ASM

Atrial Fibrillation
Current Approach

IGHA

ASM

Atrial Fibrillation: Current Approach
Κολπική Μαρμαρυγή: Σύγχρονη Αντιμετώπιση

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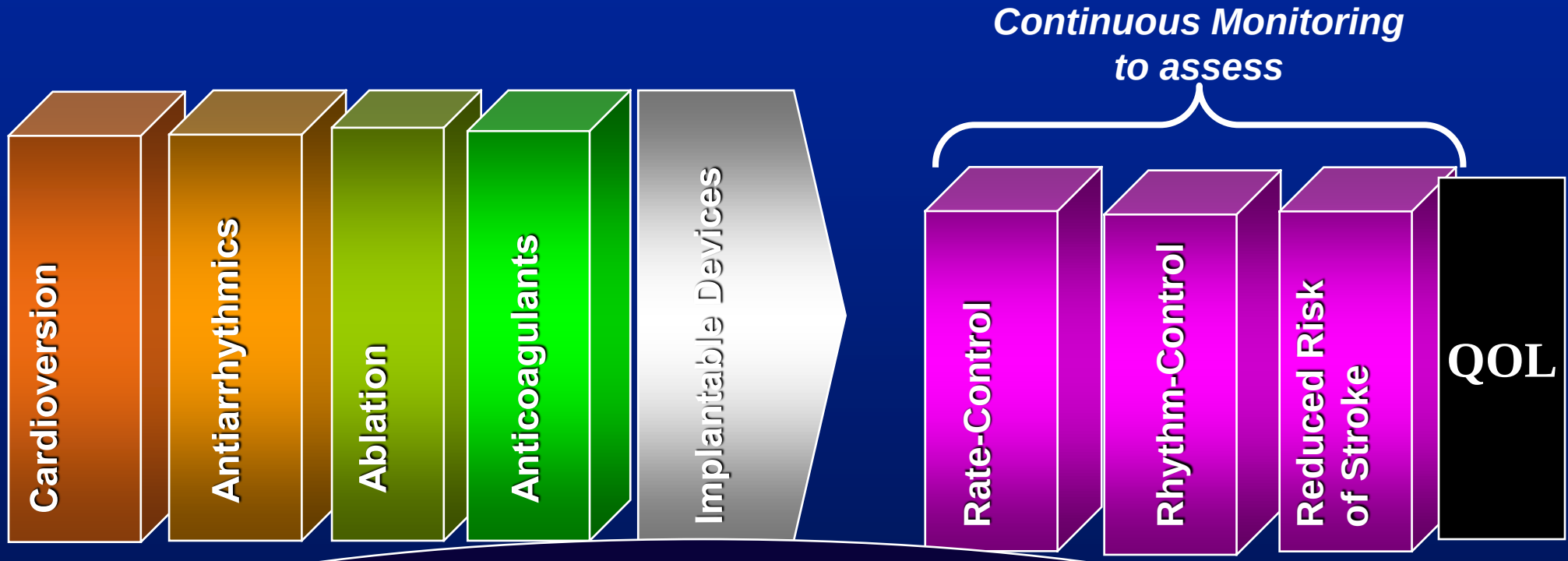
ΕΚΠΑ

AF

- AF is one of the most common cardiac arrhythmias, & its prevalence continues to rise as the aged population ↑
- Comparative studies of rhythm & rate control : equivocal;
- however, benefits of rhythm control may have been offset by the limitations of AAD
- Nonpharmacologic Rxs: hope of more effective rhythm control
- RFA techniques in specialized centers / not without complications & require considerable expertise
- Pacing Rxs designed to ↓harmful RV pacing & ↑ physiologic pacing have shown benefit in AF pts c bradycardia
- Despite progress, no single modality confers benefit for all
- Strategies to combine Rx modalities in a hybrid approach has shown increasing promise for subgroups of AF pts

Κολπική Μαρμαρυγή: Υβριδική Θεραπεία

Combinations of CV, drug, ablation, device-based & other therapies that work adjunctively to provide optimal medical care



Rhythm vs Rate Control:

these studies would not have happened if an AAD(s) with >90% efficacy & an acceptable AE profile had been available!

