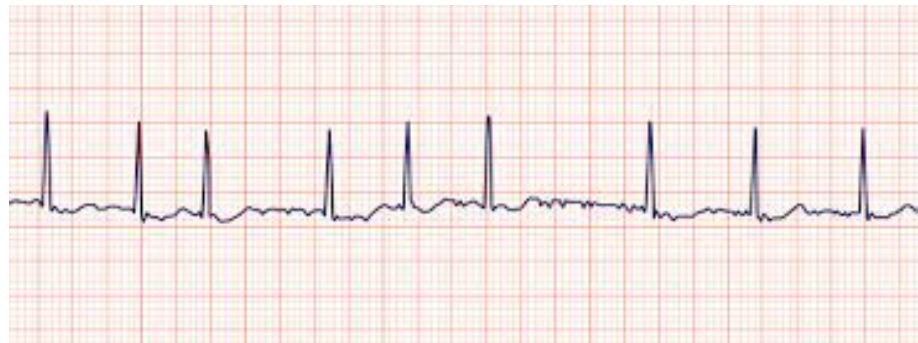
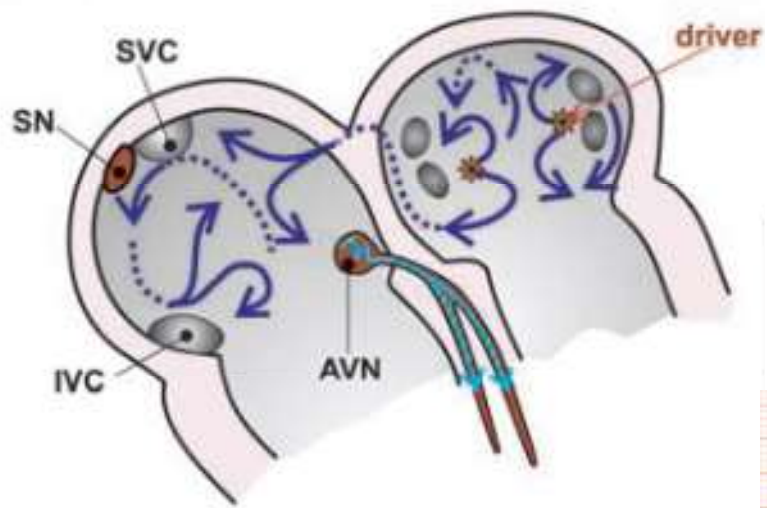
AT



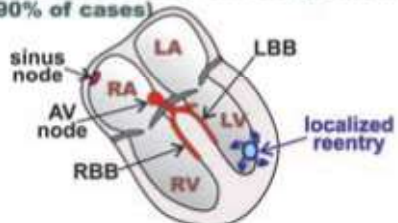
COMMON FLUTTER (CCW)



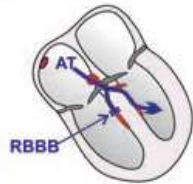
Κολπική Μαρμαρυγή



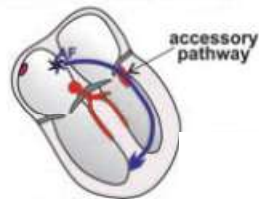
VT is the most common form of wide QRS complex tachycardia (90% of cases)



SVT (including ST, AT, AVNRT) with pre-existing or tachycardia-related BBB or functional aberrant conduction

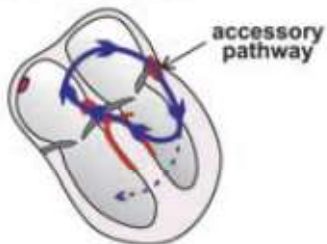


SVT with conduction over an accessory pathway



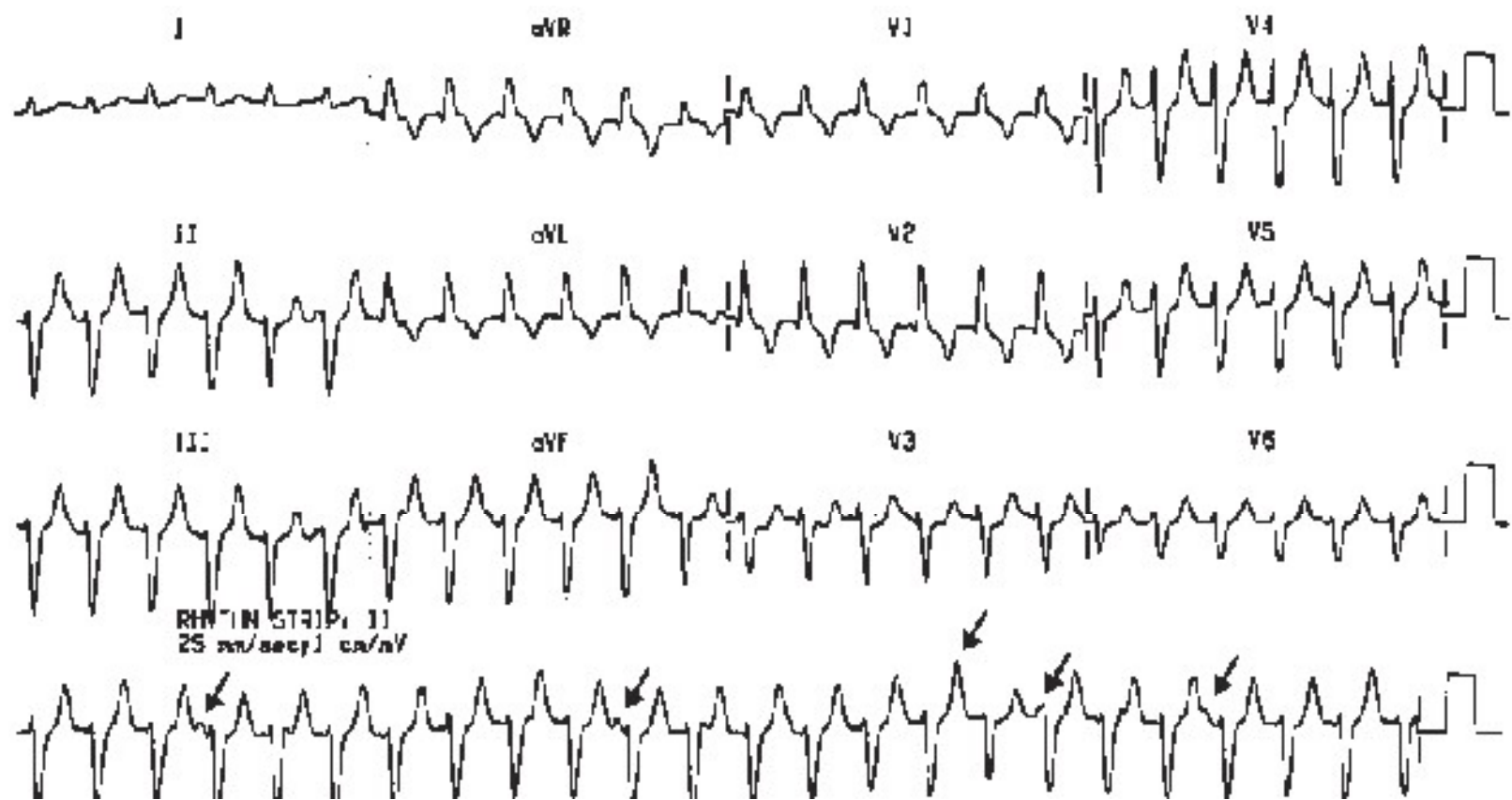
AF and conduction over a way is always : FBI (fast, broad, irregular). 1:1 AV conduction of atrial flutter over the accessory pathway may result in very rapid ventricular rates

Antidromic AVRT



Pre-excitation (WPW); delta waves
Antidromic : anterograde over an accessory pathway and retrograde over the AV node



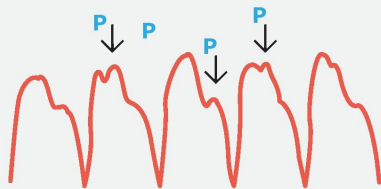


VT versus SVT with Aberration

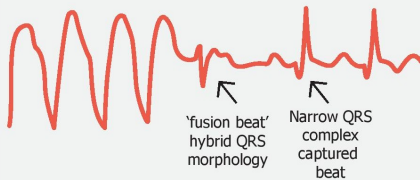
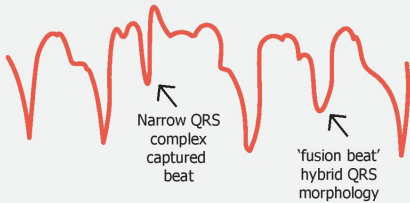
- Interpretation Cheat Sheet

Features favouring VT

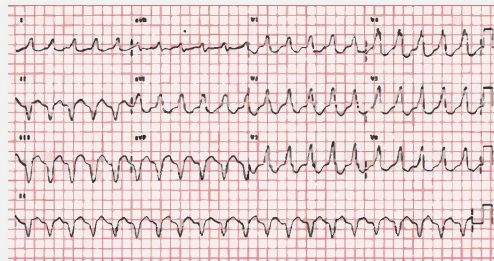
- **Absence** of typical RBBB or LBBB morphology
- **AV dissociation** (P and QRS complexes occur independantly of each other)



- Presence of **captured beats** (normal sinus beat that is captured between a VT run) and **fusion beats** (hybrid complex of normal sinus beat and a ventricular beat colision)



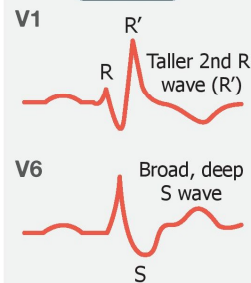
- **Positive or negative concordance** in all precordial leads, i.e. leads V1-6 show entirely positive (R) or entirely negative (QS) complexes.



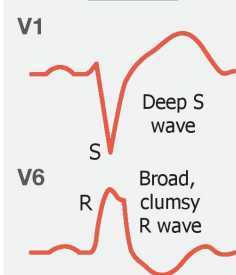
Example of positive concordance in VT

Standard patterns

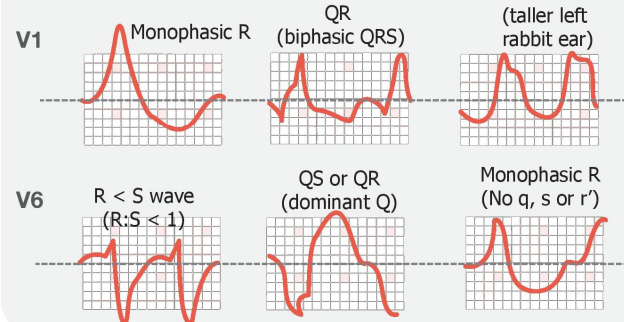
RBBB



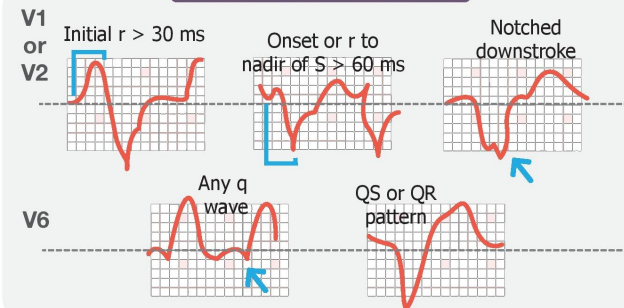
LBBB



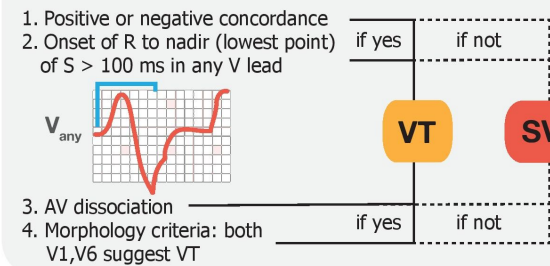
RBBB morph. criteria in VT



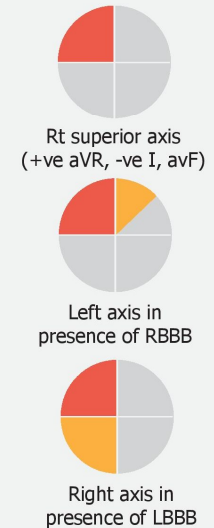
LBBB morph. criteria in VT



Brugada algorithm



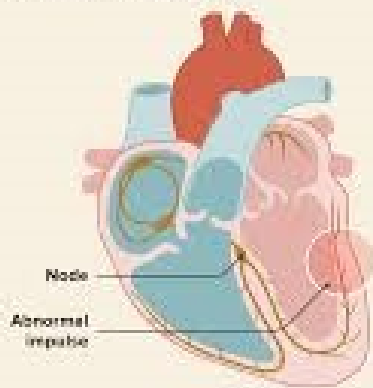
Axis suggesting VT



Ref. Arrhythmia & Electrophysiology Review 2013;2(1):23-9

If you notice any mistakes, please contact me: usama77788@gmail.com. Feel free to share the graphic with link back to my website visualmed.org

Ventricular Tachycardia

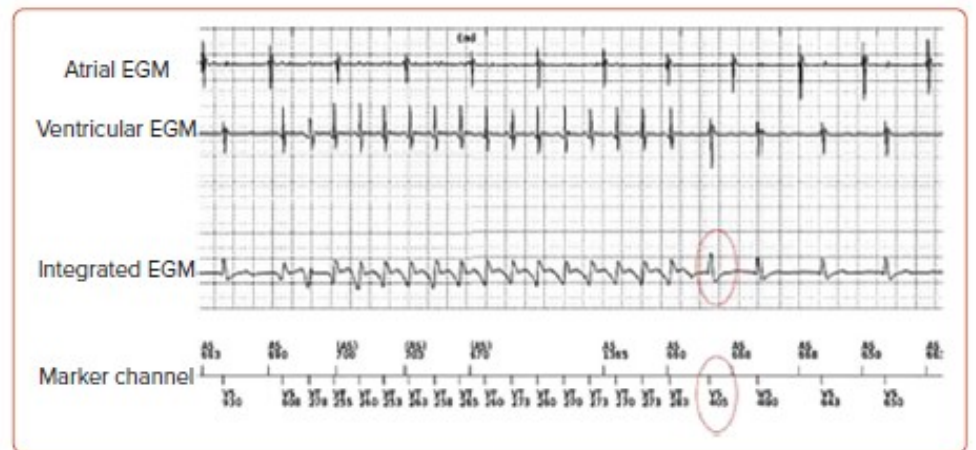


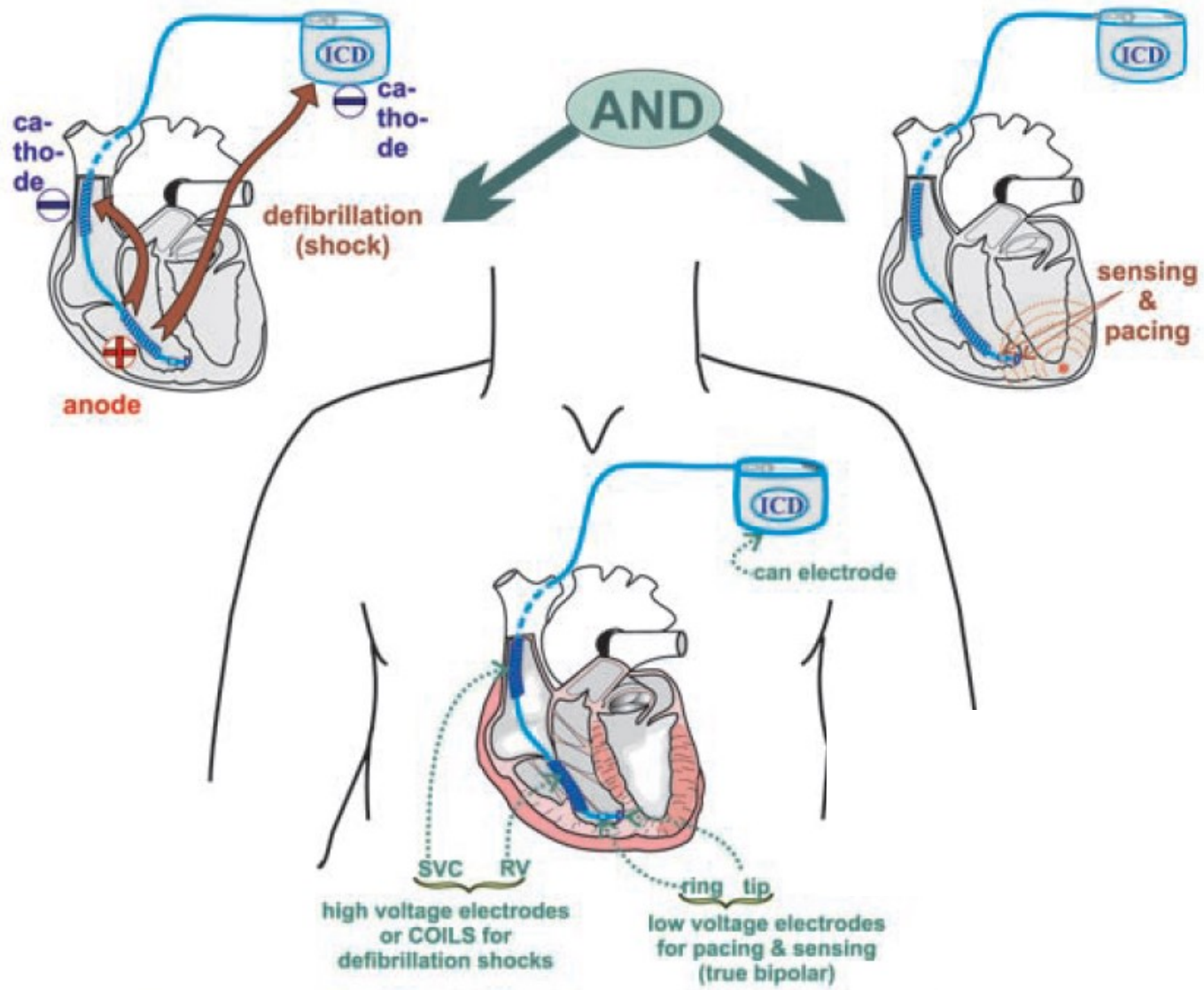
healthline

Normal heart rate



VT





1 και 2 δευτερογενής πρόληψη

Cardiac arrest due to ventricular fibrillation (VF) or ventricular tachycardia (VT) not due to a transient or reversible cause.

(level of evidence : A)



Spontaneous sustained VT in association with structural heart disease.

(level of evidence : B)



Syncope of undetermined origin with clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiologic study (EPS) when drug therapy is ineffective, not tolerated, or not preferred.

(level of evidence : B)

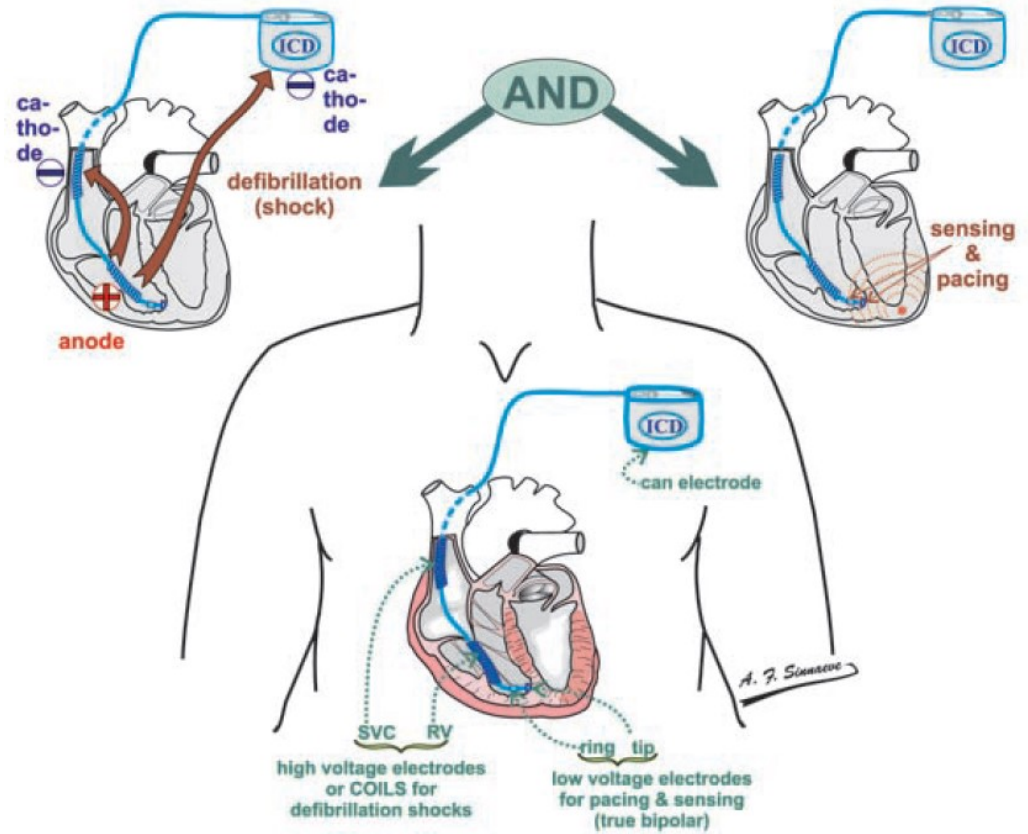


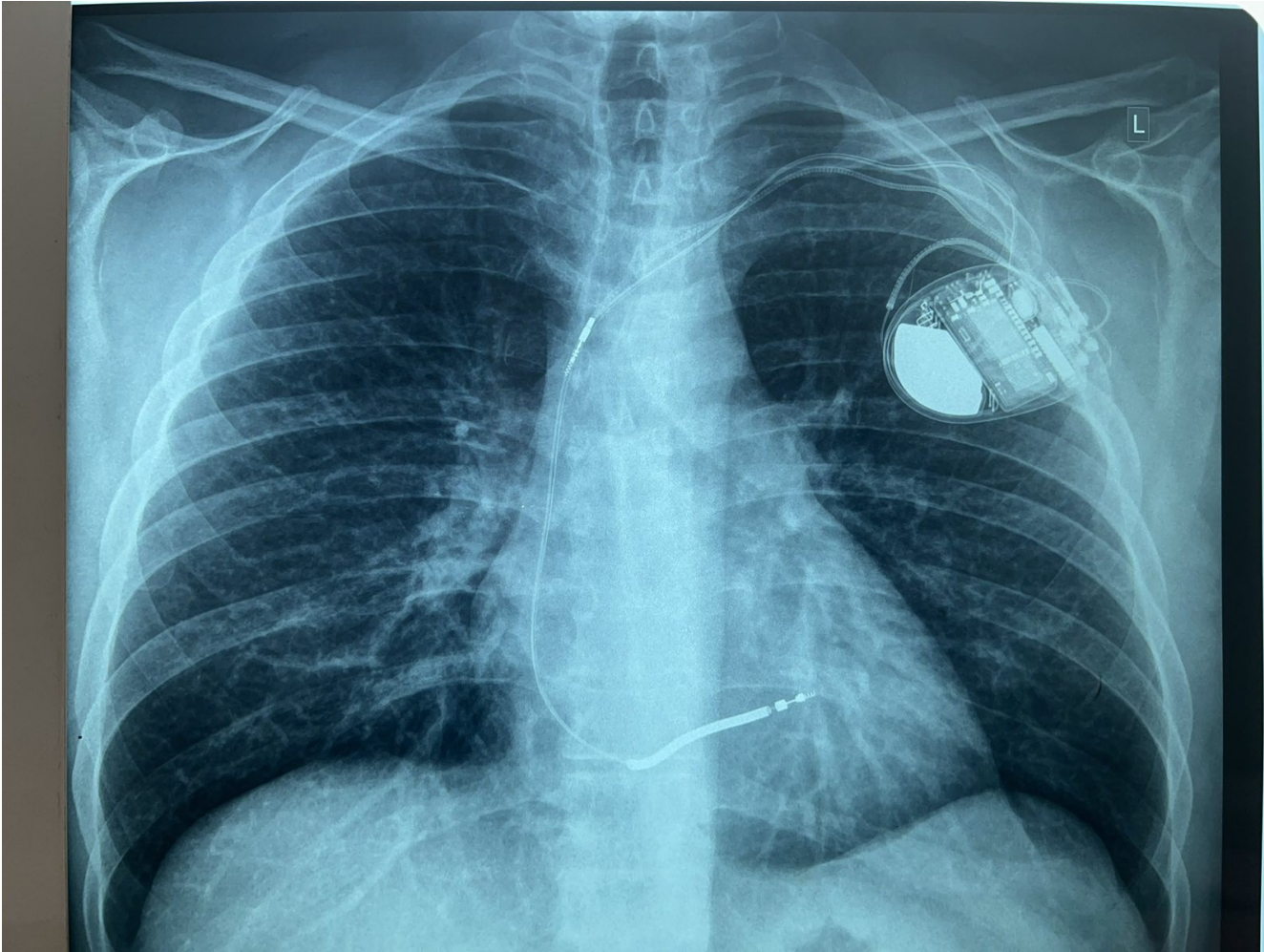
Nonsustained VT in patients with coronary artery disease, prior myocardial infarction (MI), left ventricular dysfunction, and inducible VF or sustained VT at electrophysiologic study (EPS) that is not suppressible by a class I antiarrhythmic agent.