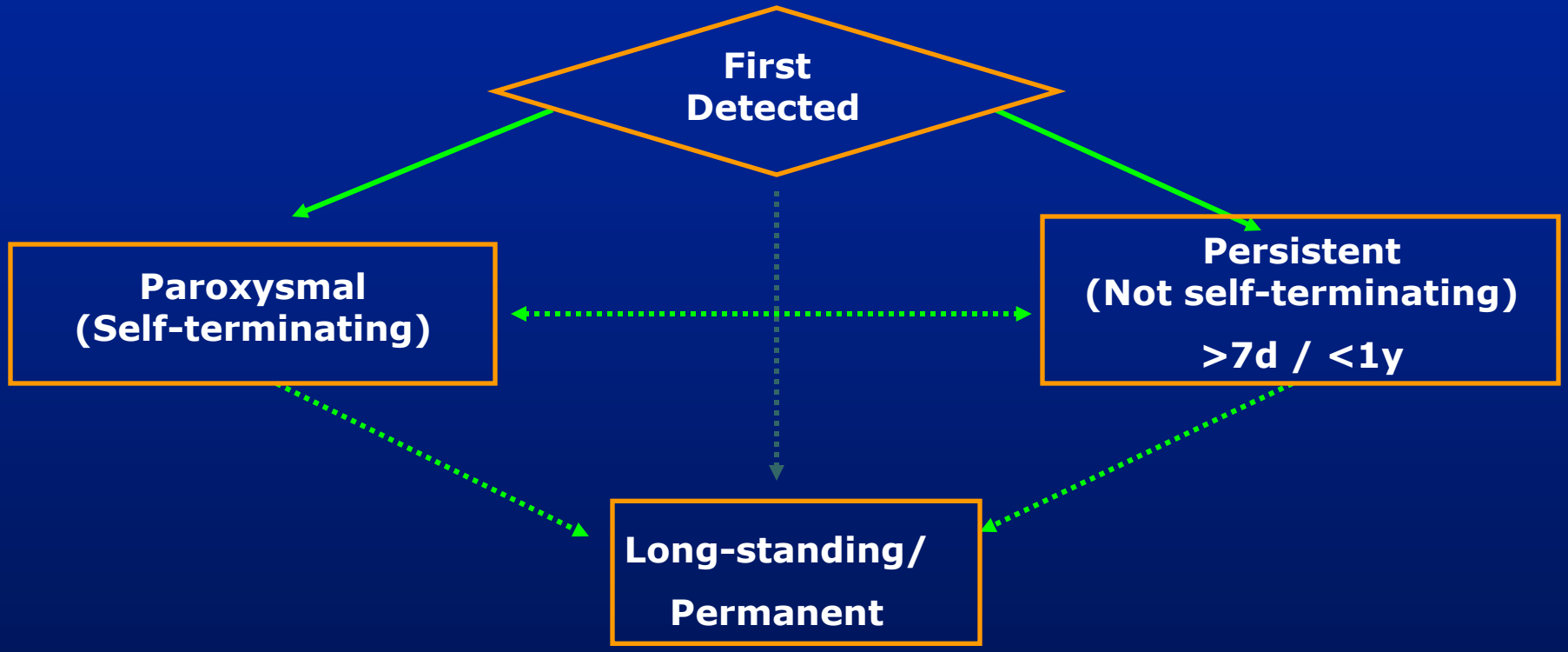
Opportunistic Screening

Recommendations for screening AF		
Recommendations	**Class[a]**	**Level[b]**
Opportunistic screening for AF in patients ≥65 years of age using pulse-taking followed by an ECG is recommended to allow timely detection of AF.	I	B

[a]Class of recommendation. [b]Level of evidence.
AF = atrial fibrillation; LoE = level of evidence.

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

Classification of Atrial Fibrillation
ACC/AHA/ESC Guidelines

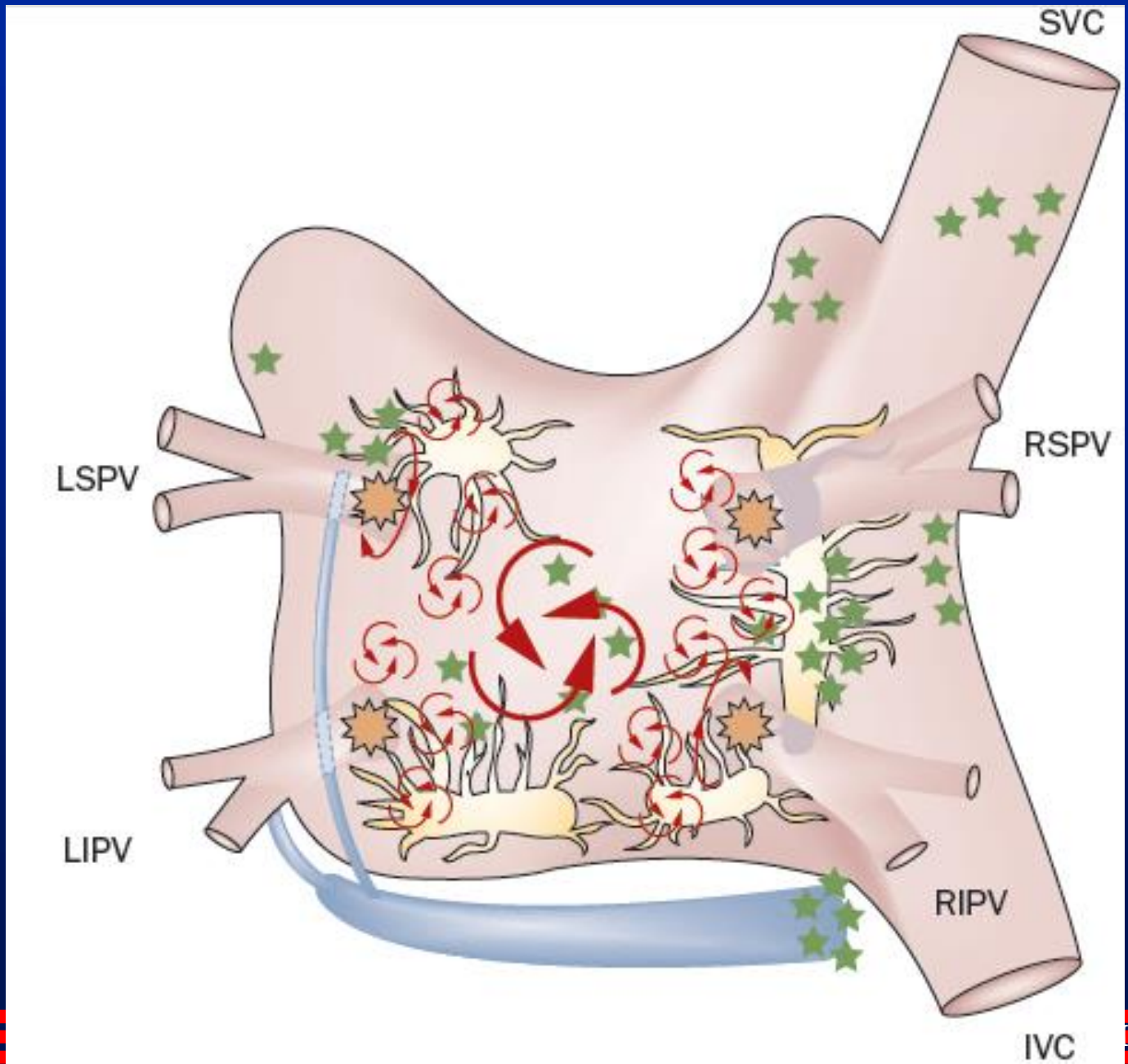


Fuster et al. J Am Coll Cardiol. 2001; 38: 1231-1265.