(level of evidence A)



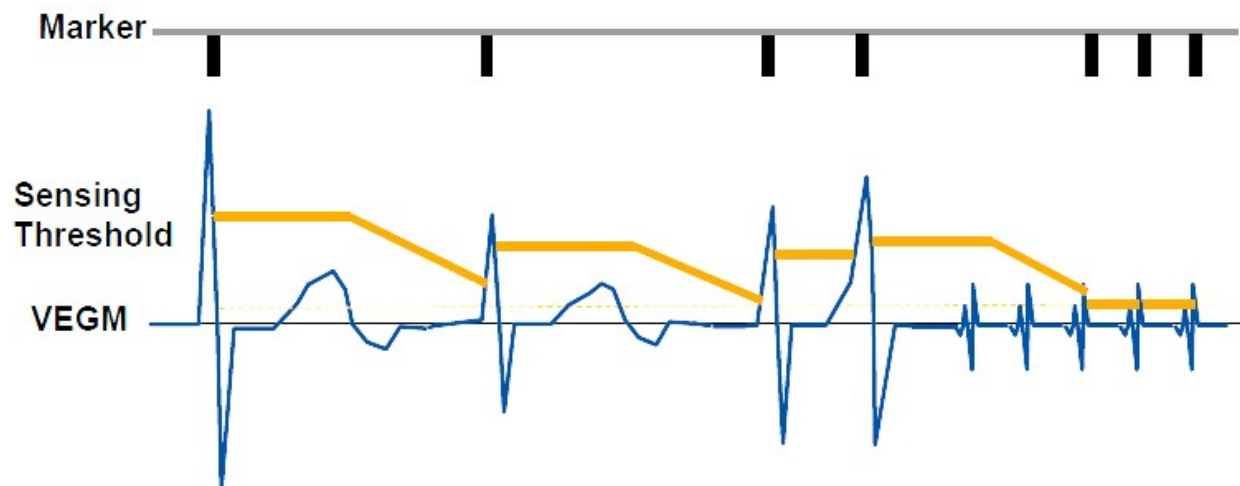
Patients with LVEF of 30% or less, at least 1 month post-MI and 3 months post coronary artery revascularization surgery. (level of evidence B)



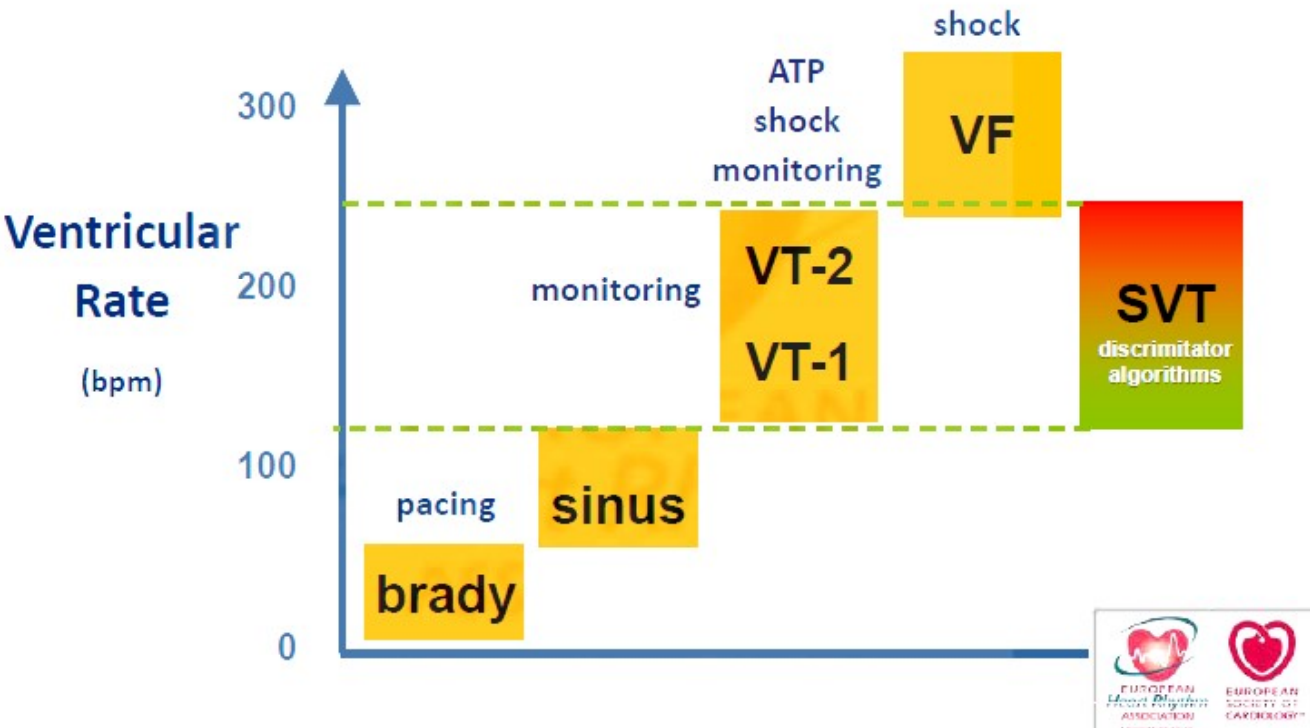


Sensing Systems

An ICD needs a different sensing system compared to a pacemaker to avoid undersensing of low amplitude signals (such as VF), but without oversensing signals such as the T-wave

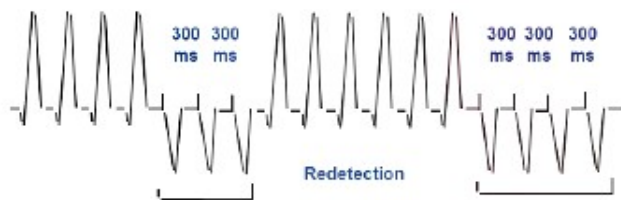


Adapted rate zones

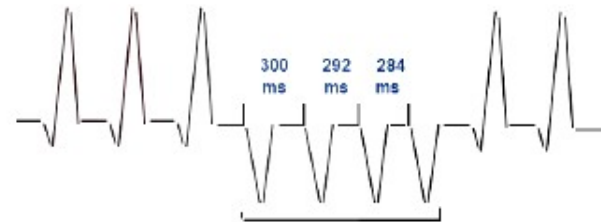


ATP Modes

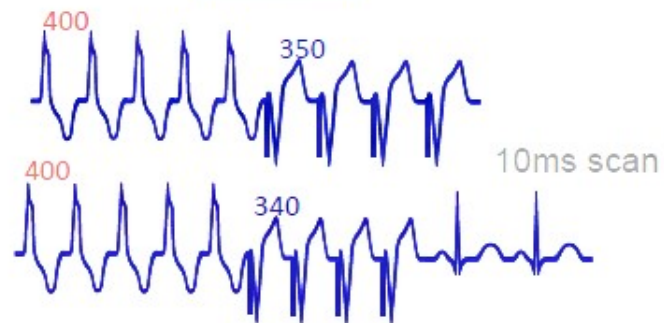
Burst

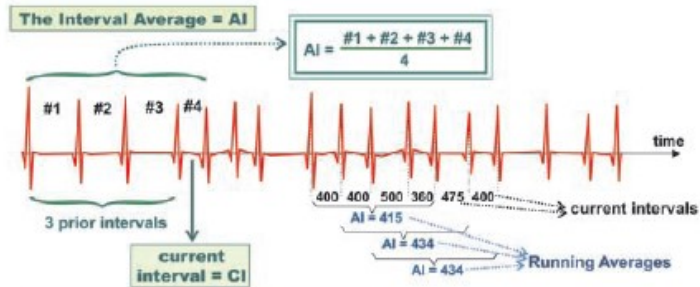


Ramp

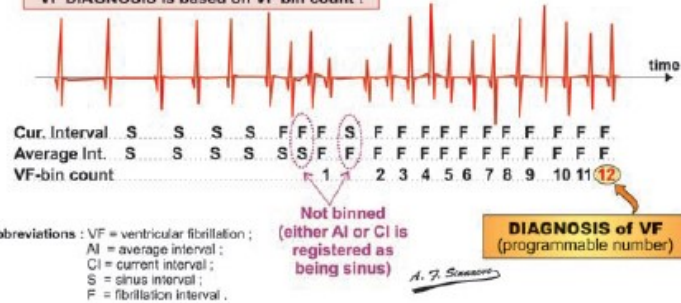


Scan





VF DIAGNOSIS is based on VF bin count !

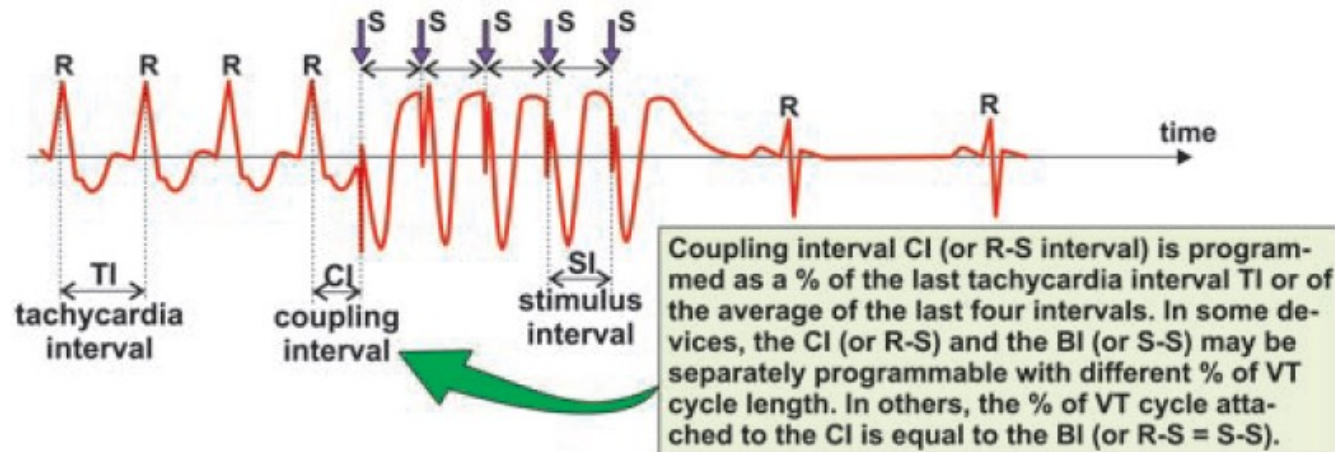


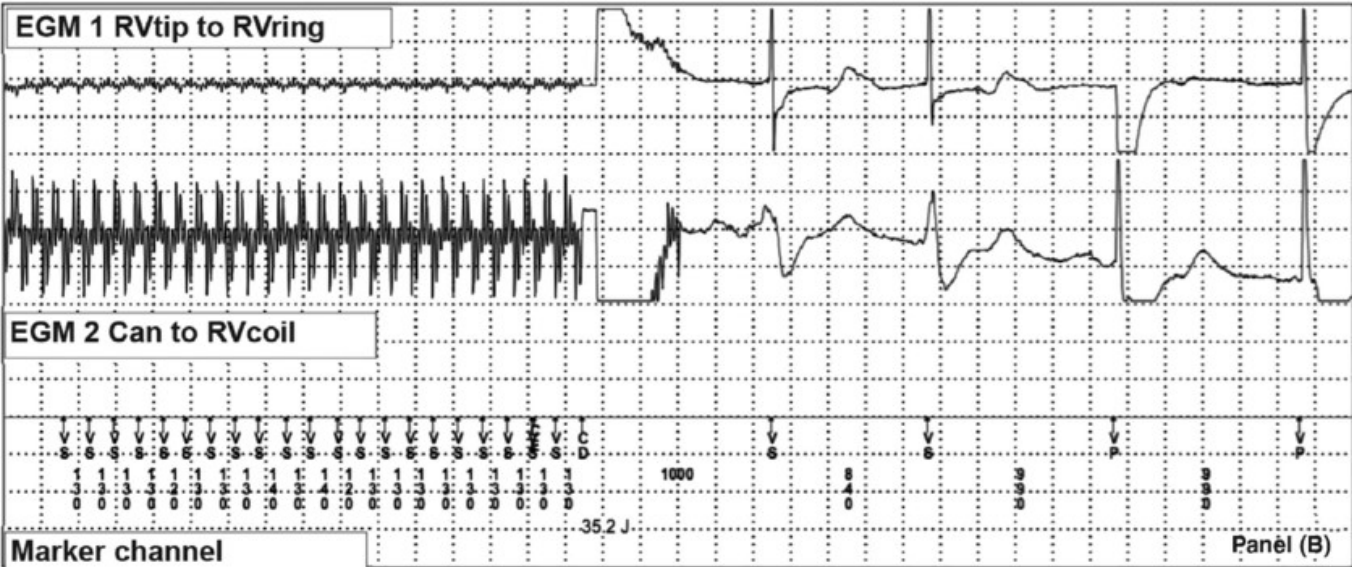
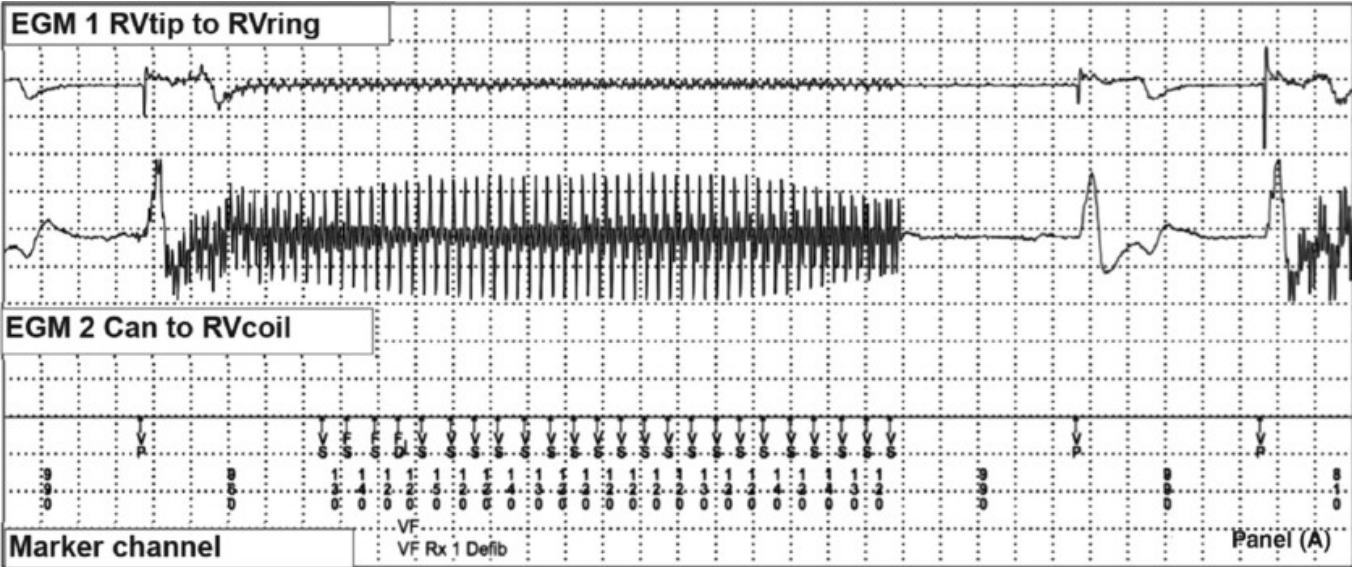
		CURRENT INTERVAL				
		Fib	Tach B	Tach A	Tach	Sinus
AVERAGE INTERVAL	Fib	Fib	Fib	Fib	Fib	Not Binned
	Tach B	Fib	Tach B	Tach B	N/A	Not Binned
	Tach A	Fib	Tach B	Tach A	N/A	Not Binned
	Tach	Fib	N/A	N/A	Tach	Not Binned
	Sinus	Not Binned	Not Binned	Not Binned	Not Binned	Sinus

N/A = not applicable (Tach stands for only 1 VT zone; Tach A & Tach B stand for 2 VT zones)

Θεραπείες

- ATP αντιταχυκαρδιακή βηματοδότηση
- Shock





AF – κοιλιακή μαρμαρυγή

Risk factors



Tobacco



Alcohol



Hypertension



Obesity



Diabetes Mellitus



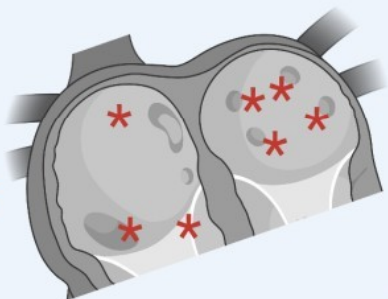
Sleep apnea



Genetics

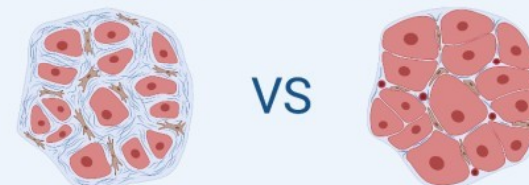


AF triggers



AF initiation and perpetuation

Substrate fibrosis



fibrotic

VS

normal

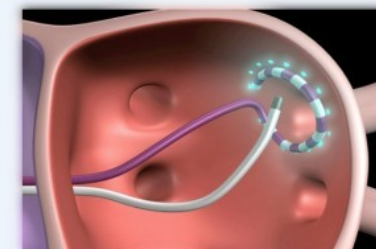
Therapy



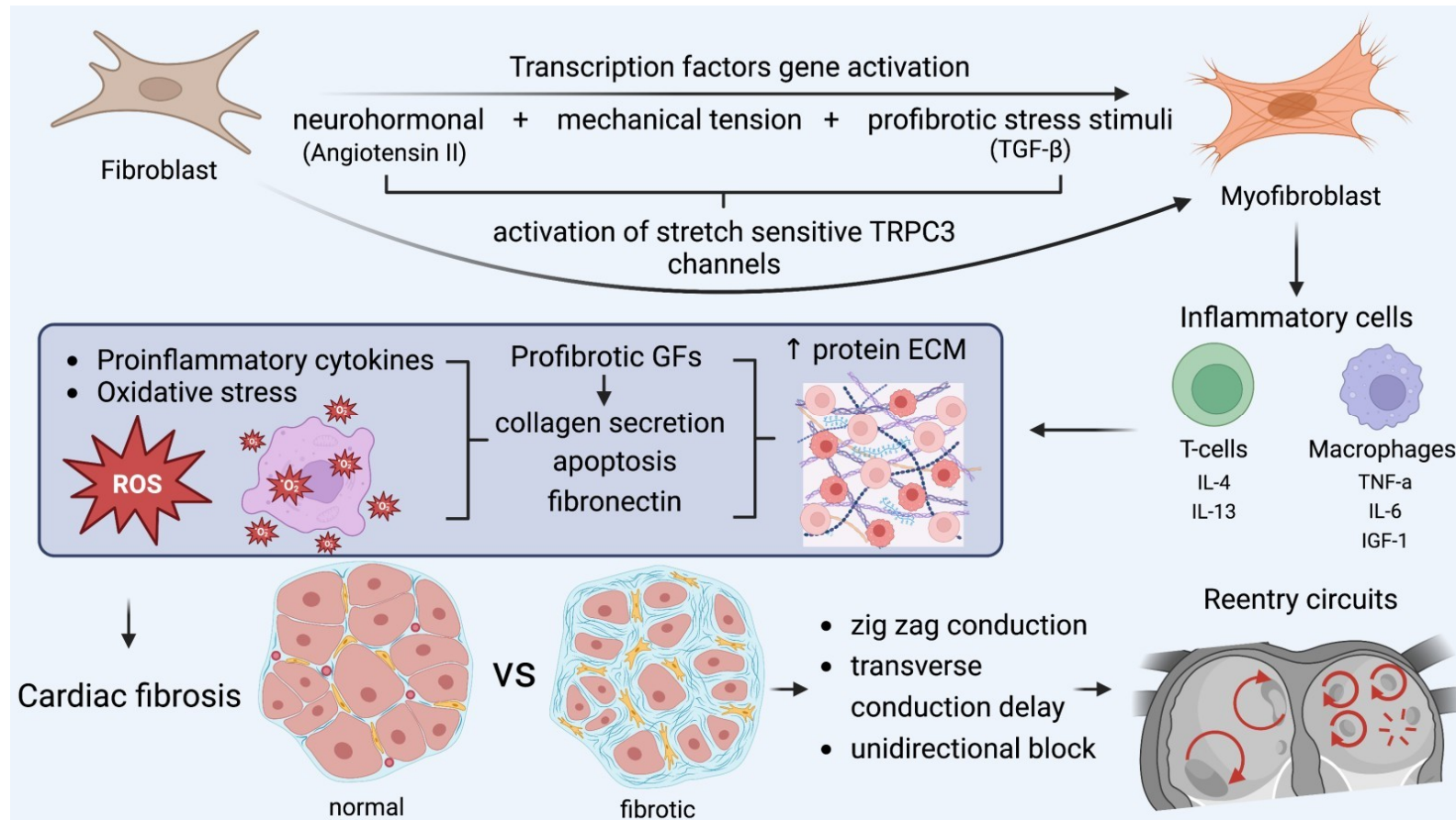
Lifestyle modifications

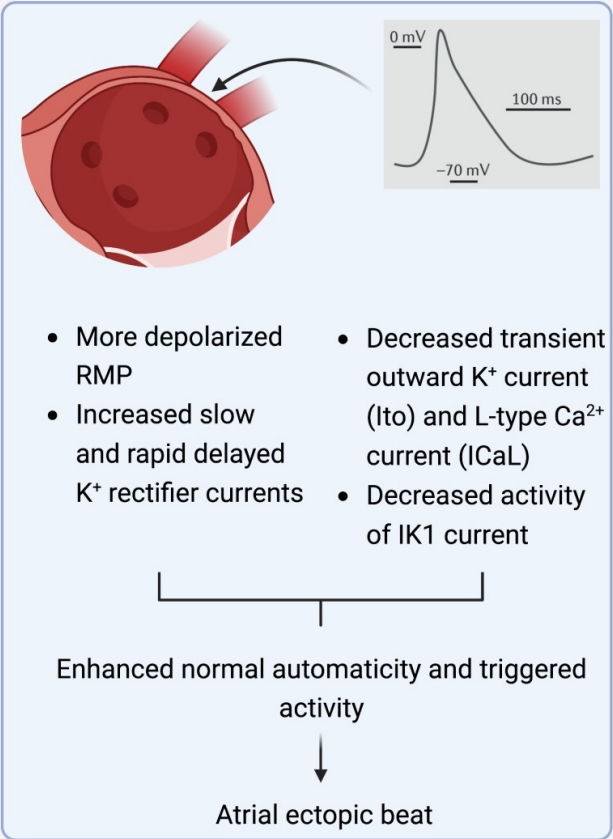
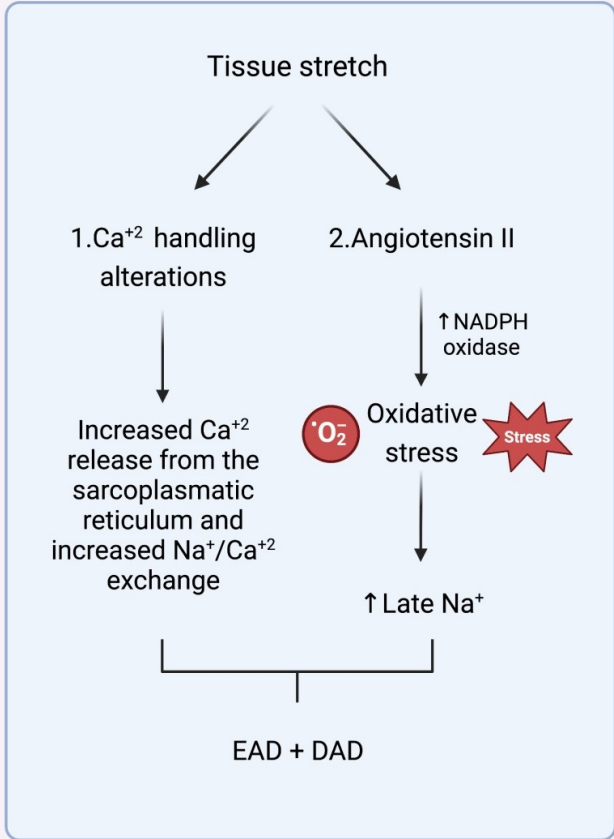


Medical treatment



AF ablation



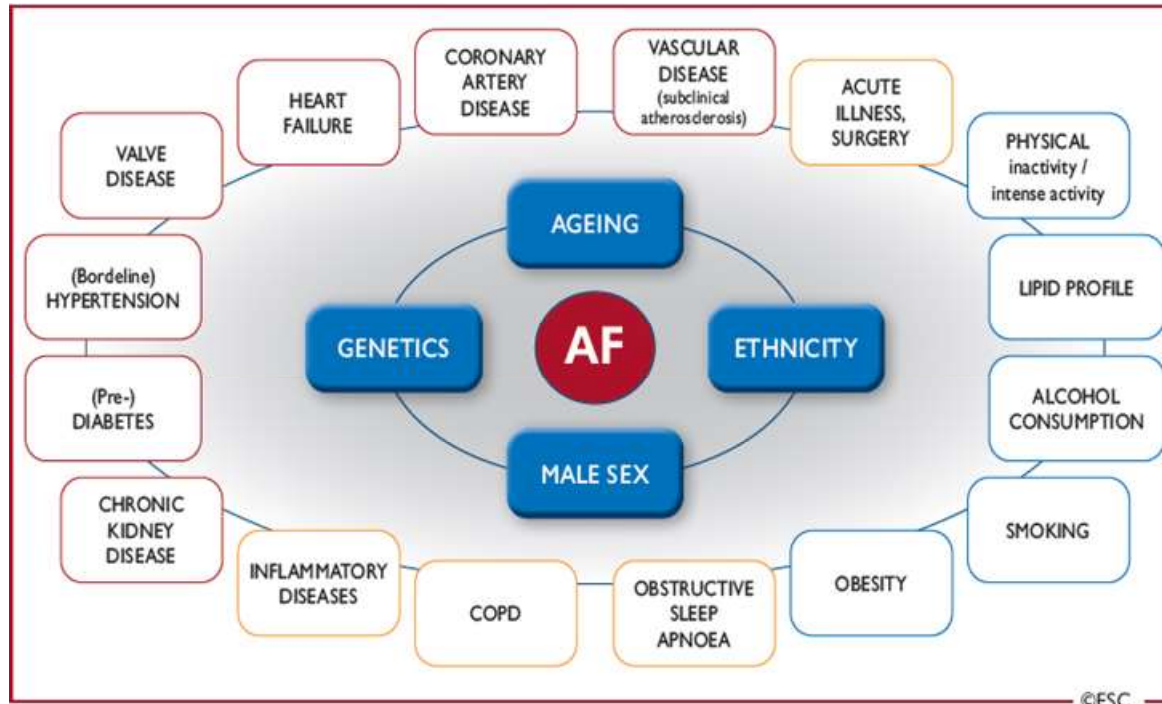


What is new in the 2020 Guidelines? New recommendations (8)

Recommendations	Class
Recommendations for rhythm control/catheter ablation of AF (continued)	
<i>Lifestyle modification and other strategies to improve outcomes of ablation</i>	
Strict control of risk factors and avoidance of triggers are recommended as part of rhythm control strategy.	I
Recommendations for stroke risk management peri cardioversion	
It is recommended that the importance of adherence and persistence to NOAC treatment both before and after cardioversion is strongly emphasized to patients.	I
In patients with AF duration of >24 hours undergoing cardioversion, therapeutic anticoagulation should be continued for at least 4 weeks even after successful cardioversion to sinus rhythm (beyond 4 weeks, the decision about long-term OAC treatment is determined by the presence of stroke risk factors).	IIa

©ESC

Figure 3 Summary of risk factors for incident AF

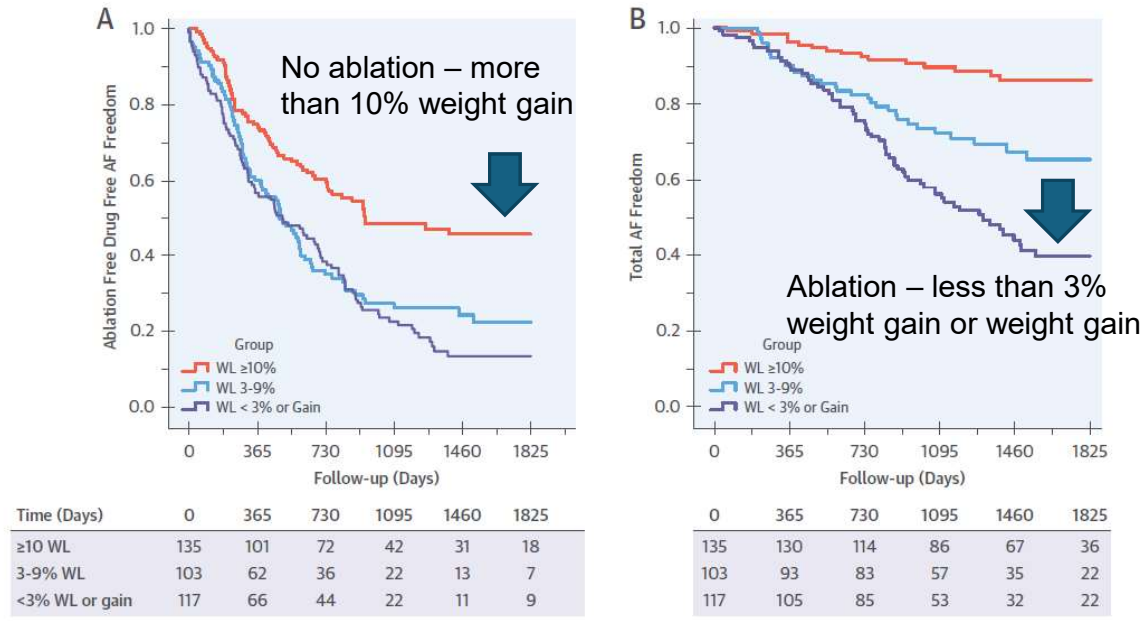


Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort



A Long-Term Follow-Up Study (LEGACY)

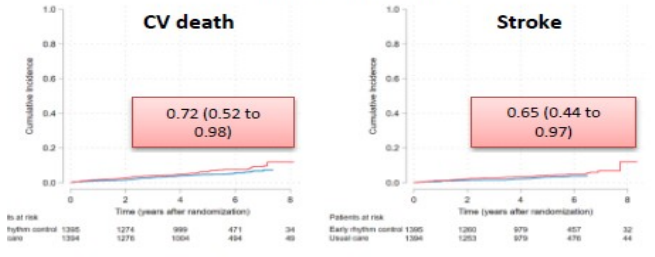
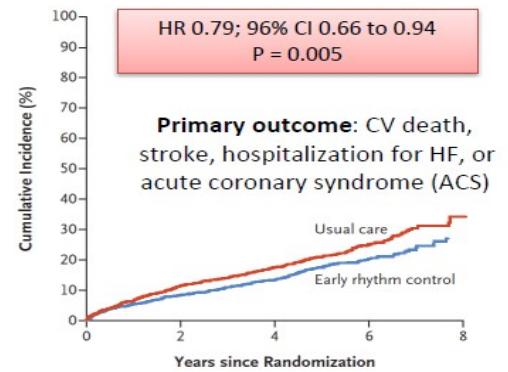
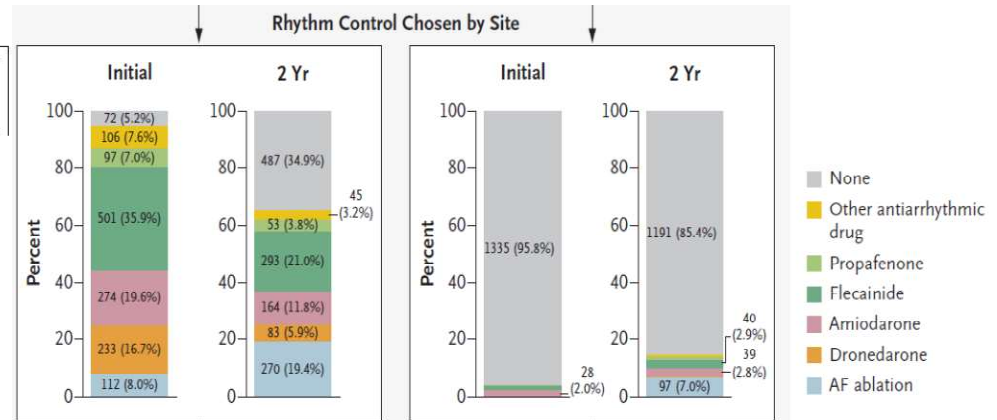
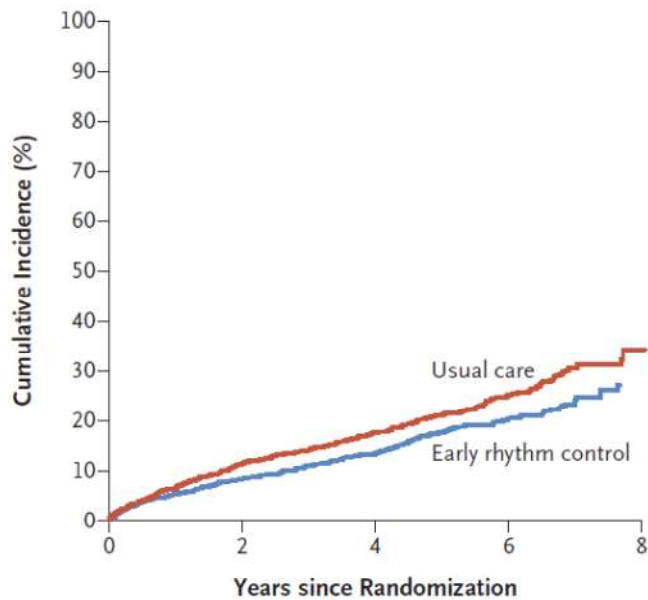
Rajeev K. Pathak, MBBS,* Melissa E. Middeldorp,* Megan Meredith,* Abhinav B. Mehta, MACTST,†
 Rajiv Mahajan, MD, PhD,* Christopher X. Wong, MBBS, PhD,*‡ Darragh Twomey, MBBS,* Adrian D. Elliott, PhD,*§
 Jonathan M. Kalman, MBBS, PhD,¶ Walter P. Abhayaratna, MBBS, PhD,# Dennis H. Lau, MBBS, PhD,*
 Prashanthan Sanders, MBBS, PhD*



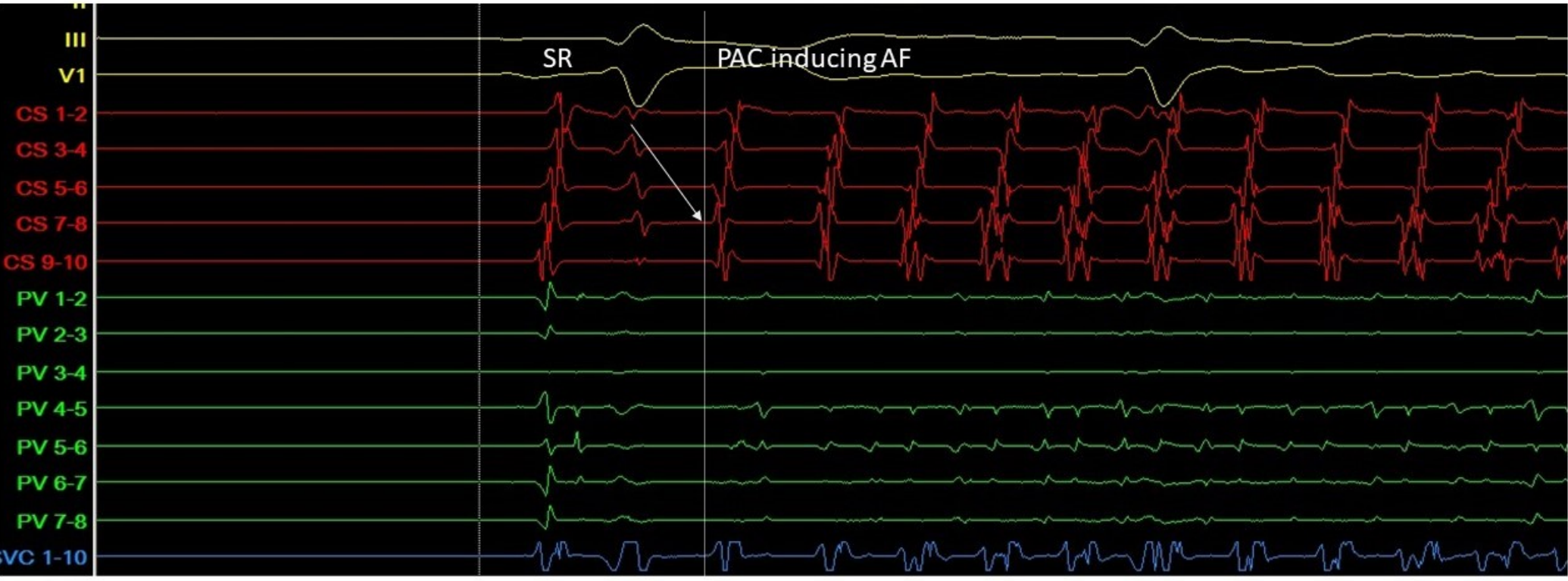
(A) Kaplan-Meier curve for AF-free survival without the use of rhythm control strategies. (B) Kaplan-Meier curve for AF-free survival for total AF-free survival (multiple ablation procedures with and without drugs). Abbreviations as in Figure 1.

ORIGINAL ARTICLE

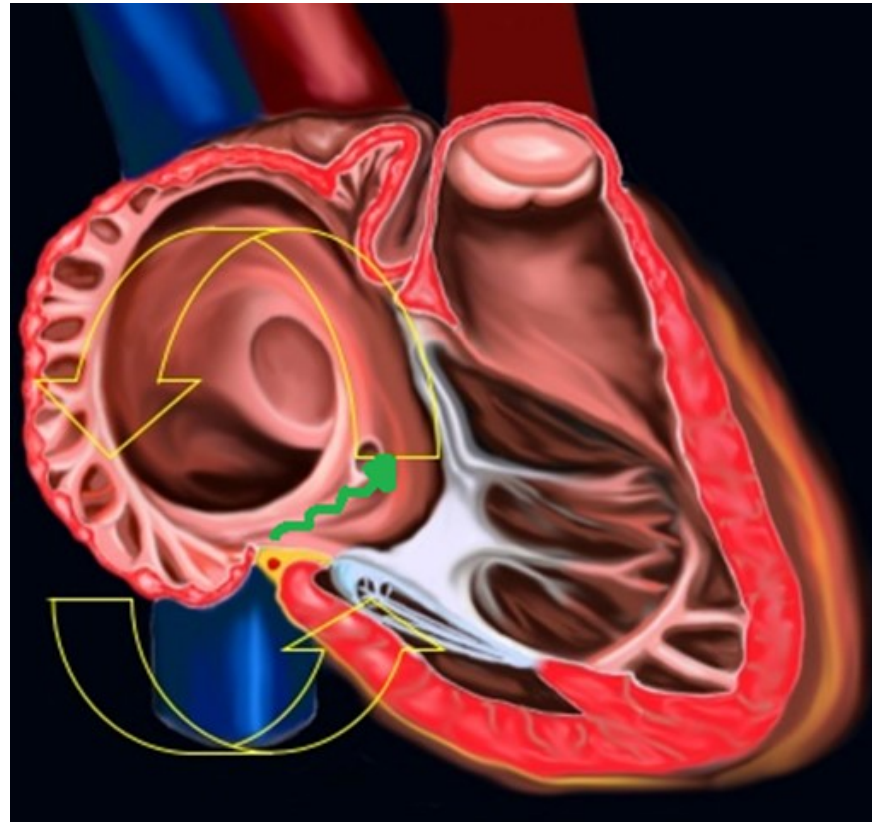
Early Rhythm-Control Therapy in Patients with Atrial Fibrillation

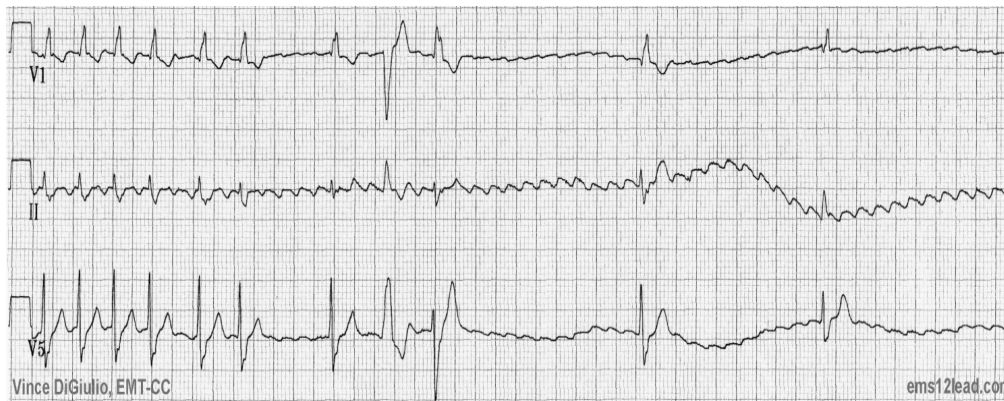
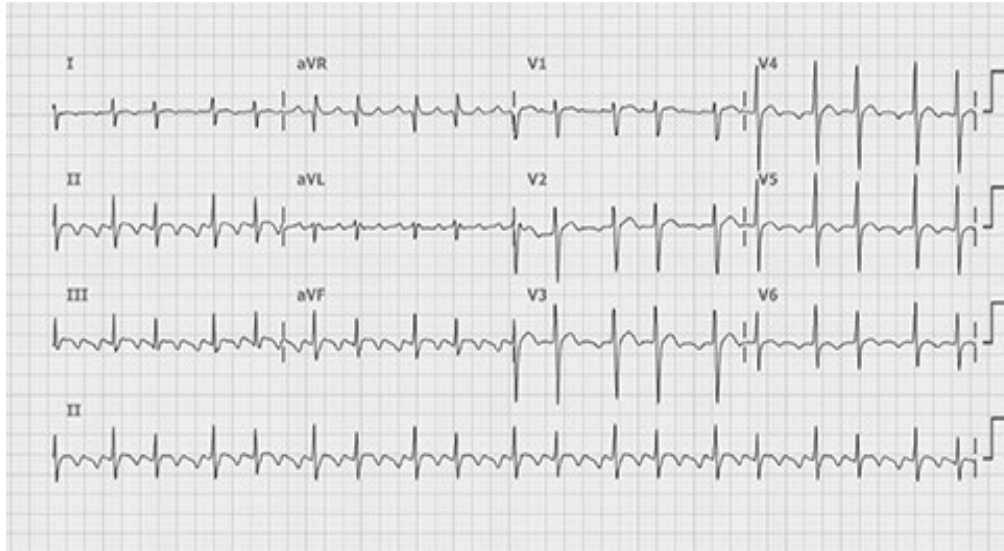


Outcome	Time (years after randomization)	Early rhythm control	Usual care
CV death	0	1385	1384
	2	1274	1276
	4	999	1006
	6	471	494
	8	34	48
Stroke	0	1385	1384
	2	1260	1263
	4	979	979
	6	457	476
	8	32	44



Κολπικός πτερυγισμός





- Ο κοιλιακός πτερυγισμός απαντάται συνήθως σε άτομα με δομική καρδιοπάθεια. Συνήθως υπάρχει διάταση του δεξιού κόλπου.
- Αίτια: υπέρταση, στεφανιαία νόσος, βαλβιδοπάθειες, υπερθυρεοειδισμός, συγγενείς καρδιοπάθειες κ.α.
- Στην τελευταία περίπτωση ο πτερυγισμός μπορεί να μην είναι ο τυπικός και το κύκλωμα να μην πορεύεται γύρω από τη τριγλώχινά.
- Επίσης, ασθενείς μετά από καρδιοχειρουργική επέμβαση μπορεί να αναπτύξουν άτυπο πτερυγισμό, καθώς η περιοχή της χειρουργικής ουλής αποτελεί το τέλειο υπόστρωμα και τη δημιουργία στενών διαδρόμων όπου το ηλεκτρικό ερέθισμα κινείται γύρω από την ουλή.

Φαρμακευτική αντιμετώπιση Κολπικού
Πτερυγισμού

- **ΑΝΤΙΠΗΚΤΙΚΗ ΘΕΡΑΠΕΙΑ με τις ίδιες ενδείξεις όπως και στην κολπική μαρμαρυγή**

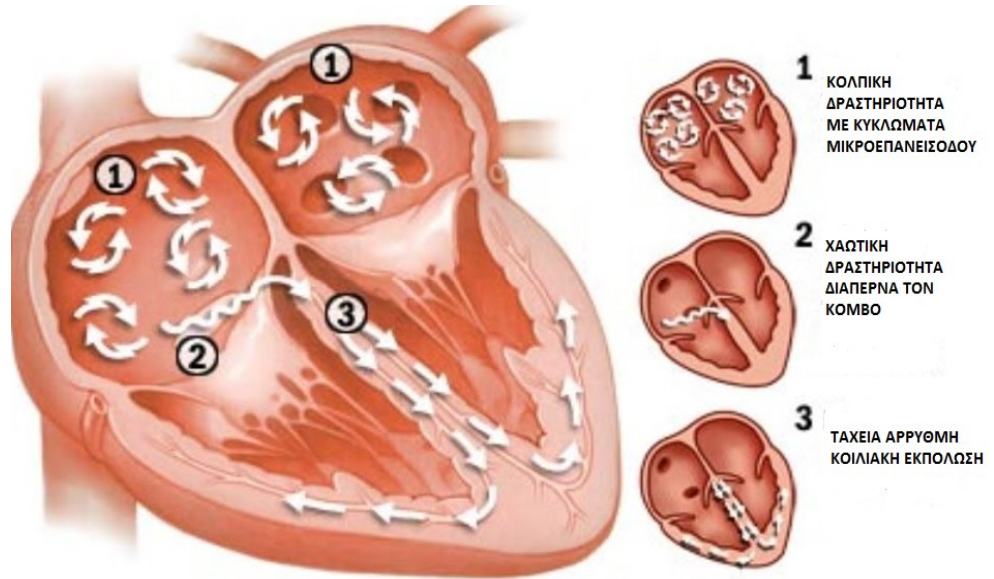
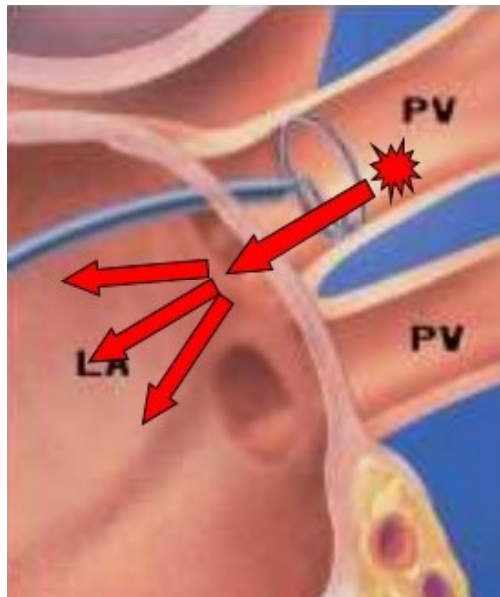
Κολπική μαρμαρυγή