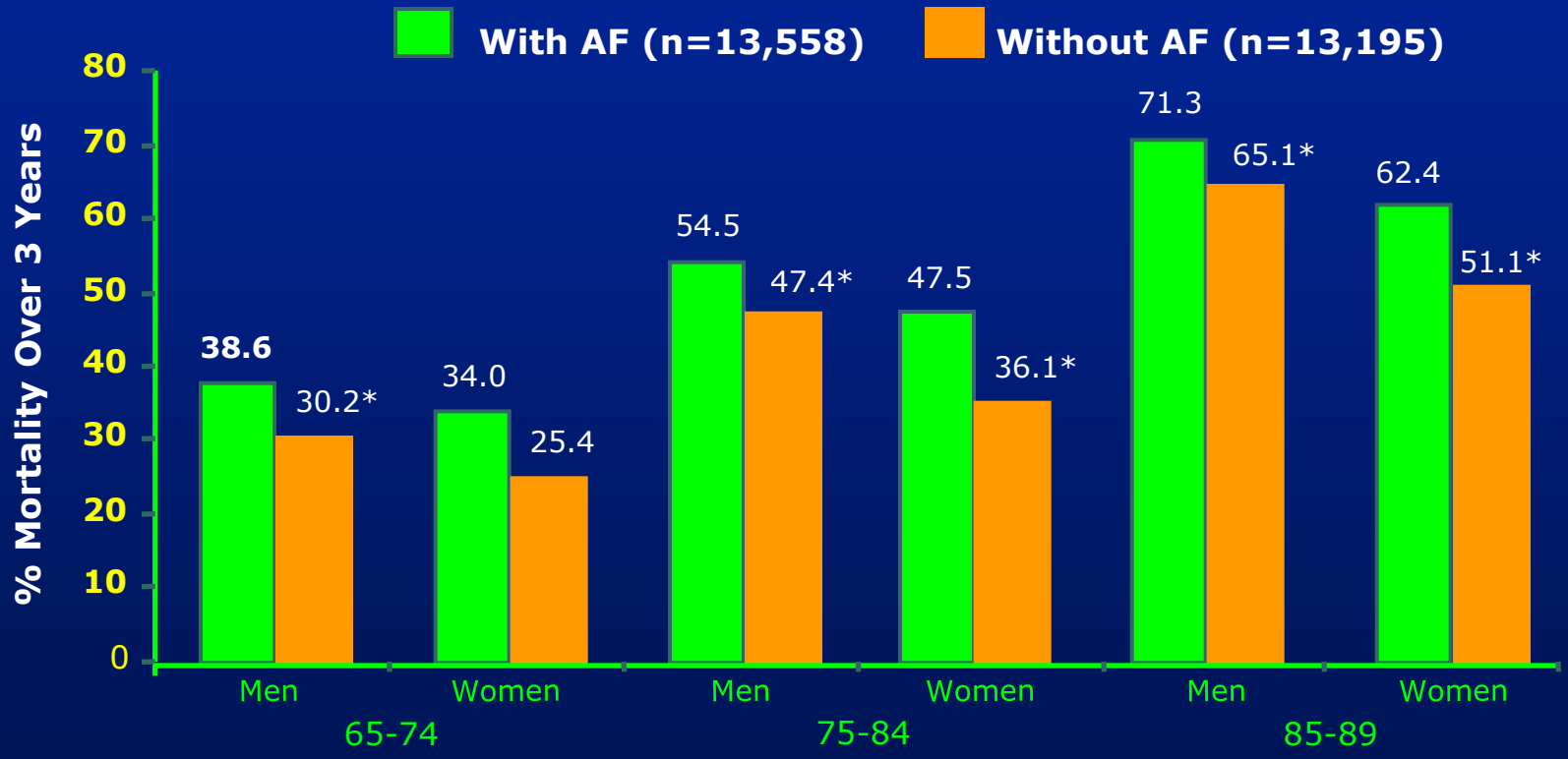
Anatomical and arrhythmic mechanisms of AF