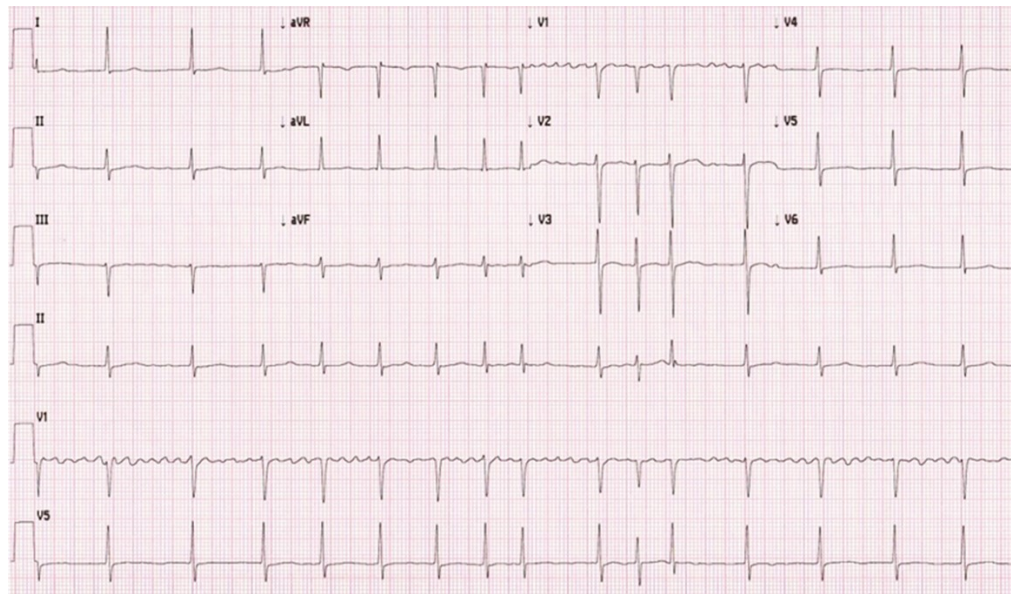
AF

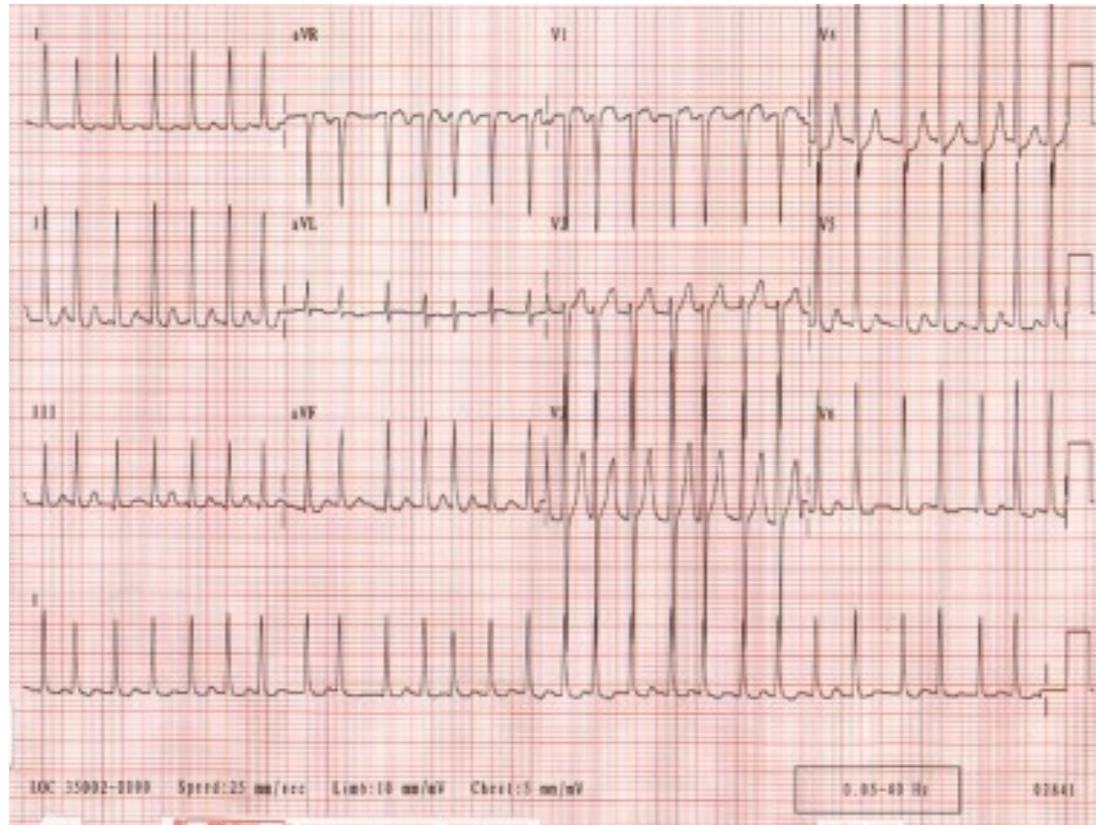


SR

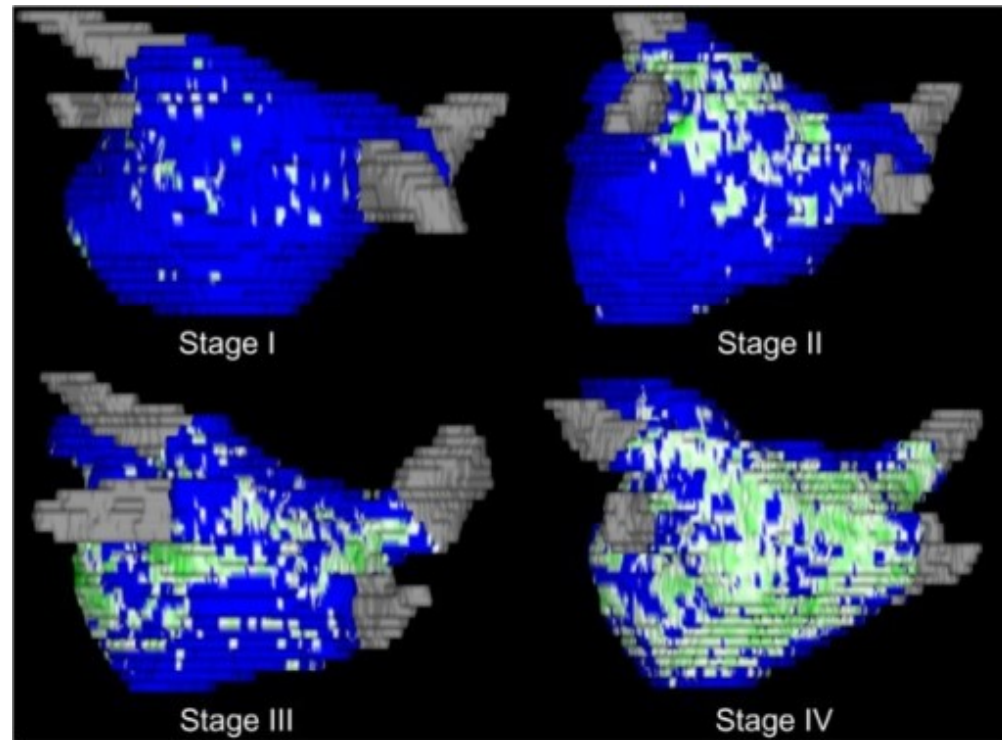


- Αποτελεί τη συχνότερη αρρυθμία στην καθημερινή κλινική πράξη σε άτομα άνω των 65 ετών.
- Τα χαρακτηριστικά της ταχυκαρδίας είναι η απουσία των P συμπλεγμάτων και τα άρρυθμα QRS κοιλιακά συμπλέγματα

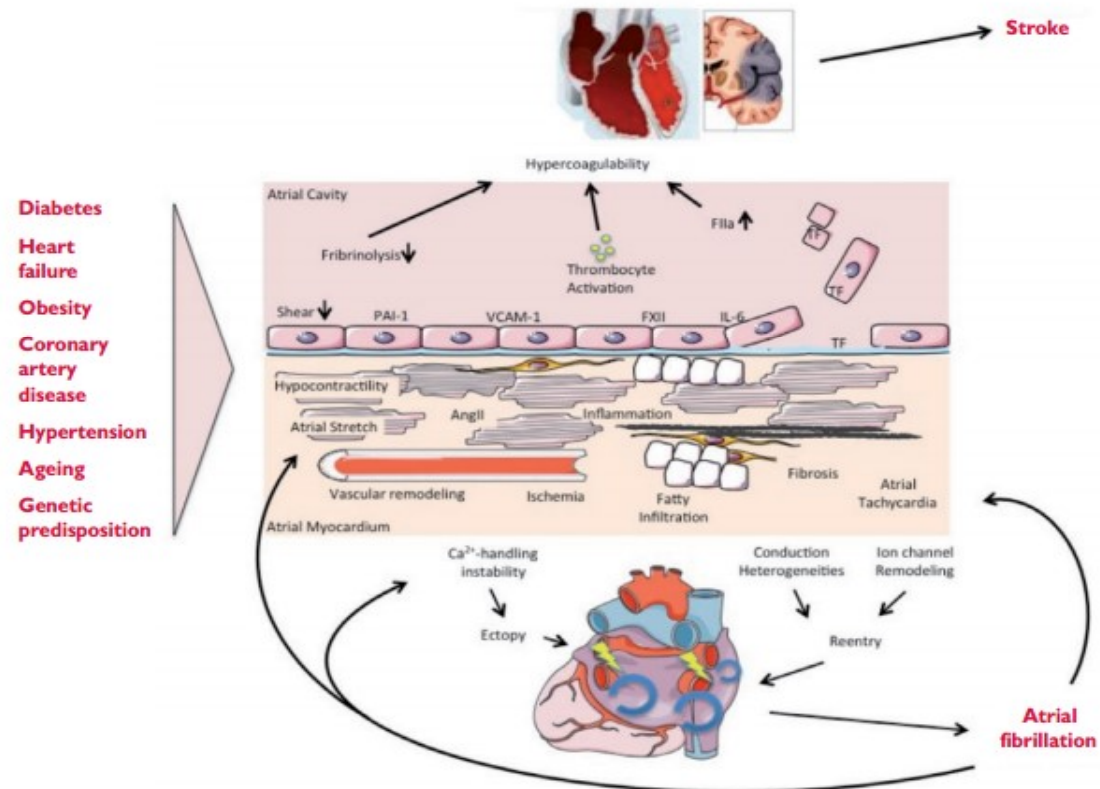




Ο ρόλος της ίνωσης

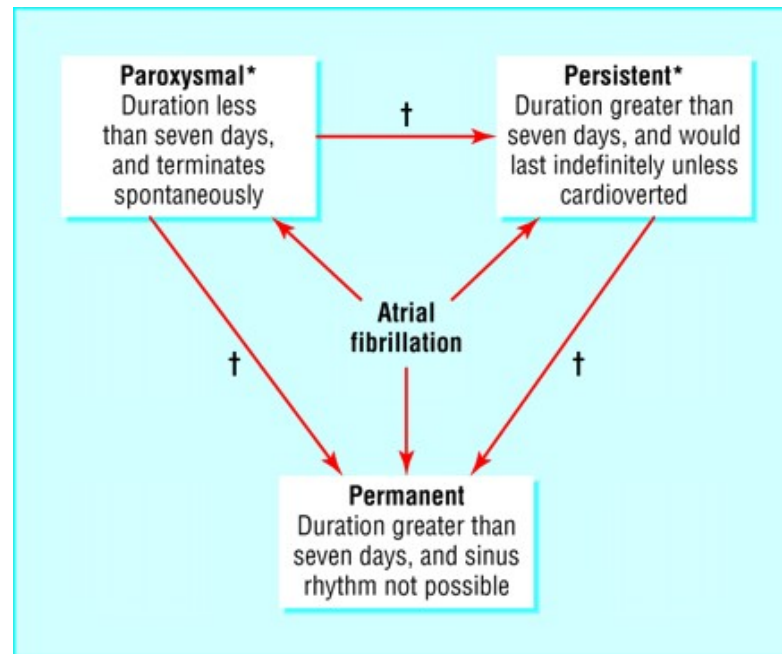


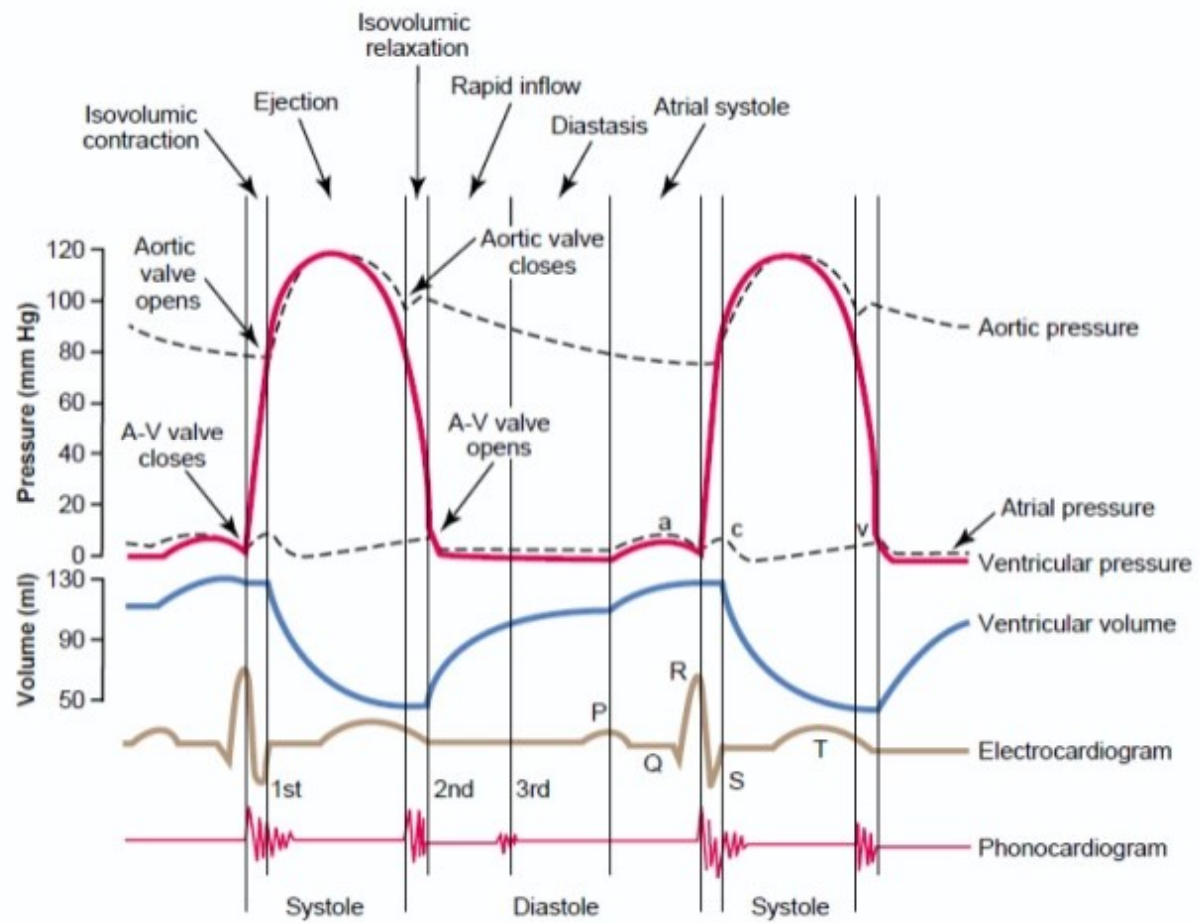
Αυξημένες πιέσεις στον αριστερό κόλπο



Ταξινόμηση ΚΜ

- Παροξυσμική
- Εμμένουσα
- Μόνιμη





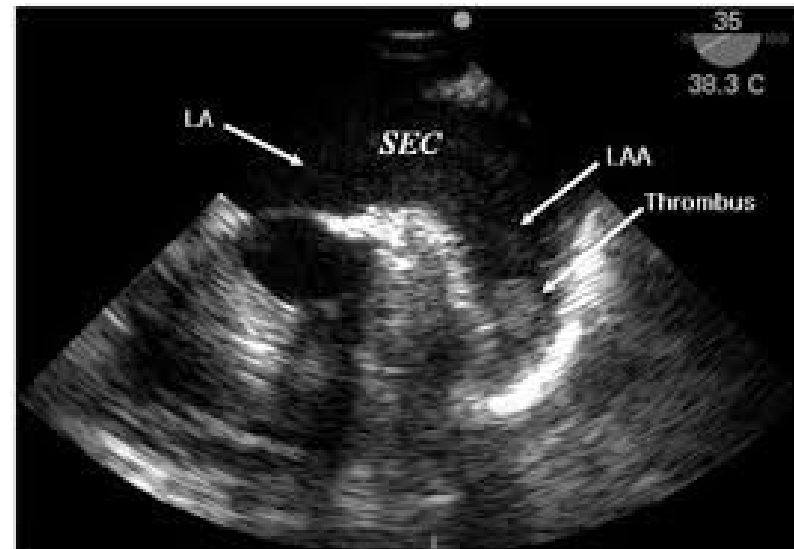
3.1 Incidence and prevalence of atrial fibrillation

In 2010, the estimated numbers of men and women with AF worldwide were 20.9 million and 12.6 million, respectively, with higher incidence and prevalence rates in developed countries.^{1,2} One in four middle-aged adults in Europe and the US will develop AF.^{3–5} By 2030, 14–17 million AF patients are anticipated in the European Union, with 120 000–215 000 newly diagnosed patients per year.^{2,6,7} Estimates suggest an AF prevalence of approximately 3% in adults aged 20 years or older,^{8,9} with greater prevalence in older persons¹ and in patients with conditions such as hypertension, heart failure, coronary artery disease (CAD), valvular heart disease, obesity, diabetes mellitus, or chronic kidney disease (CKD).^{7,10–15} The increase in AF prevalence can be attributed both to better detection of silent AF^{16–18}, alongside increasing age and conditions predisposing to AF.

AF is independently associated with a two-fold increased risk of all-cause mortality in women and a 1.5-fold increase in men^{20–22} (Table 3). Death due to stroke can largely be mitigated by anticoagulation, while other cardiovascular deaths, for example due to heart failure and sudden death, remain common even in AF patients treated according to the current evidence base.²³ AF is also associated with increased morbidity, such as heart failure and stroke.^{21,24,25} Contemporary studies show that 20–30% of patients with an ischaemic stroke have AF diagnosed before, during,



Θρόμβος στο αριστερό ωτίο



Υπολογισμός θρομβοεμβολικού κινδύνου

CHA ₂ DS ₂ -VASc risk factor	Points
Congestive heart failure Signs/symptoms of heart failure or objective evidence of reduced left ventricular ejection fraction	+1
Hypertension Resting blood pressure >140/90 mmHg on at least two occasions or current antihypertensive treatment	+1
Age 75 years or older	+2
Diabetes mellitus Fasting glucose >125 mg/dL (7 mmol/L) or treatment with oral hypoglycaemic agent and/or insulin	+1
Previous stroke, transient ischaemic attack, or thromboembolism	+2
Vascular disease Previous myocardial infarction, peripheral artery disease, or aortic plaque	+1
Age 65–74 years	+1
Sex category (female)	+1

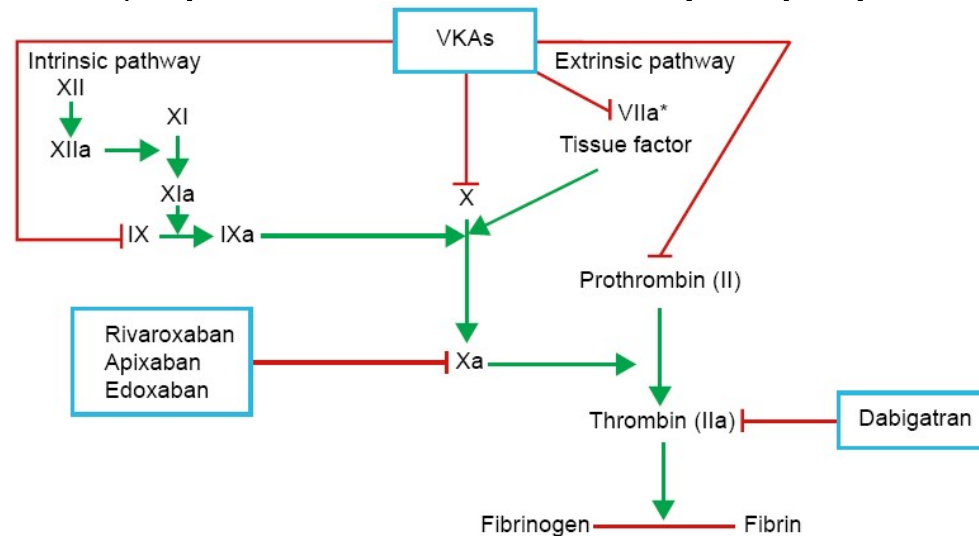
Η απόφαση λήψης αντιπηκτικής θεραπείας βασίζεται αποκλειστικά στη χρήση αυτού του risk score και δεν εξαρτάται από το είδος της ΚΜ (παροξυσμική-εμμένουσα-μόνιμη) και τους θεραπευτικούς χειρισμούς που έχουν επιλεγεί.

Αντιπηκτικά



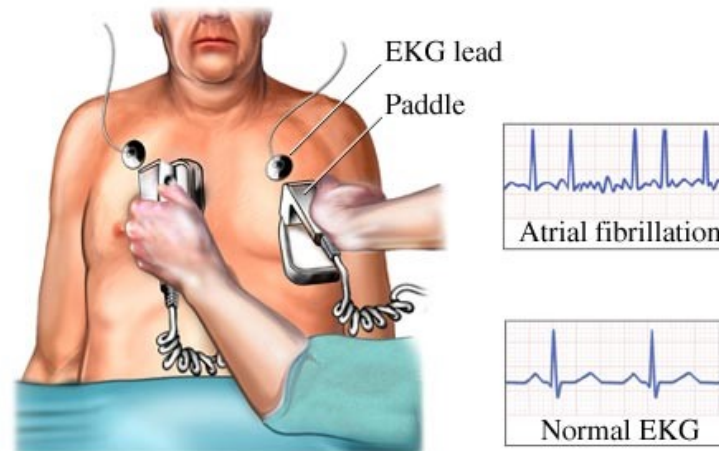
ΑΝΤΙΠΗΚΤΙΚΑ

- Ασενοκουμαρόλη, βαρφαρίνη: αναστολείς βιταμίνης Κ
- Dabigatran: αναστολείς παράγοντα IIa
- Rivaroxaban, Αrixaban: αναστολείς παράγοντα Xa

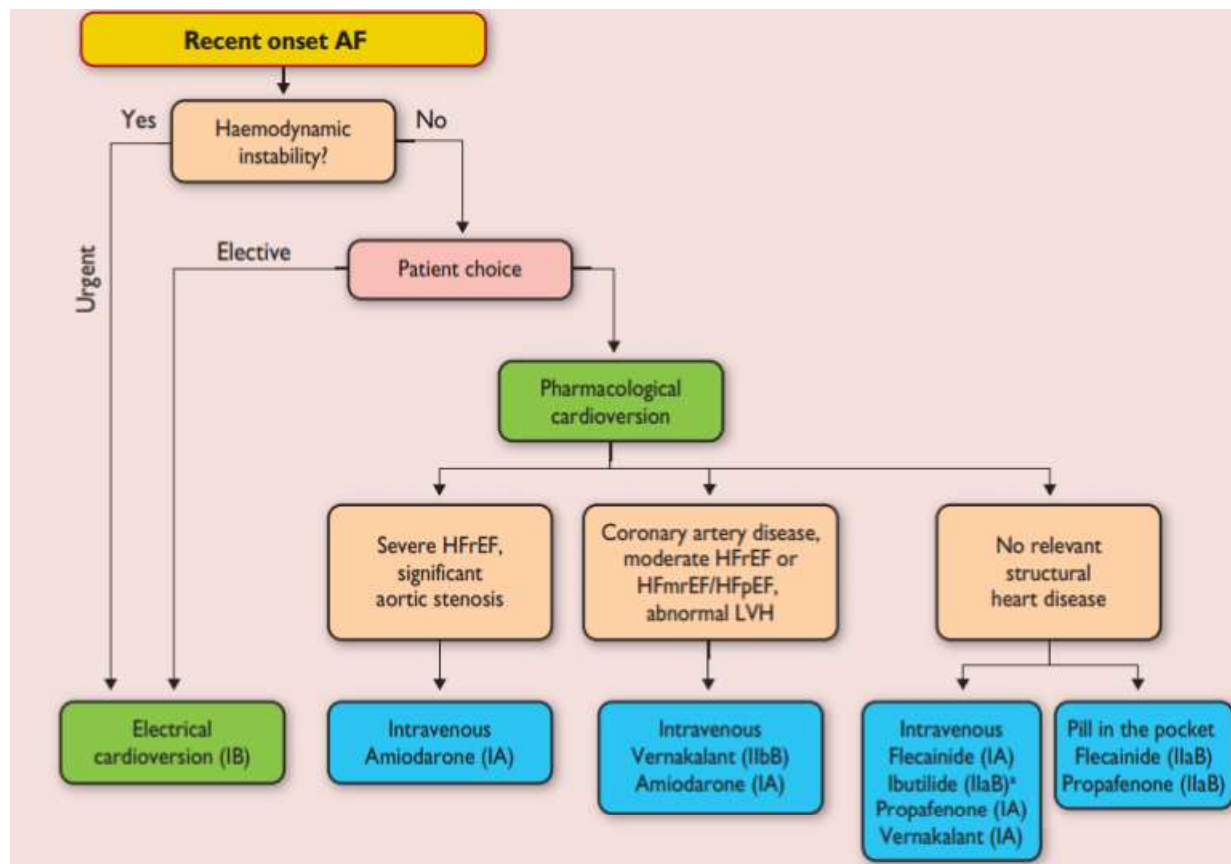


Θεραπεία

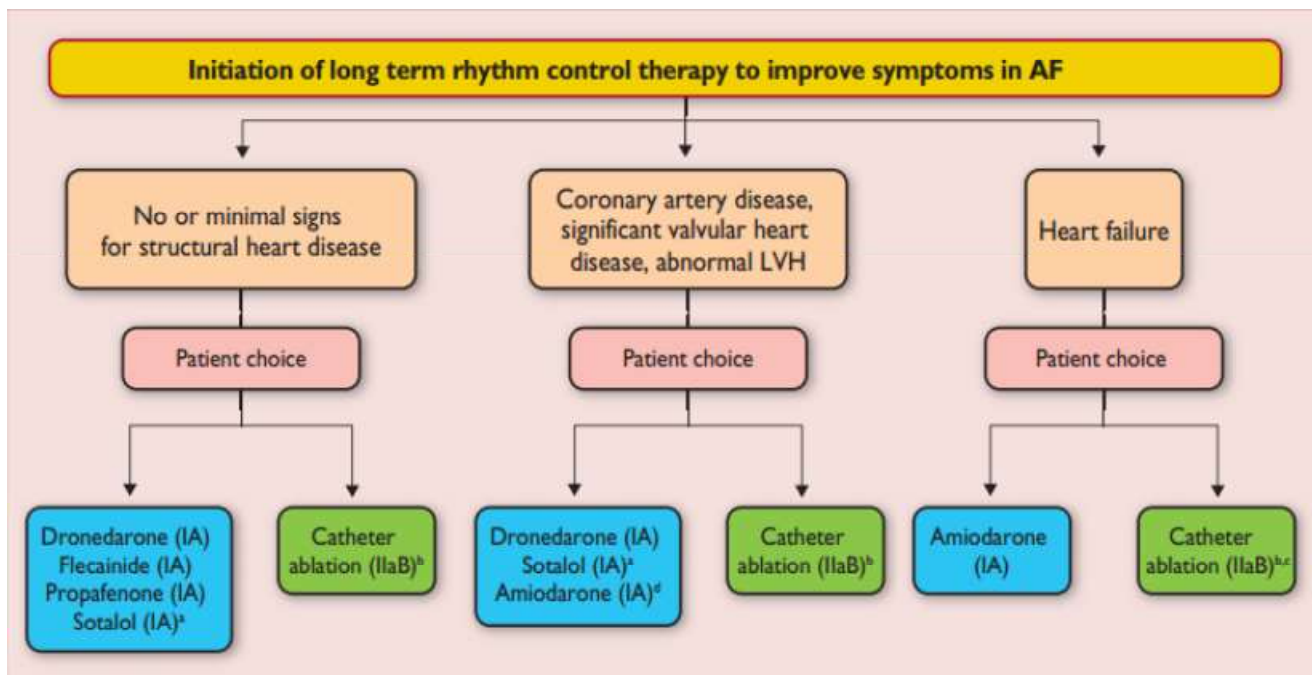
- Καρδιοανάταξη εάν η ΚΜ είναι εντός 48 ωρών
- Ή εφόσον έχει αποκλειστεί η ύπαρξη θρόμβου στο ωτίο του αριστερού κόλπου



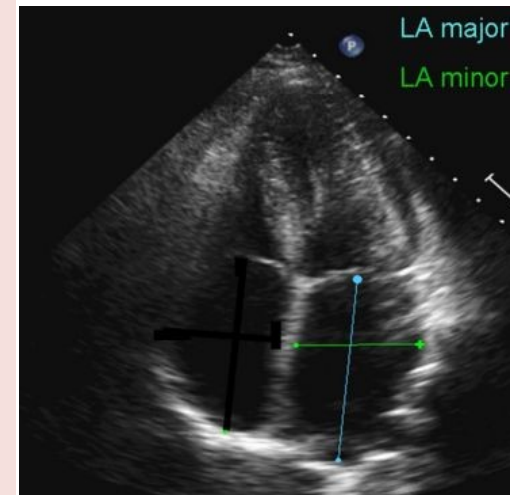
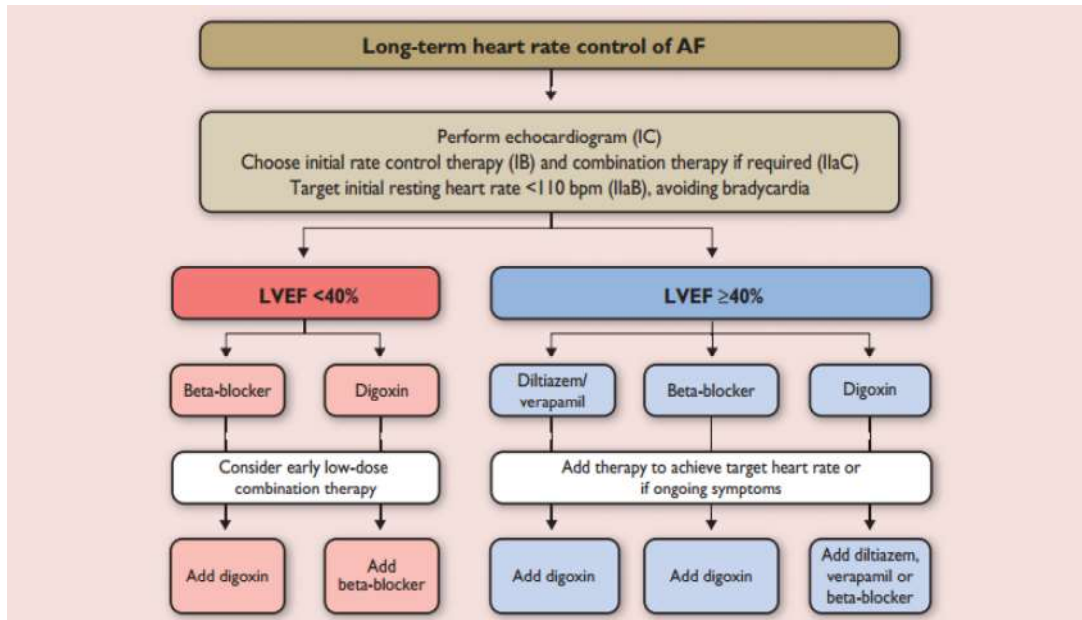
Αντιαρρυθμικά – Αγωγή ρυθμού



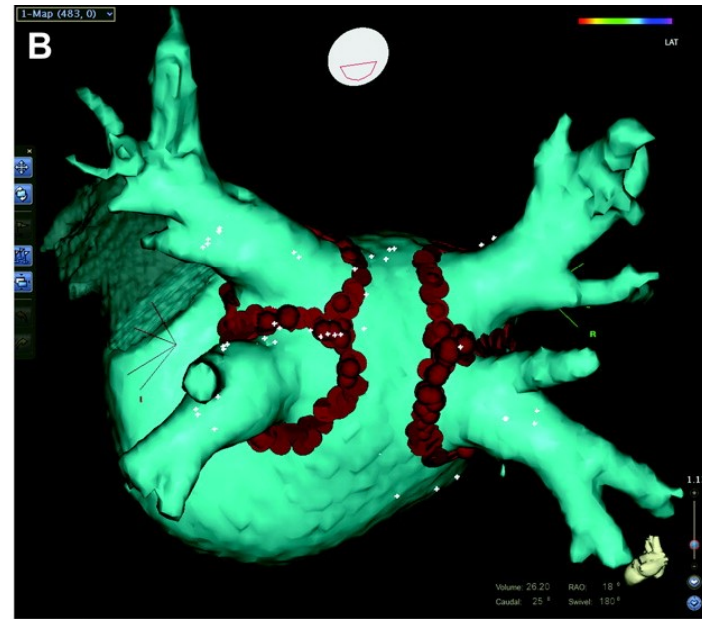
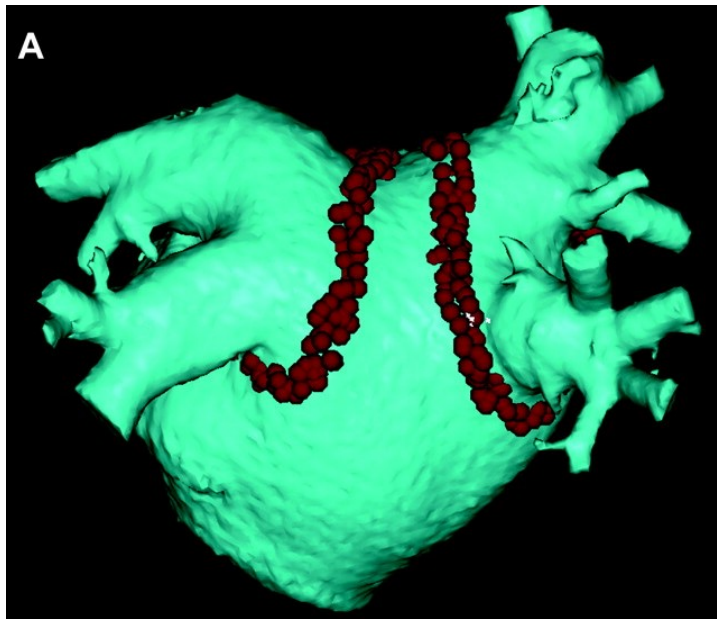
Αντιαρρυθμικά – Αγωγή ρυθμού



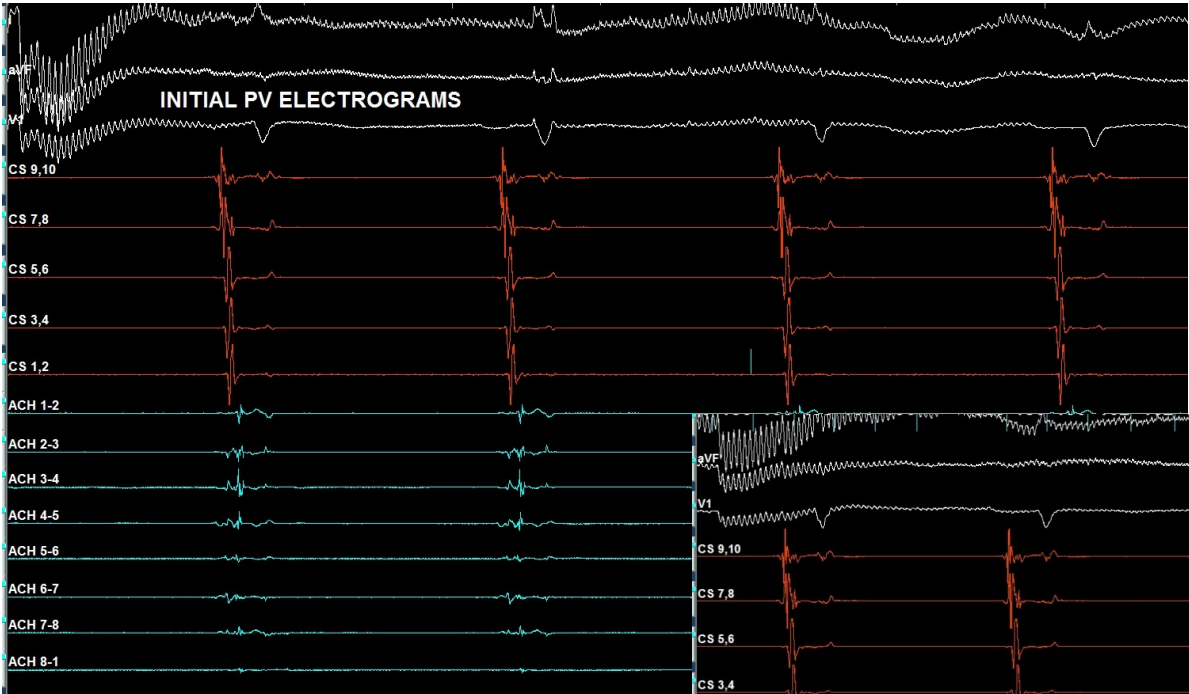
Αντιαρρυθμικά – Αγωγή συχνότητας



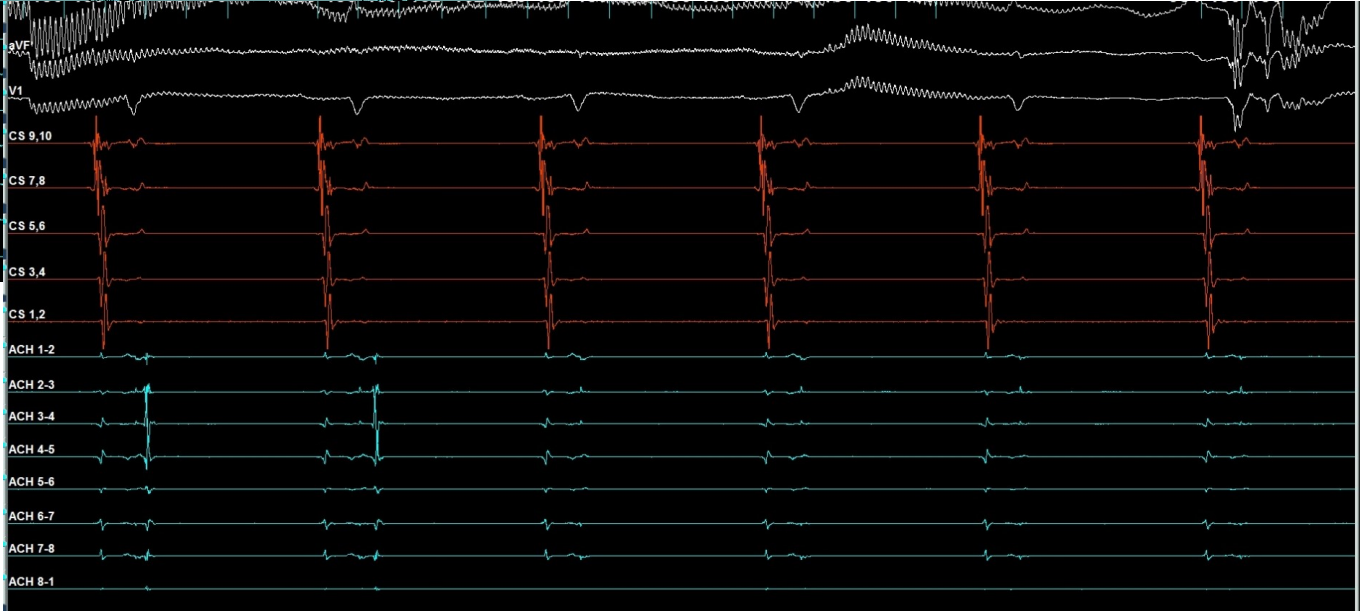
Κατάλυση AF

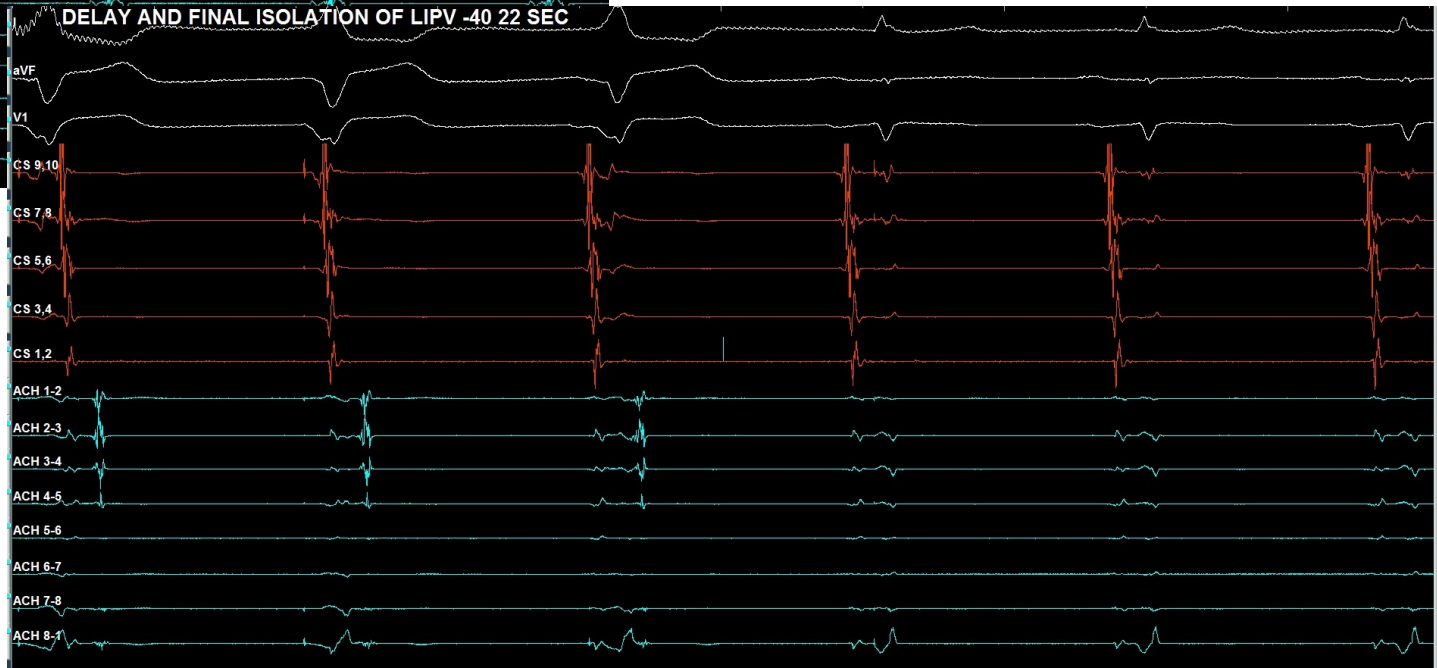
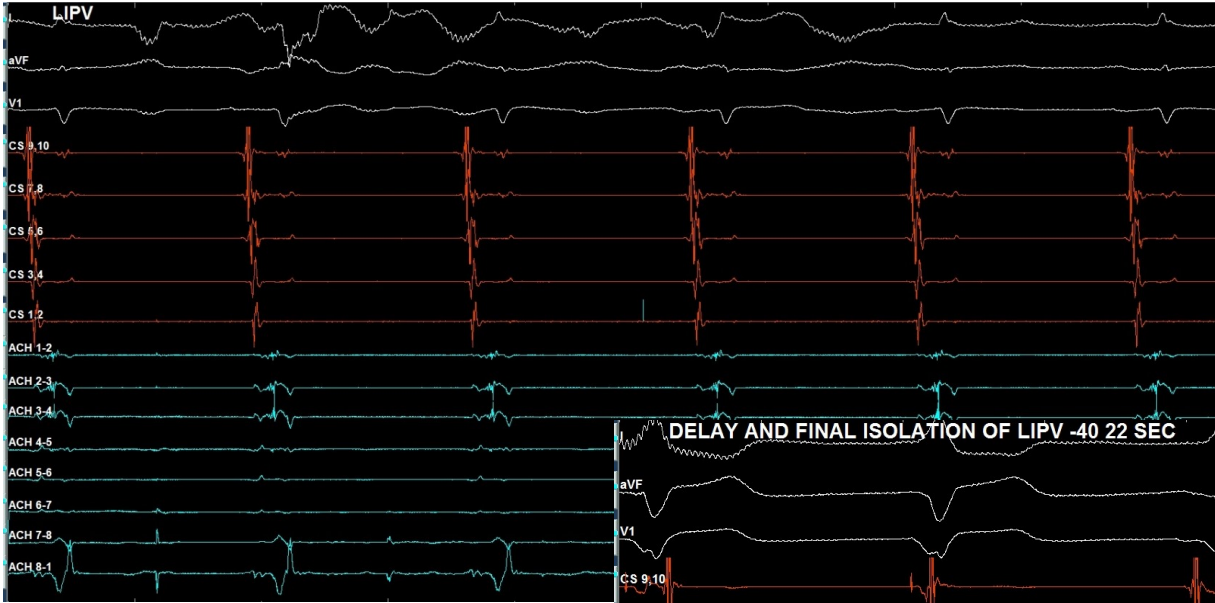


- Ασθενής 78 ετών βρίσκεται σε αγωγή συχνότητας (διλτιαζέμη και μετοπρολόλη) και είναι συμπτωματικός παρά τον έλεγχο συχνότητας
- Κολπική μαρμαρυγή από 6 ετίας με δοκιμή **προπαφαινόνης** αλλά με συνέχιση υποτροπών
- **Αύξηση** της προπαφαινόνης
- Συμπτωματική **βραδυκαρδία**
- Εμφύτευση **βηματοδότη** DR ως ταχυ βραδυ
- Συνέχιση επεισοδίων παρά την αύξηση προπαφαινόνης
- Δοκιμή και **σοταλόλης**
- Τελικά αλλαγή στρατηγικής από αγωγή ρυθμού σε αγωγή συχνότητας αλλά... παραμονή συμπτωμάτων
- ECG AF - ECHO normal LA 44



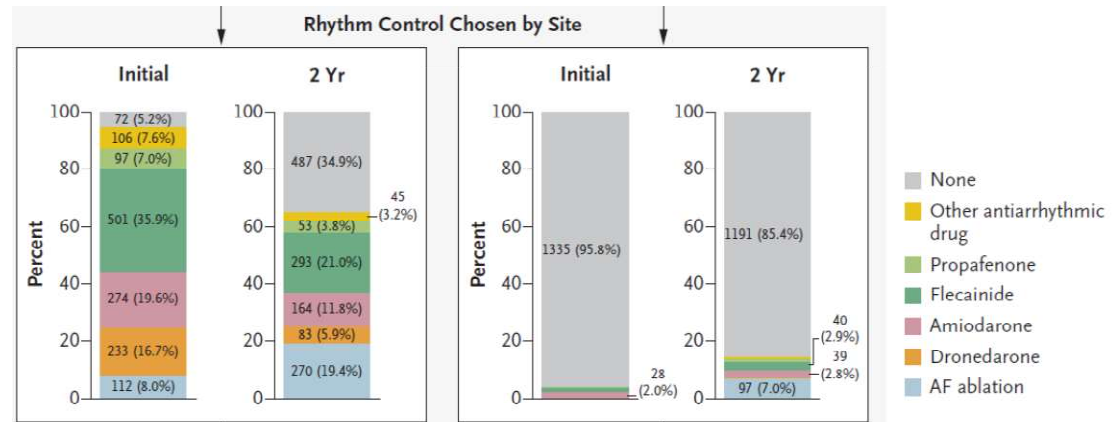
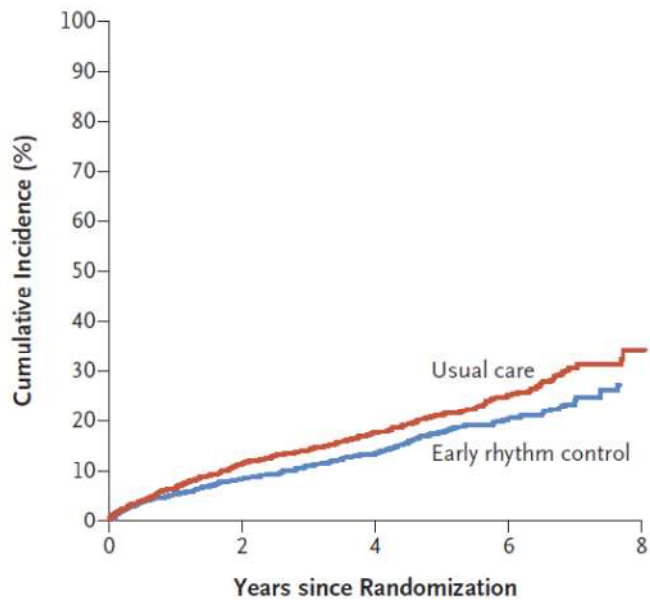
LUPV





ORIGINAL ARTICLE

Early Rhythm-Control Therapy in Patients with Atrial Fibrillation



Outcome	Early Rhythm Control	Usual Care	Treatment Effect
First primary outcome — events/person-yr (incidence/100 person-yr)	249/6399 (3.9)	316/6332 (5.0)	0.79 (0.66 to 0.94)†
Components of first primary outcome — events/person-yr (incidence/100 person-yr)			
Death from cardiovascular causes	67/6915 (1.0)	94/6988 (1.3)	0.72 (0.52 to 0.98)‡
Stroke	40/6813 (0.6)	62/6856 (0.9)	0.65 (0.44 to 0.97)‡
Hospitalization with worsening of heart failure	139/6620 (2.1)	169/6558 (2.6)	0.81 (0.65 to 1.02)‡
Hospitalization with acute coronary syndrome	53/6762 (0.8)	65/6816 (1.0)	0.83 (0.58 to 1.19)‡