- **Pulmonary veins**:

demonstrated to be the origin of bursts of atrial tachycardia, which trigger AF



Higher Mortality Rate in Patients with AF[1]



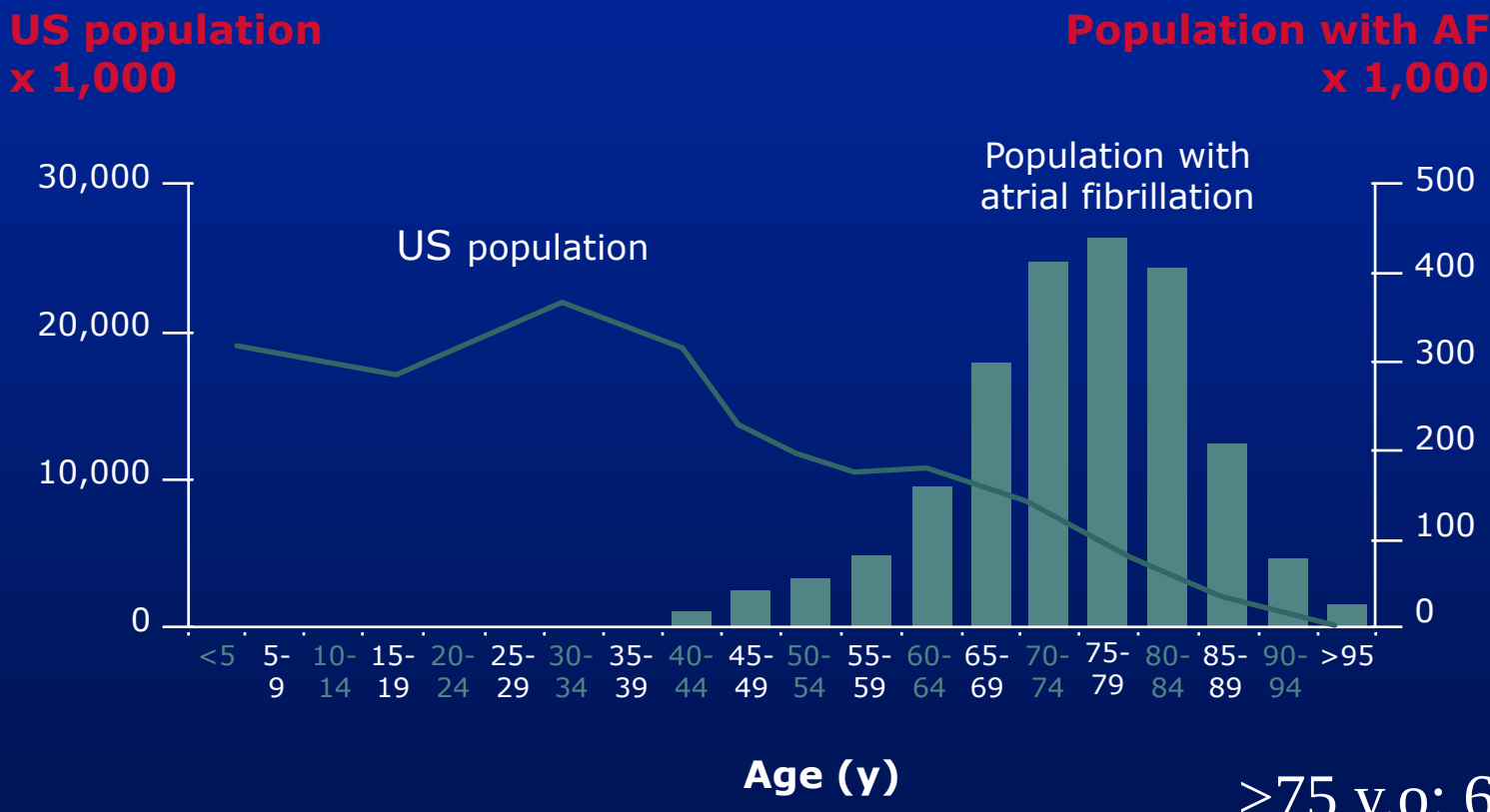
** Significantly different from patients with AF at P<0.05.*