Table 3. Safety Outcomes.*

Outcome	Early Rhythm Control (N=1395)	Usual Care (N=1394)
	<i>number (percent)</i>	
Primary composite safety outcome	231 (16.6)	223 (16.0)
Stroke	40 (2.9)	62 (4.4)
Death	138 (9.9)	164 (11.8)
Serious adverse event of special interest related to rhythm-control therapy	68 (4.9)	19 (1.4)
Serious adverse event related to antiarrhythmic drug therapy		
Nonfatal cardiac arrest	1 (0.1)	1 (0.1)
Toxic effects of atrial fibrillation–related drug therapy	10 (0.7)	3 (0.2)
Drug-induced bradycardia	14 (1.0)	5 (0.4)
Atrioventricular block	2 (0.1)	0
Torsades de pointes tachycardia	1 (0.1)	0

Predicting Atrial Fibrillation Ablation Outcome:
The CAAP-AF Score

Roger A. Winkle, Julian W.E. Jarman, R. Hardwin Mead, Gregory Engel, Melissa H. Kong, William Fleming, Rob A. Patrawala

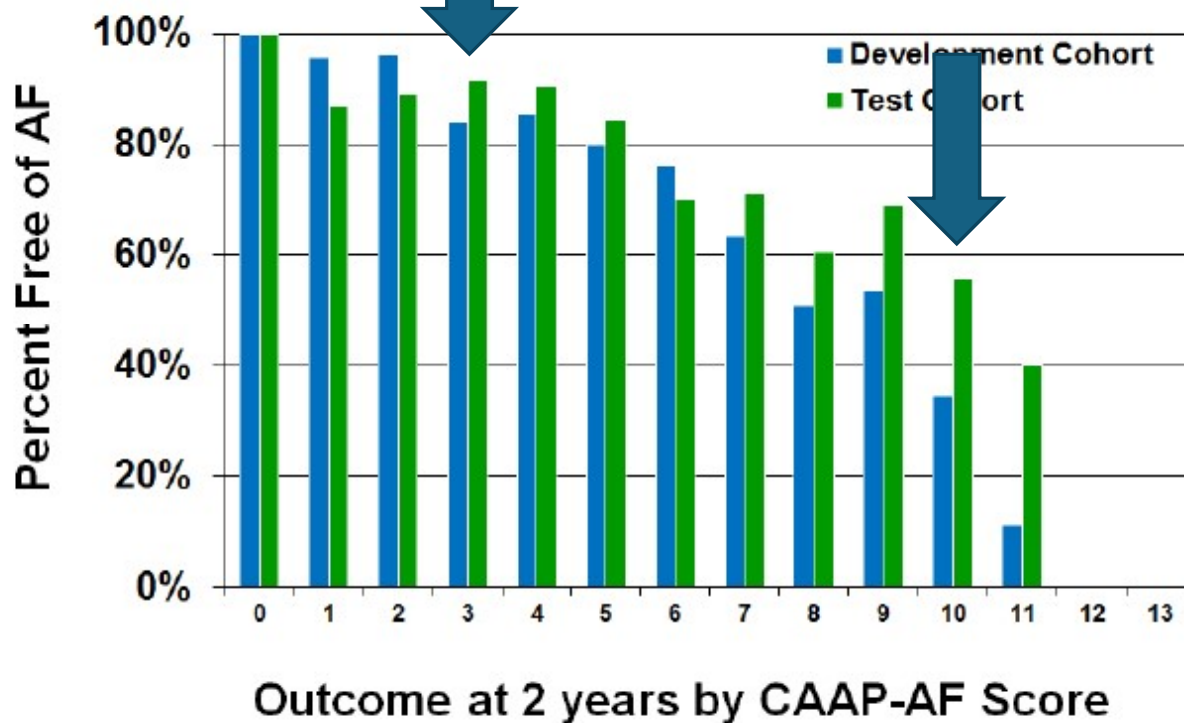


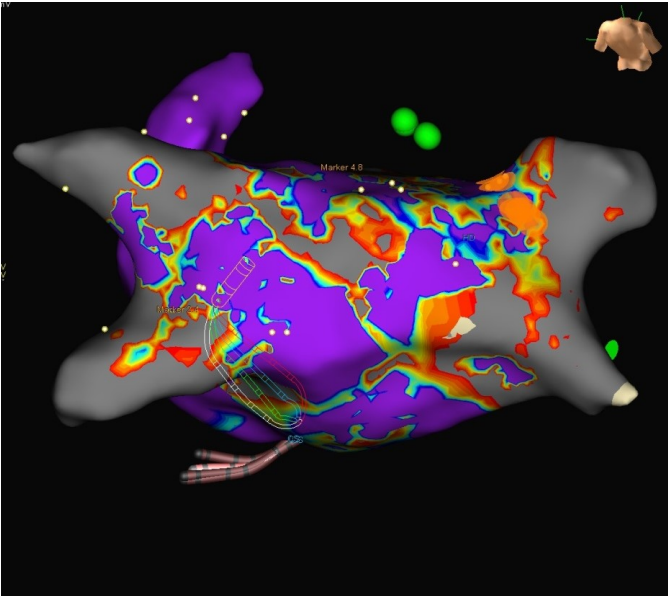
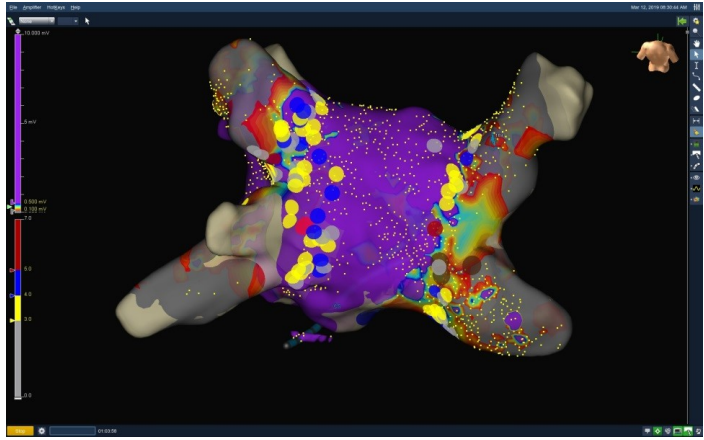
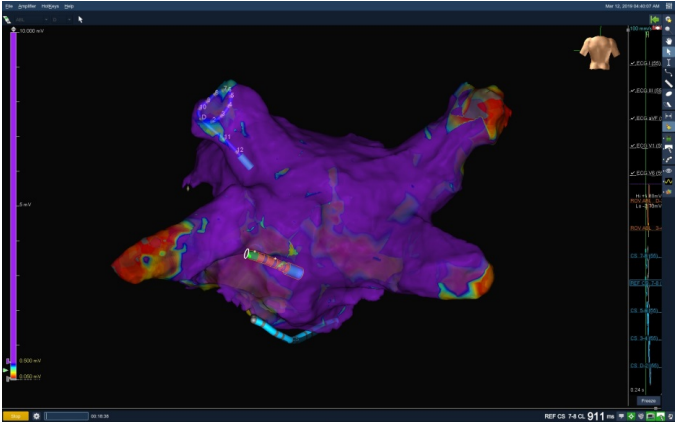
Heart Rhythm 2016

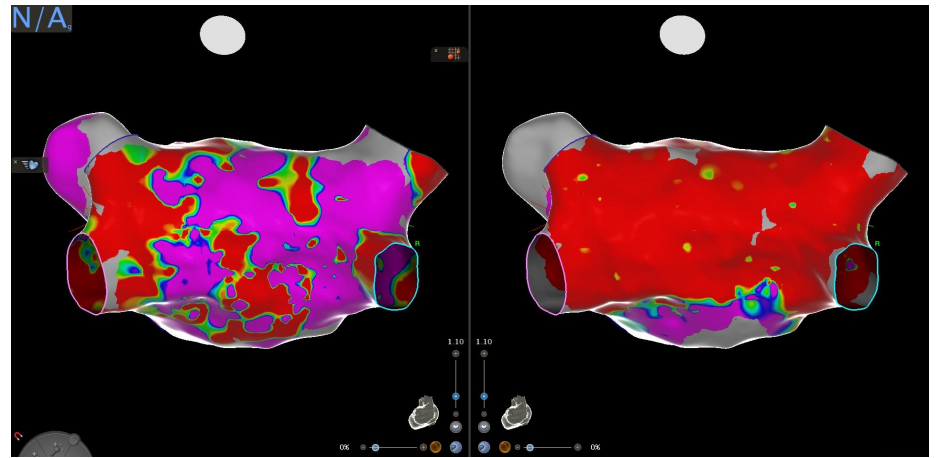
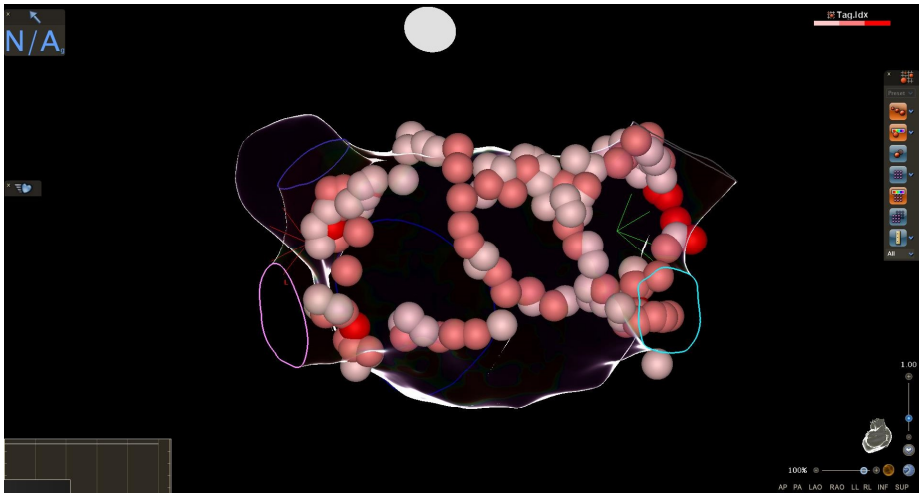
	Clinical Descriptor	Score
C	Coronary Artery Disease	1
A	Atrial diameter (left, cm)	
	<4.0	0
	4.0--<4.5	1
	4.5-<5.0	2
	5.0-<5.5	3
	≥5.5	4
A	Age	
	<50	0
	50-<60	1
	60-<70	2
	≥70	3
P	Persistent or longstanding AF	2
A	Antiarrhythmics failed	
	None	0
	1 or 2	1
	>2	2
F	Female gender	1
	Maximum score	13

	Clinical Descriptor	Score	
	C Coronary Artery Disease	1	
	A Atrial diameter (left, cm)		
	<4.0	0	
LA 43 mm	4.0--<4.5	1	
	4.5-<5.0	2	
	5.0-<5.5	3	LA 47 mm
	≥5.5	4	
	A Age		
	<50	0	
55 ετών	50-<60	1	
	60-<70	2	
	≥70	3	73 ετών
	P Persistent or longstanding AF	2	
	A Antiarrhythmics failed		
	None	0	
Ic failed	1 or 2	1	Στο παρελθόν persistent
Αντρας	>2	2	«Έχει δοκιμάσει τα πάντα»
	F Female gender	1	Γυναίκα
Total 3 points	Maximum score	13	Total 10 points

AF ABLATION 2 YEAR OUTCOMES BY CAAP-AF SCORE: DEVELOPMENT VS TEST COHORT

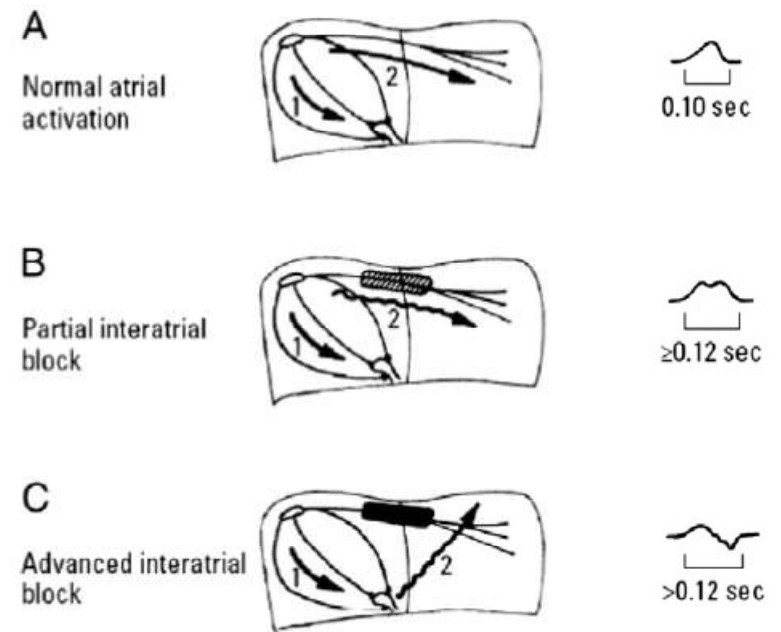
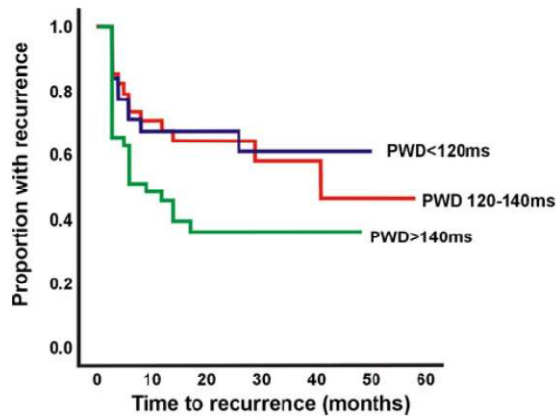






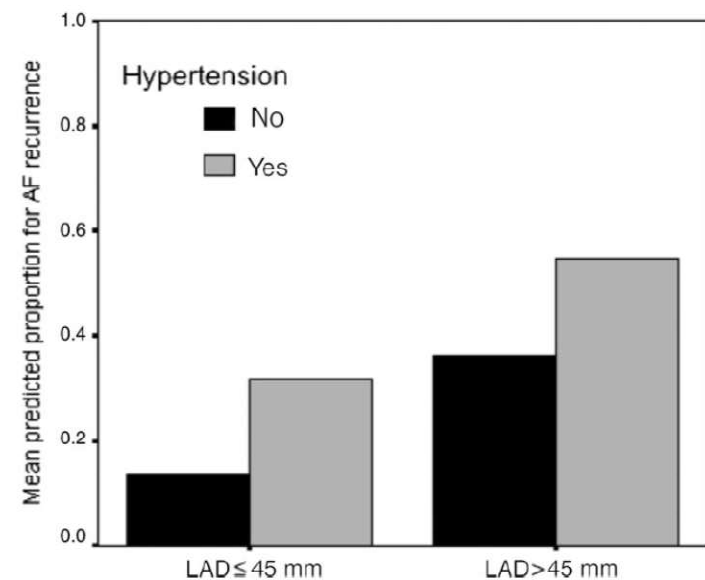
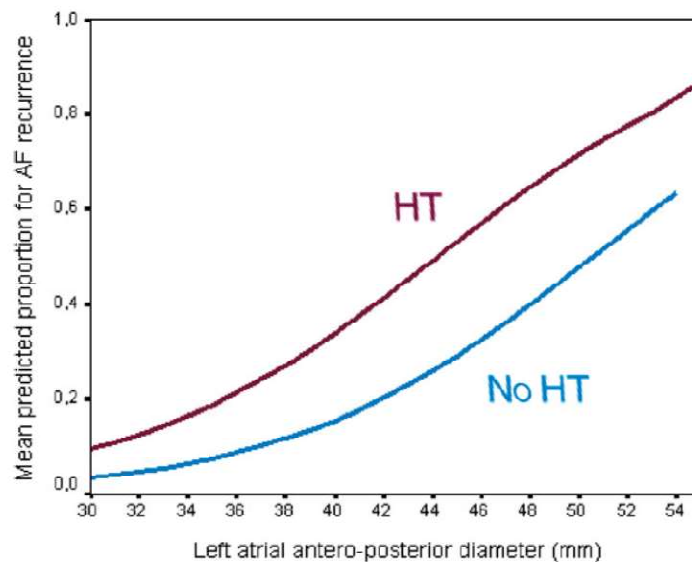
Prolonged P-wave duration is associated with atrial fibrillation recurrence after successful pulmonary vein isolation for paroxysmal atrial fibrillation

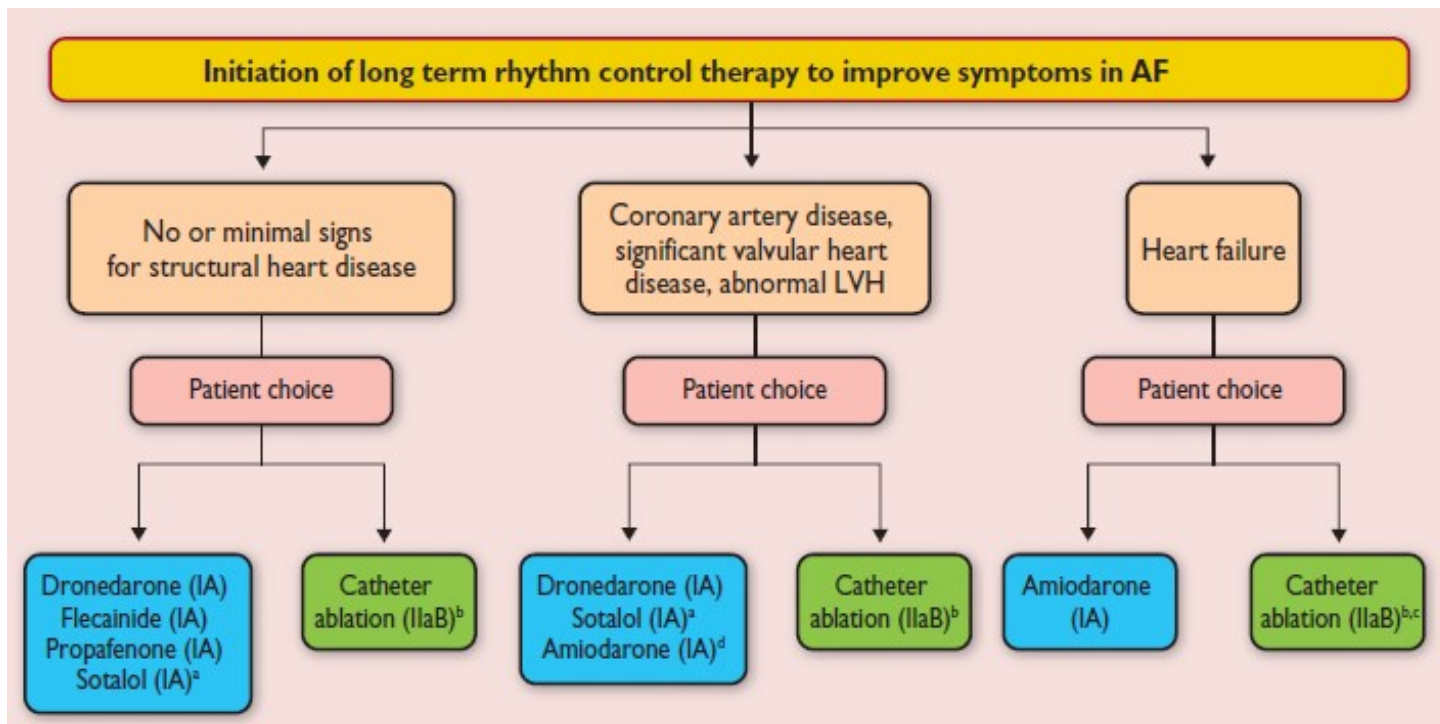
Jane Caldwell · Sahil Koppikar · Walid Barake · Damian Redfearn · Kevin Michael · Christopher Simpson · Wilma Hopman · Adrian Baranchuk



Pre-procedural predictors of atrial fibrillation recurrence after circumferential pulmonary vein ablation

Antonio Berruezo[†], David Tamborero[†], Lluís Mont^{*}, Begoña Benito, Jose María Tolosana, Marta Sitges, Bárbara Vidal, Germán Arriagada, Francisco Méndez, María Matiello, Irma Molina, and Josep Brugada





What is new in the 2020 Guidelines? New recommendations (8)

Recommendations	Class
Recommendations for rhythm control/catheter ablation of AF (continued)	
<i>Lifestyle modification and other strategies to improve outcomes of ablation</i>	
Strict control of risk factors and avoidance of triggers are recommended as part of rhythm control strategy.	I
Recommendations for stroke risk management peri cardioversion	
It is recommended that the importance of adherence and persistence to NOAC treatment both before and after cardioversion is strongly emphasized to patients.	I
In patients with AF duration of >24 hours undergoing cardioversion, therapeutic anticoagulation should be continued for at least 4 weeks even after successful cardioversion to sinus rhythm (beyond 4 weeks, the decision about long-term OAC treatment is determined by the presence of stroke risk factors).	IIa

Figure 3 Summary of risk factors for incident AF

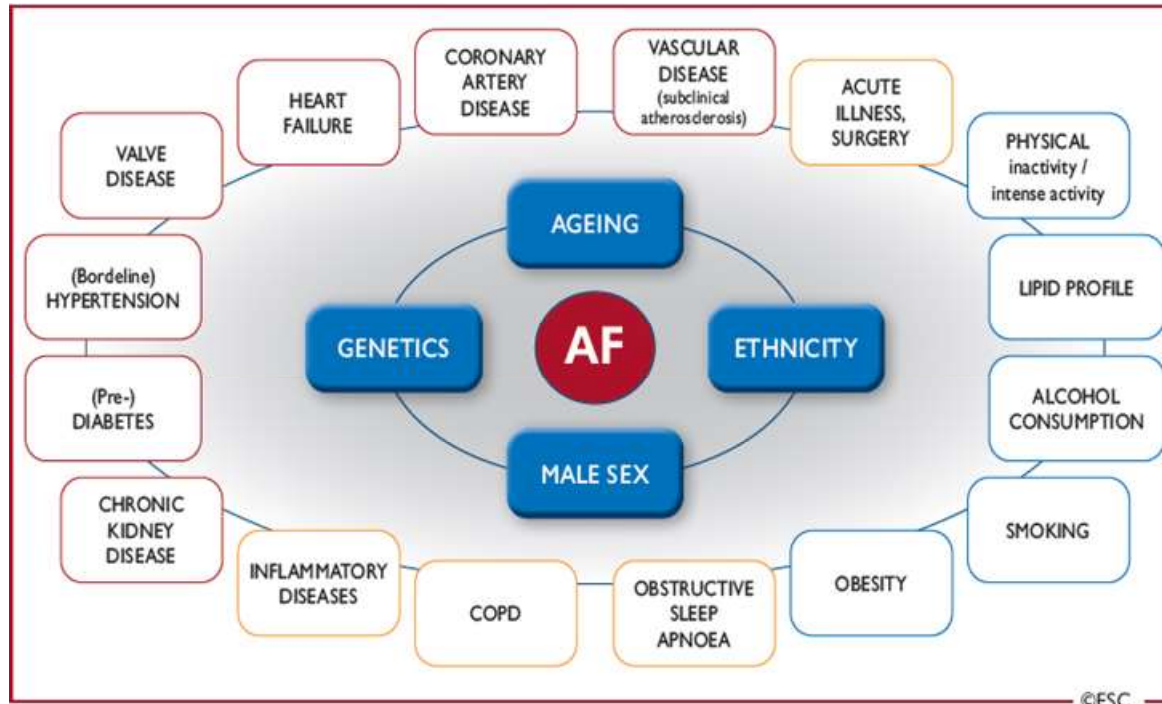
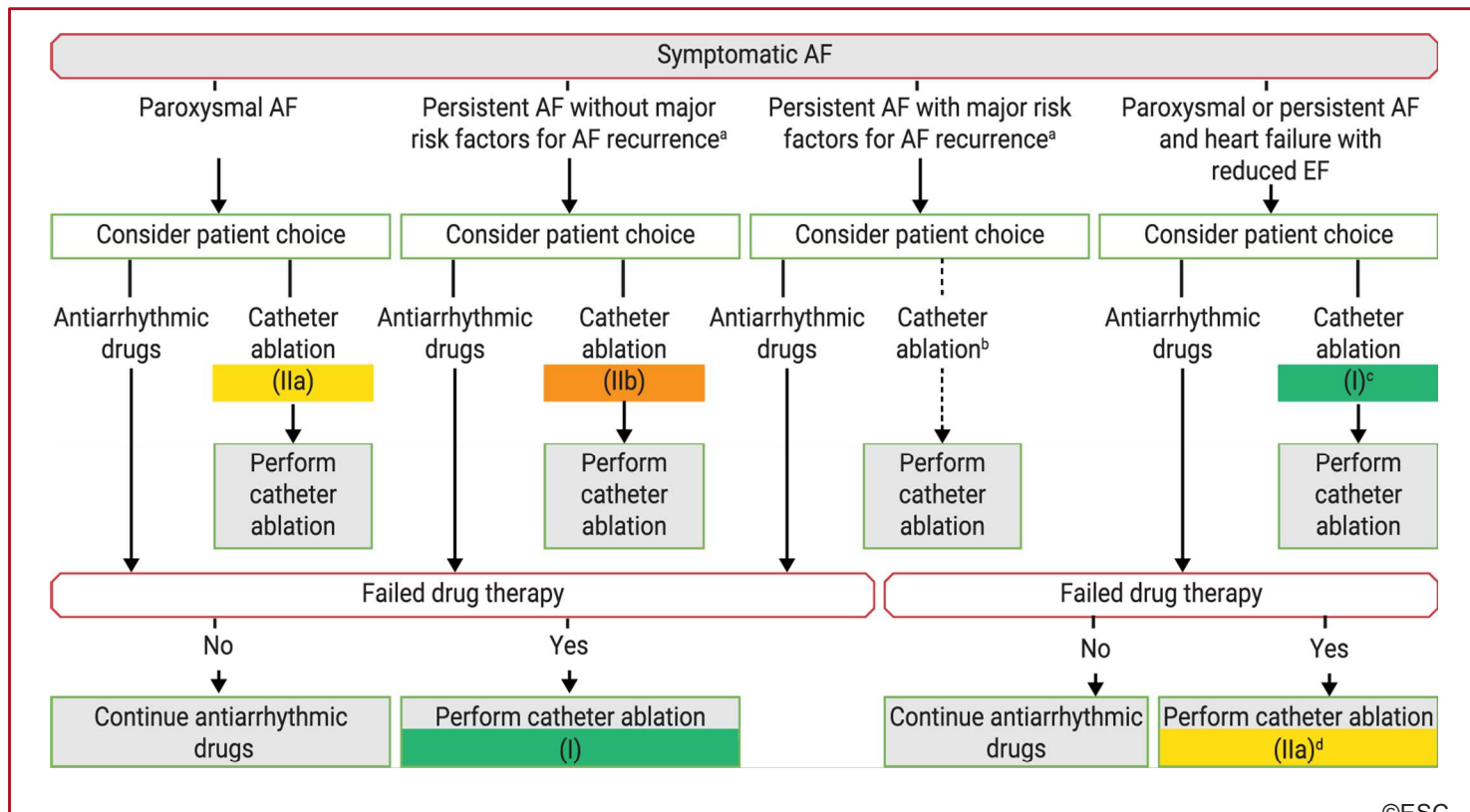


Figure 17 Indications for catheter ablation of symptomatic AF



©ESC

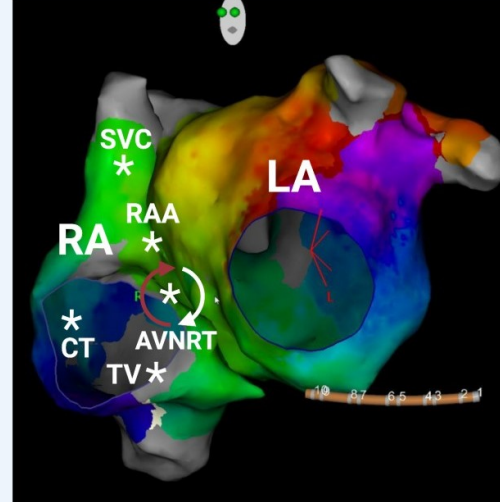
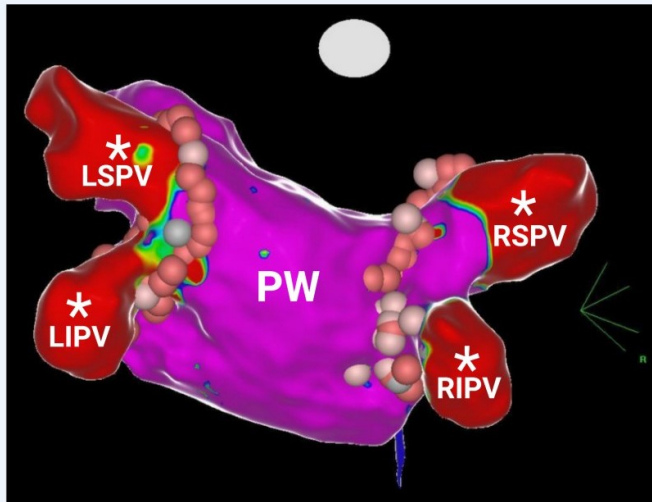
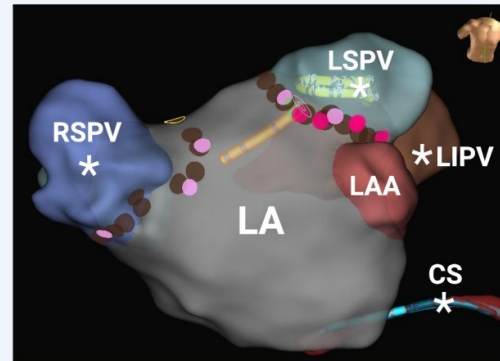
^aSignificantly enlarged LA volume, advanced age, long AF duration, renal dysfunction, and other cardiovascular risk factors. ^bIn rare individual circumstances, catheter ablation may be carefully considered as first-line therapy. ^cRecommended to reverse LV dysfunction when tachycardiomyopathy is highly probable. ^dTo improve survival and reduce hospitalization.

Recommendations for rhythm control/catheter ablation of AF

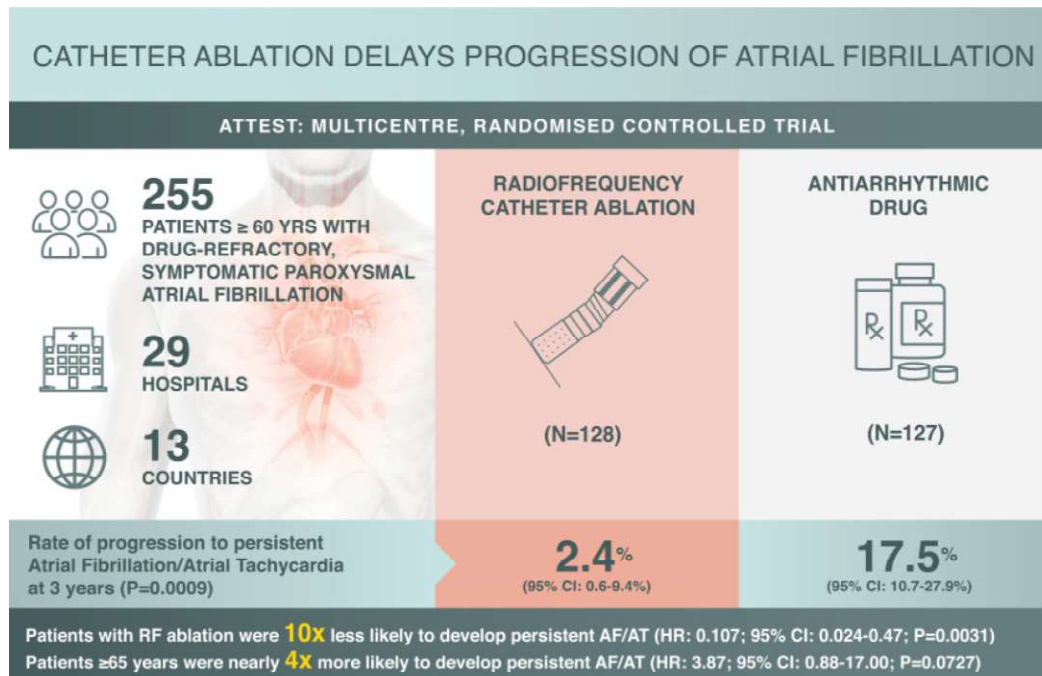
Recommendations	Class ^a	Level ^b
General recommendations		
For the decision on AF catheter ablation, it is recommended to take into consideration the procedural risks and the major risk factors for AF recurrence following the procedure and discuss them with the patient. ^{235–237,239,607,609,612,613,636,638,652,654,680,682,785,789}	I	B
Repeated PVI procedures should be considered in patients with AF recurrence provided the patient's symptoms were improved after the initial PVI. ^{812–814}	IIa	B
AF catheter ablation after failure of drug therapy		
AF catheter ablation for PVI is recommended for rhythm control after one failed or intolerant class I or III AAD, to improve symptoms of AF recurrences in patients with ^{235–238,247,605–609,612,613,615–617,654,677,678,680,682,685,758,779,780,815,}	I	
● Paroxysmal AF, or		A
● Persistent AF without major risk factors for AF recurrence, or		A
● Persistent AF with major risk factors for AF recurrence.		B
AF catheter ablation for PVI should be considered for rhythm control after one failed or intolerant to beta-blocker treatment to improve symptoms of AF recurrences in patients with paroxysmal and persistent AF. ²⁴⁶	IIa	B

First-line therapy		
AF catheter ablation for PVI should/may be considered as first-line rhythm control therapy to improve symptoms in selected patients with symptomatic:		
<ul style="list-style-type: none"> ● Paroxysmal AF episodes,^{240–242,614,615} or 	IIa	B
<ul style="list-style-type: none"> ● Persistent AF without major risk factors for AF recurrence.^{253–255,264,598–601,609,610,633,636,641,724,745,746,832} 	IIb	C
as an alternative to AAD class I or III, considering patient choice, benefit, and risk.		
AF catheter ablation:		
<ul style="list-style-type: none"> ● Is recommended to reverse LV dysfunction in AF patients when tachycardia-induced cardiomyopathy is highly probable, independent of their symptom status.^{666,675,676} 	I	B
<ul style="list-style-type: none"> ● Should be considered in selected AF patients with HF with reduced LVEF to improve survival and reduce HF hospitalization.^{612,659,662–666,668–671,817–826} 	IIa	B
AF catheter ablation for PVI should be considered as a strategy to avoid pacemaker implantation in patients with AF-related bradycardia or symptomatic pre-automaticity pause after AF conversion considering the clinical situation. ^{816–818}	IIa	C

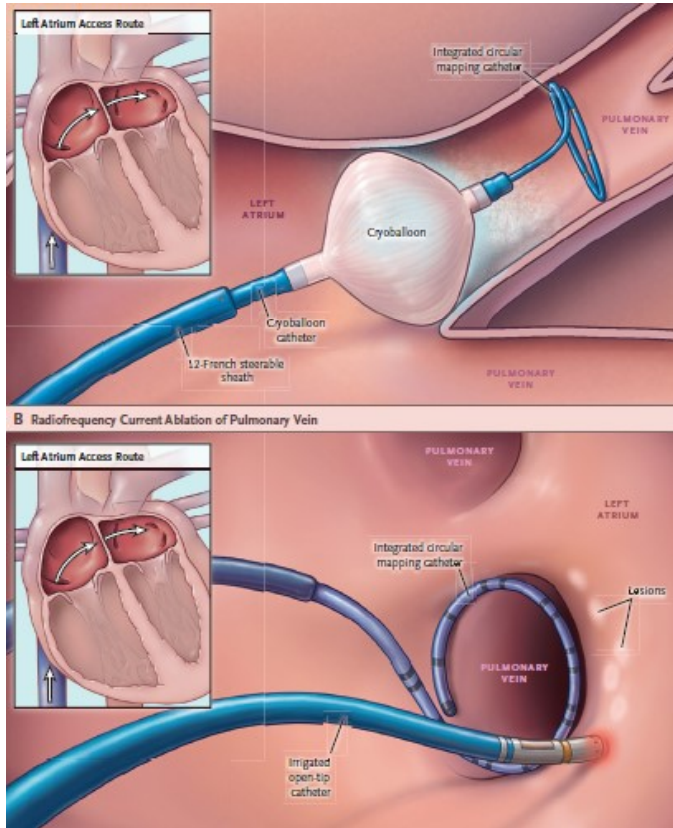
RA= right atrium
 RAA = right atrial appendage
 RSPV= right superior pulmonary vein
 RIPV= right inferior pulmonary vein
 LA= left atrium
 LAA= left atrial appendage
 LSPV= left superior pulmonary vein
 LIPV= left inferior pulmonary vein
 PW= posterior wall
 SVC= superior vena cava
 CT= crista terminalis
 TV= tricupsid valve



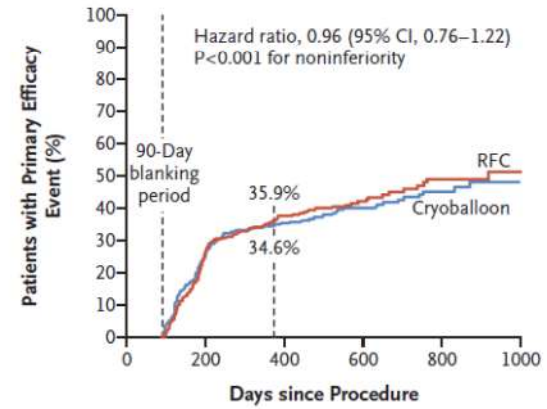
Catheter ablation or medical therapy to delay progression of atrial fibrillation: the randomized controlled atrial fibrillation progression trial (ATTEST)



FIRE AND ICE

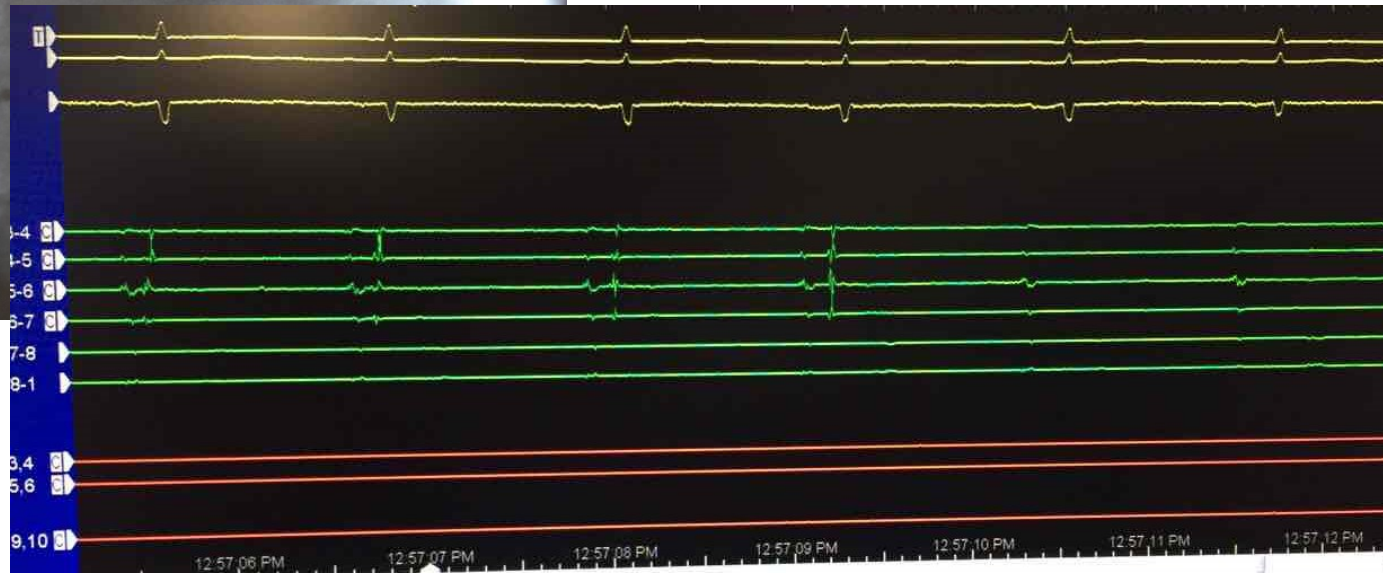
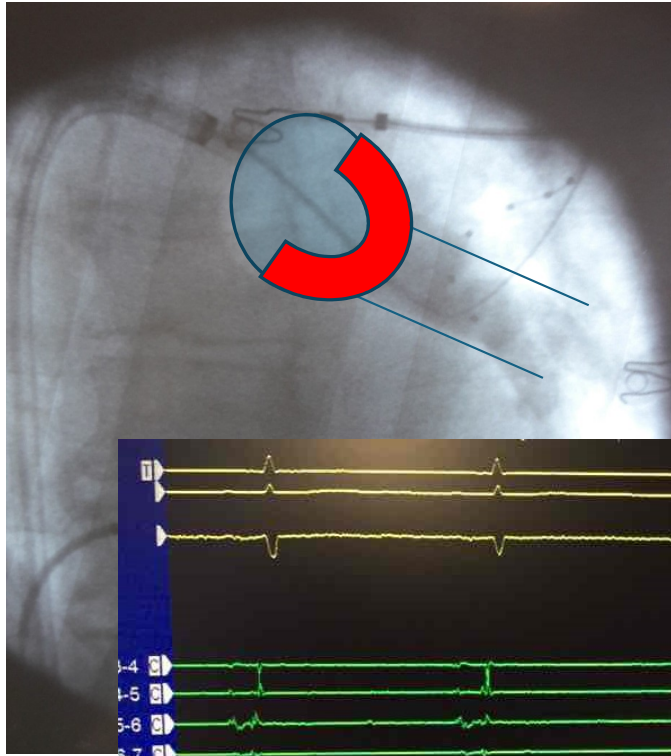


A Primary Efficacy End Point



No. at Risk
Cryoballoon
RFC

374	338	242	194	165	132	107	70	57	34	12
376	350	243	191	149	118	93	58	44	25	12



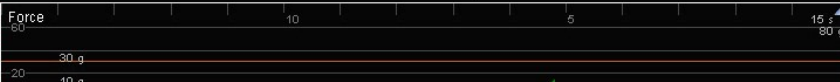
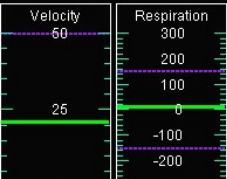


TF
 1g
 0g
 --gs
 LSI
 FTI

Power (M) 33 107 RF Session Time (s)

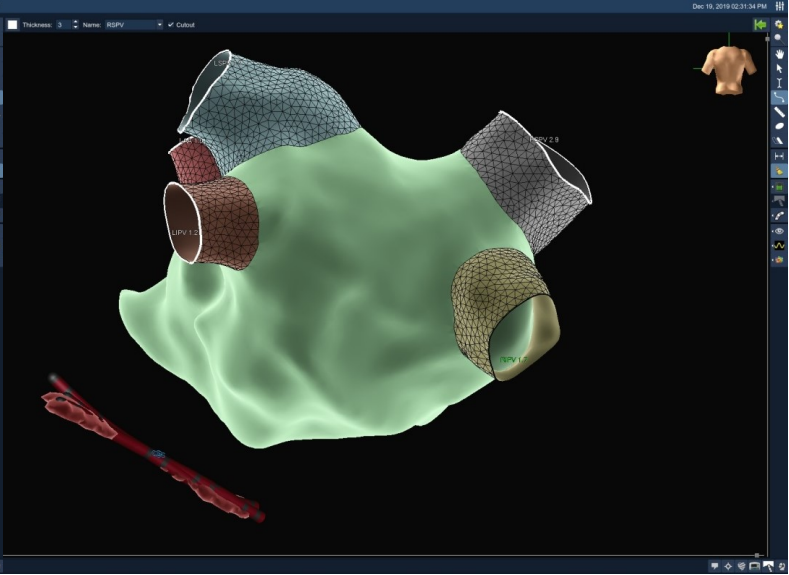
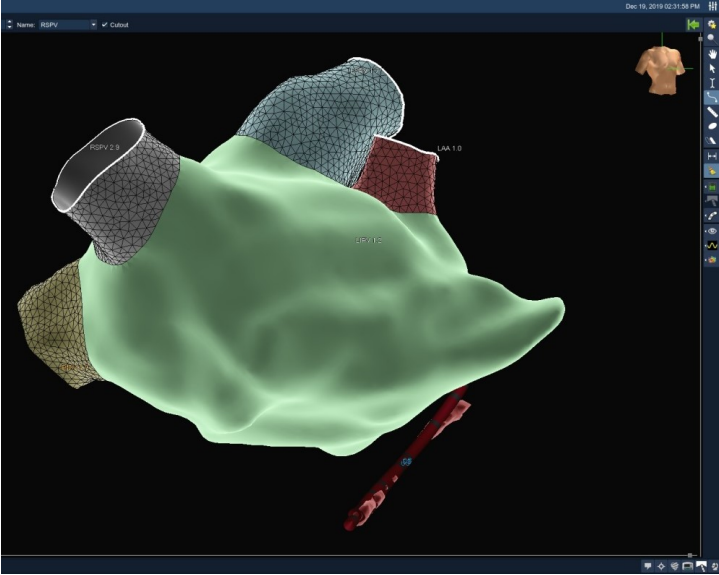
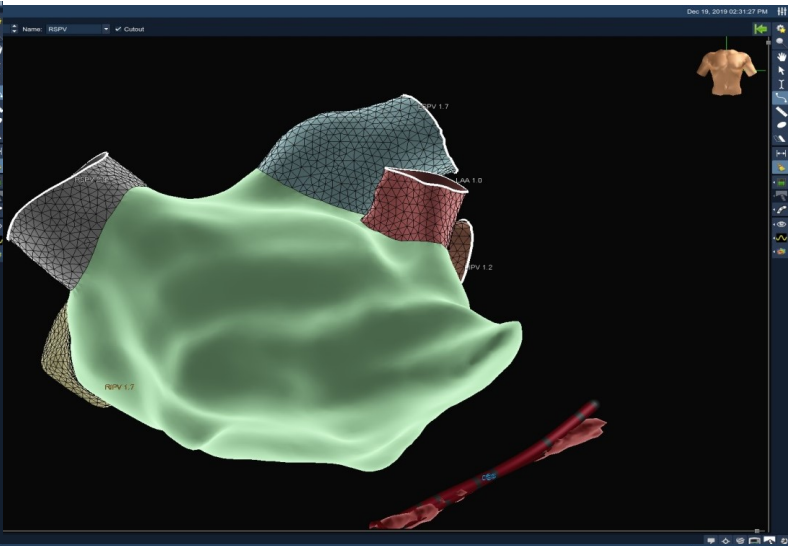
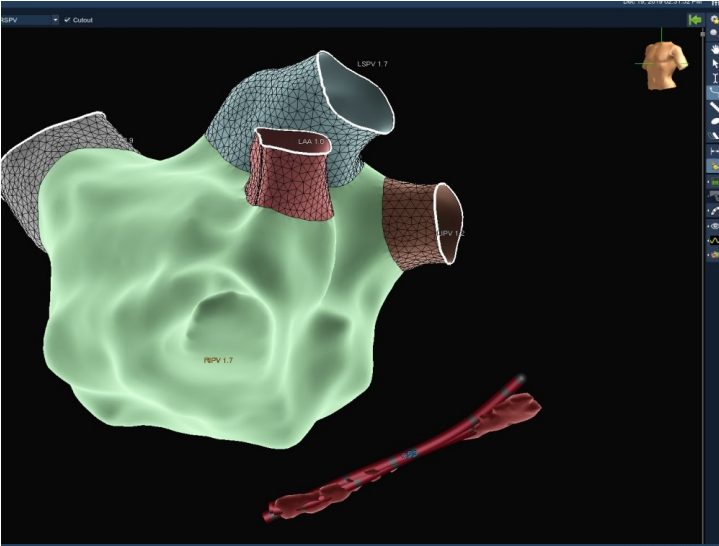
No map selected