1. Wolf et al. Arch Intern Med 1998; 158: 229–234.

ΕΚΠΑ

Prevalence of Atrial Fibrillation in the US[1]

AF prevalence: 2.3% (>40y) / 5.9% (>65y)
70%: 65-85 y / absolute # men & women equal

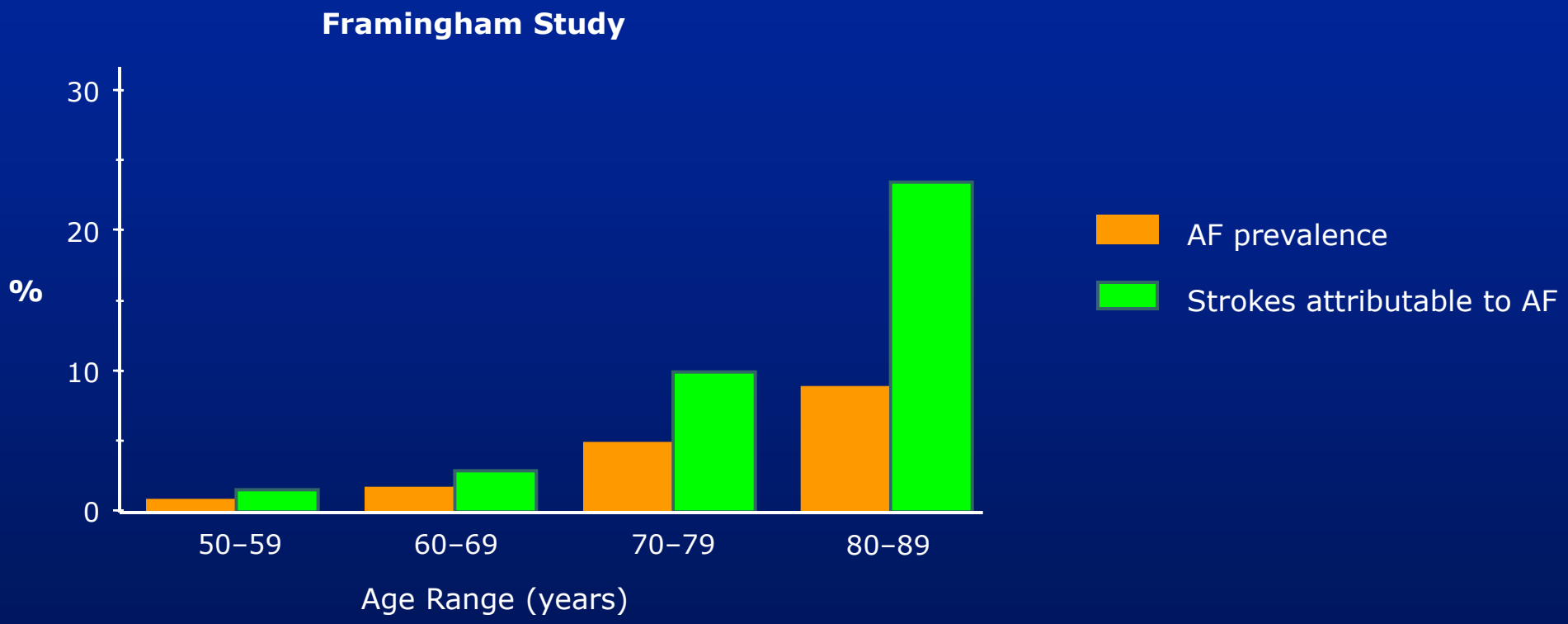


2.2 million
mean age:75y

>75 y.o: 60% of AF sufferers are women

Adapted from Feinberg WM. *Arch Intern Med* 1995; 155: 469-473.