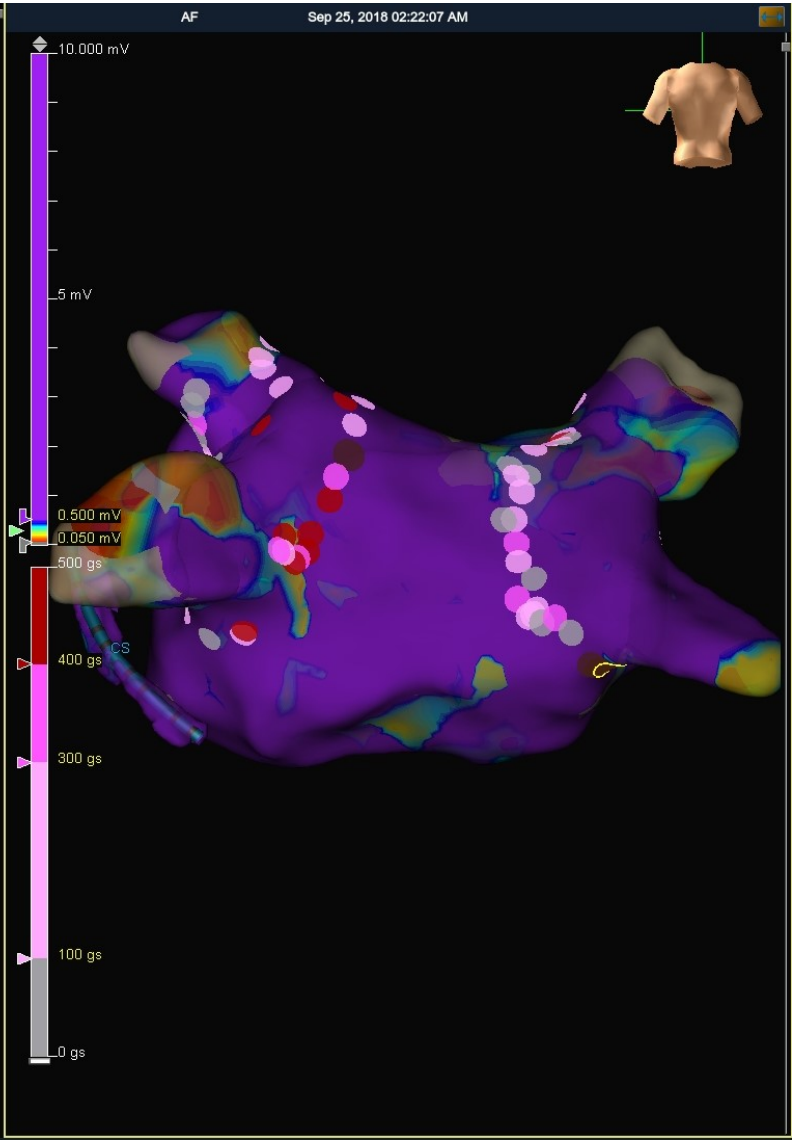
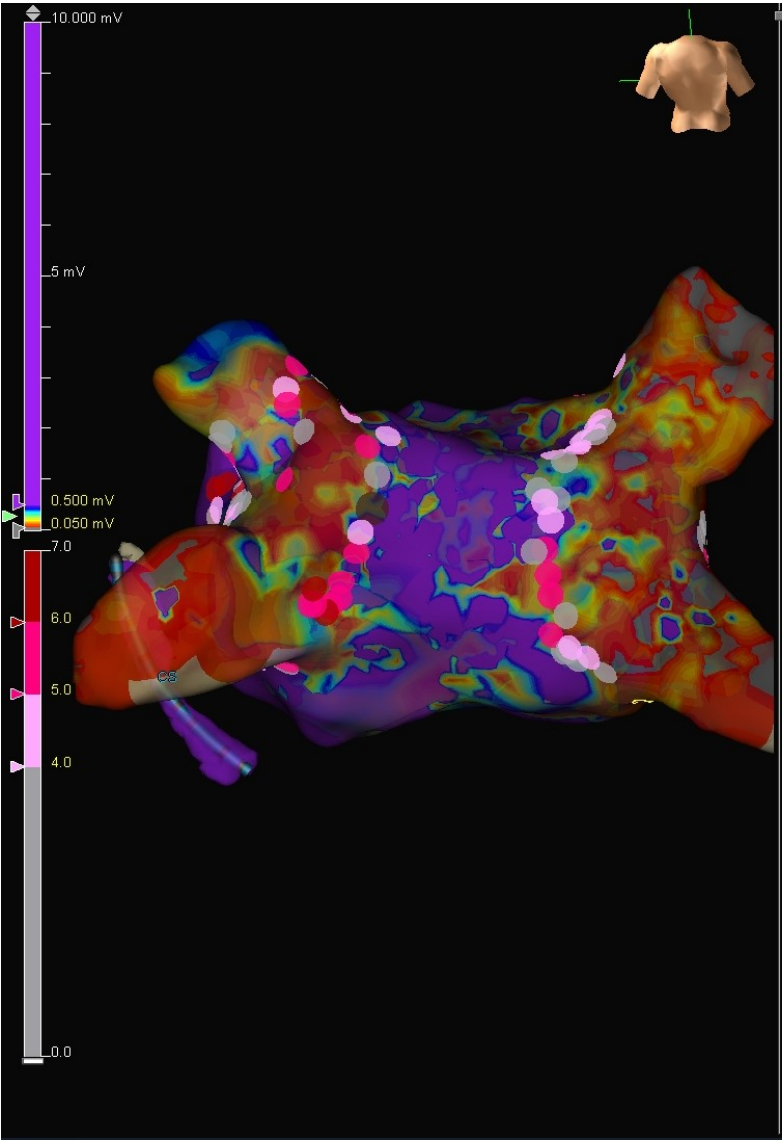
40 s
 20 s
 0 s

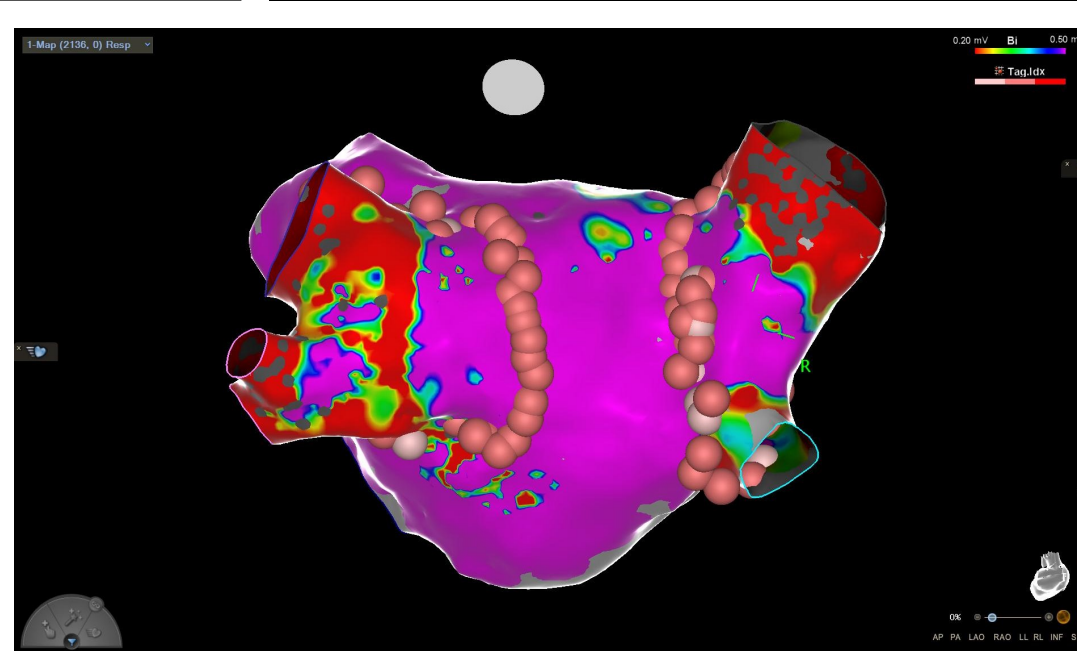
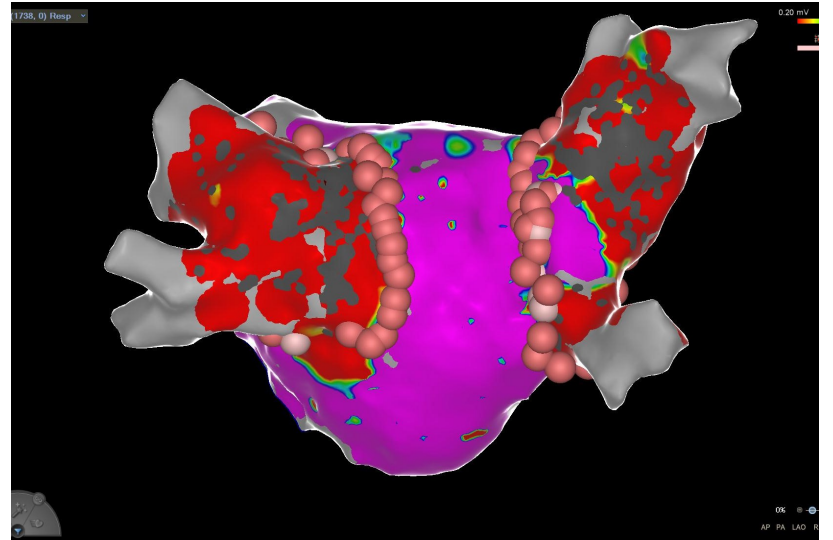
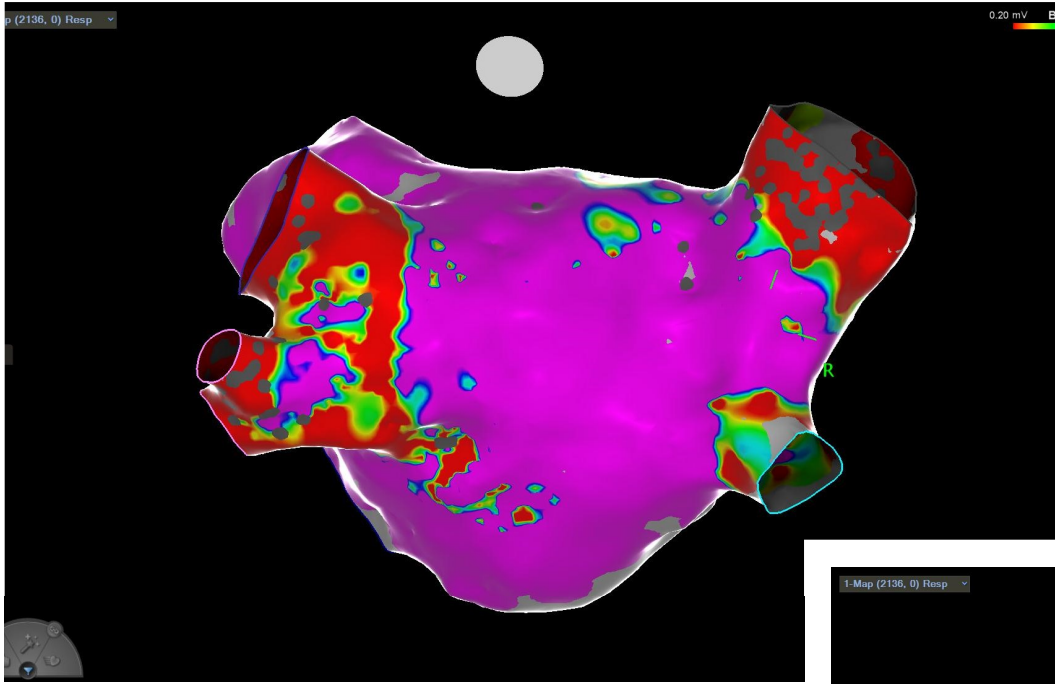


Score 100
 CL 1,221ms
 LAT -111ms

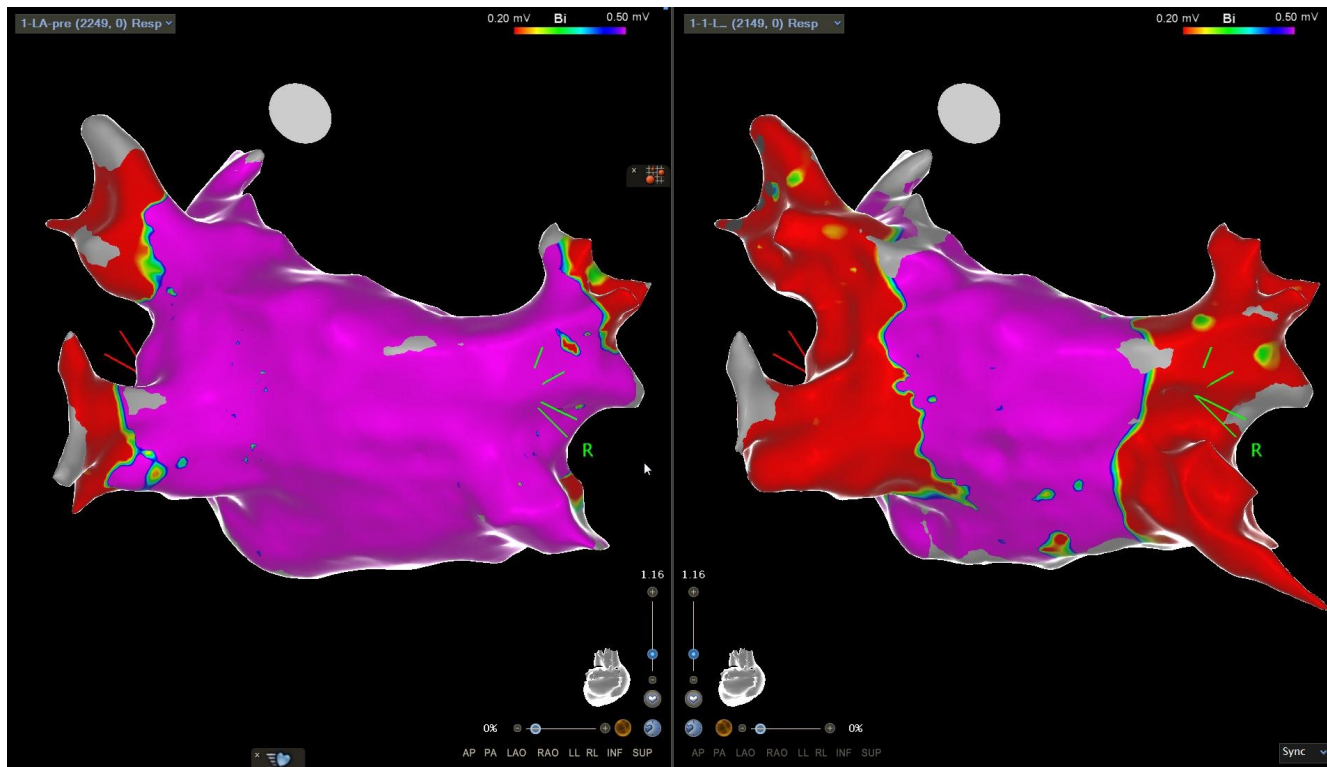




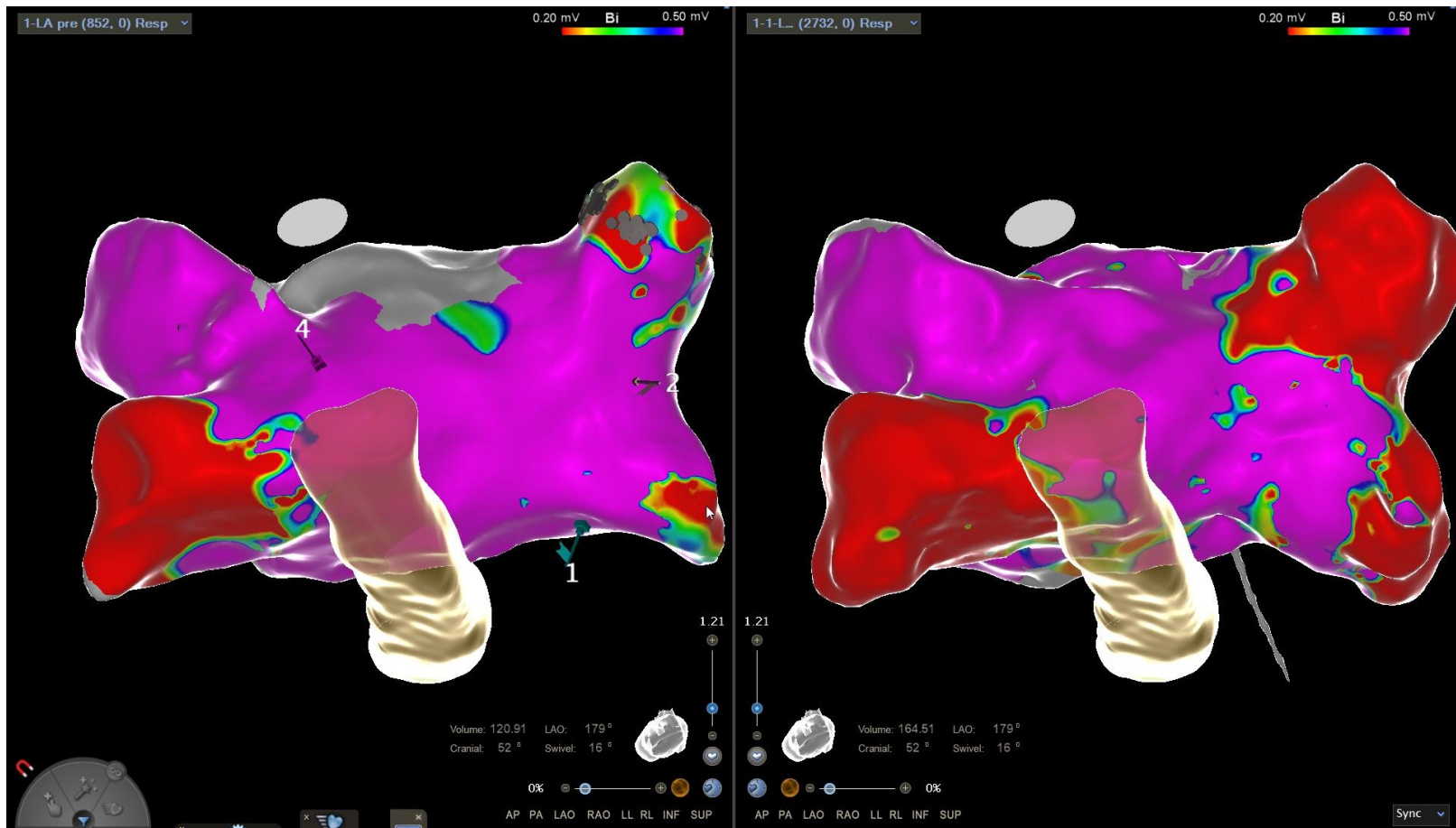




CARTOCRYO

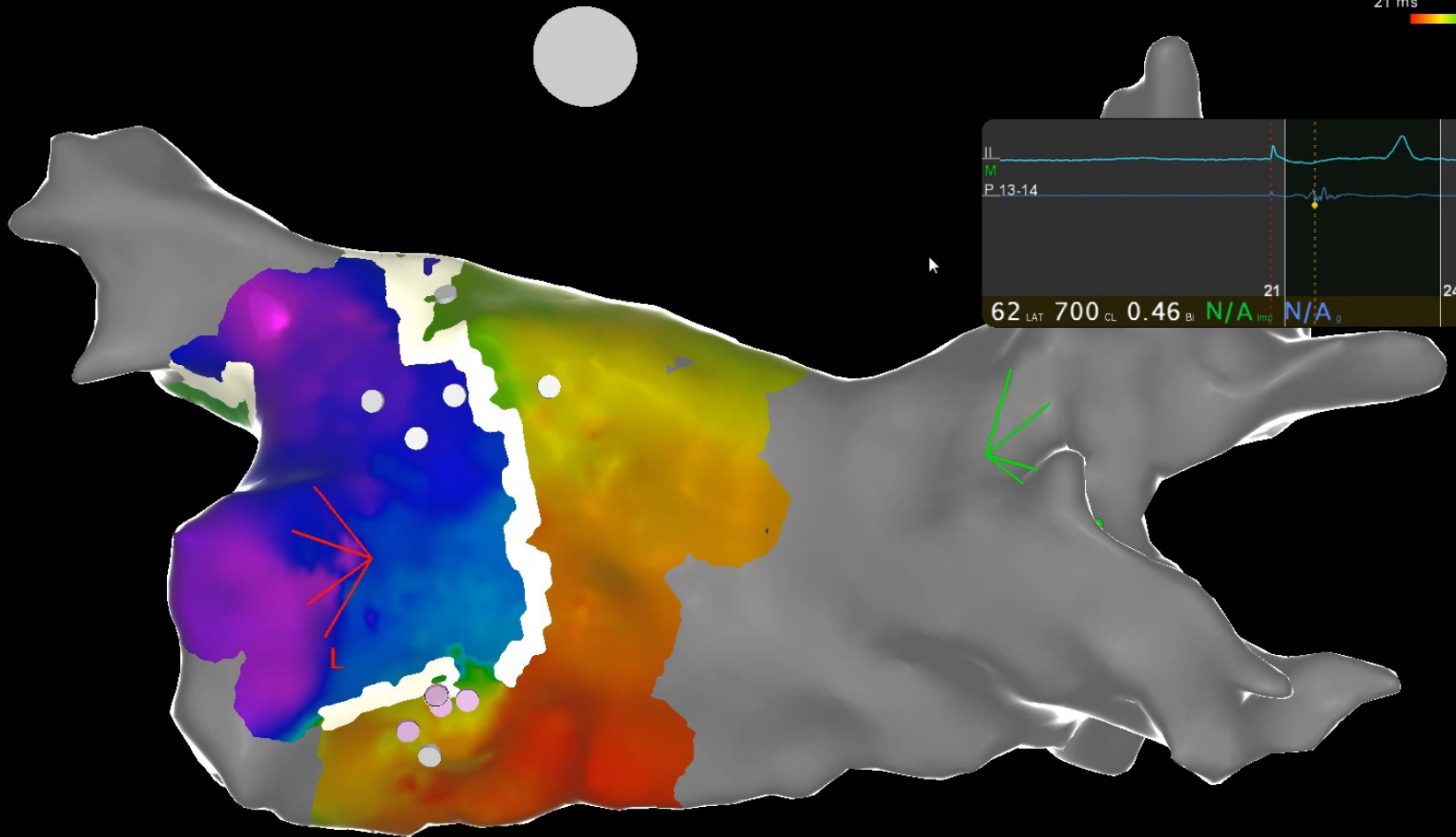
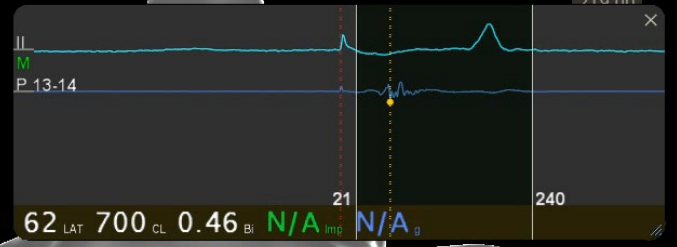


CARTOCRYO



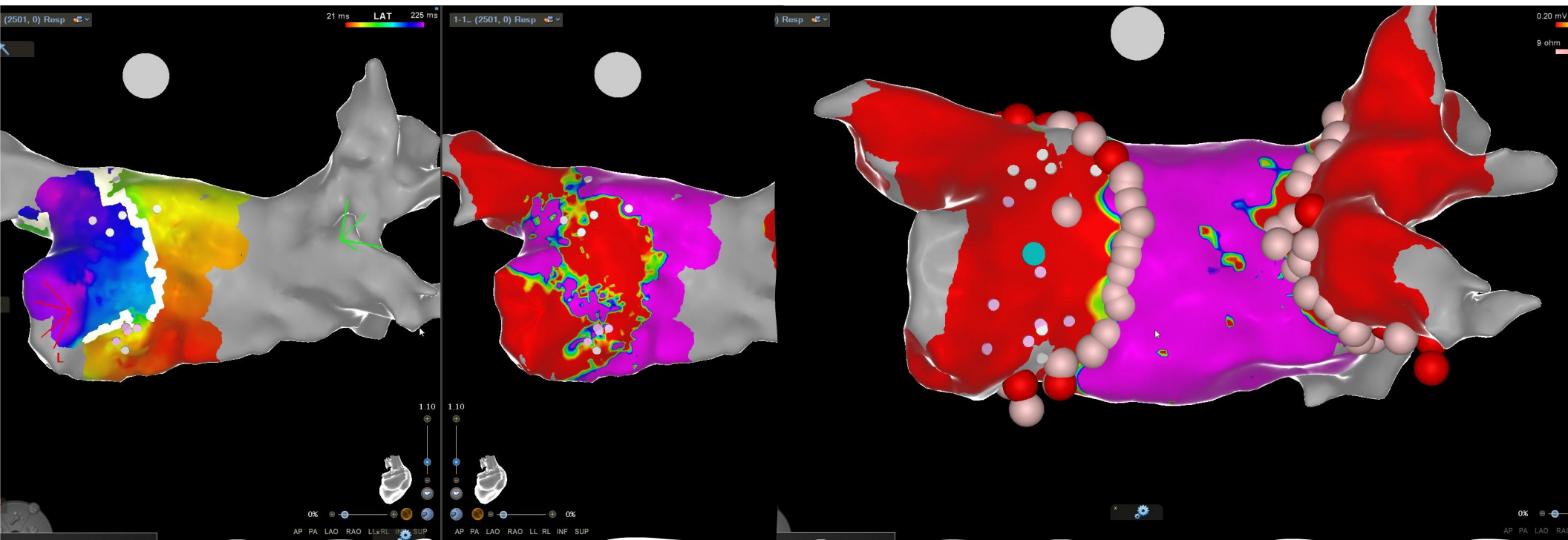
1-1_ (2501, 0) Resp

21 ms LAT 225 ms
221 24



0.91

0% AP PA LAO RAO LL RL INF SUP



Voltage map Before and After gap closure