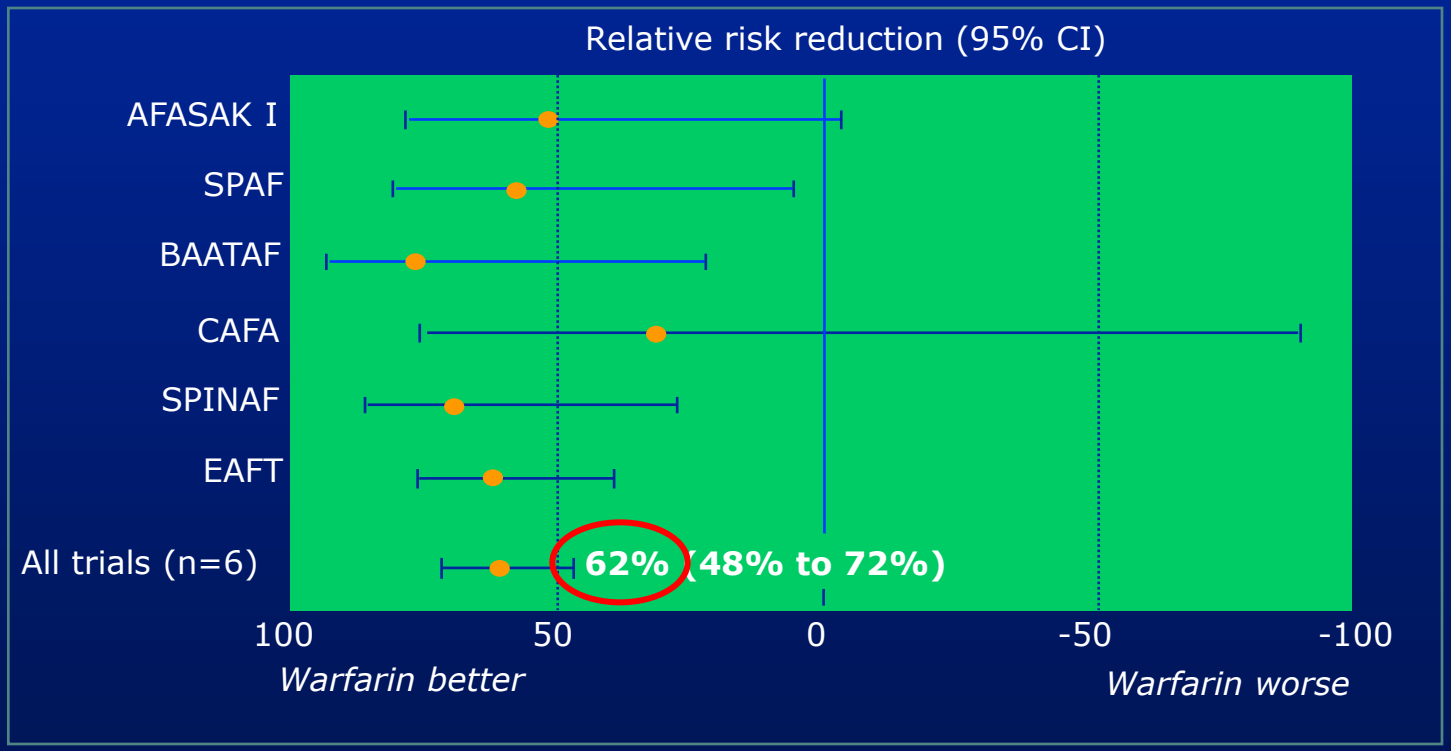
One Sixth of All Strokes Attributable to AF[1]



Wolf *et al. Stroke* 1991; 22: 983-988.

Relative Risk Reduction of Stroke in AF – Warfarin Compared with Placebo[1]

Adjusted-dose warfarin compared with placebo



Hart *et al*. *Ann Intern Med* 1999; 131: 492-501.

Randomized Trials of Maintenance of Sinus Rhythm Compared with Rate Control

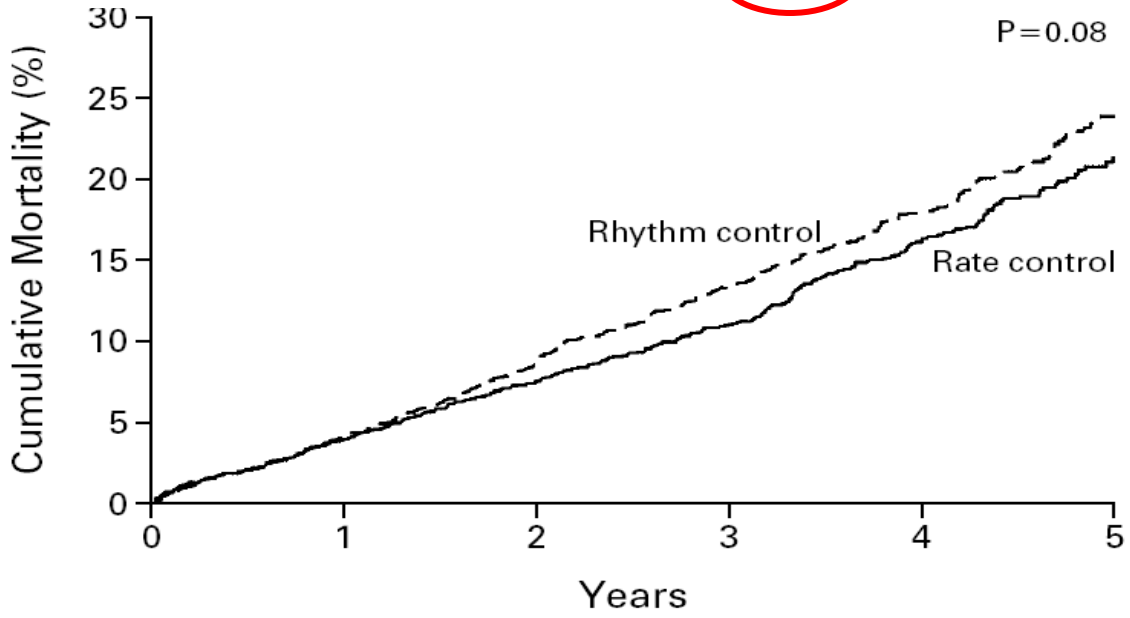
Study (Reference)	Patients, *n*	Mean Age ± SD, *y*	Mean Follow-up, *y*	Patients Receiving Amiodarone, %	Patients Receiving Warfarin, %	Patients Having Thromboembolic Complications, %	Mortality Rate, %
AFFIRM (1)							
Rate control	2027	70 ± 9	3.5	10	85	6	21.3/5 y
Rhythm control	2033	70 ± 9		70	70	7.5	23.8/5 y
RACE (2)							
Rate control	256	68 ± 9	2.3	NR	96–99	5.5	17.2/2.3 y
Rhythm control	266	68 ± 9		NR	86–99	7.9	12.6/2.3 y
STAF (3)							
Rate control	100	65 ± 9	1.8	0	NR	0.6	4.9
Rhythm control	100	66 ± 8		0	NR	3.1	2.5
PIAF (4)							
Rate control	125	61 ± 9	1	0	NR	NR	NR
Rhythm control	127	60 ± 10		100	NR	NR	NR

The New England Journal of Medicine

VOLUME 347 DECEMBER 5, 2002 NUMBER 23

A COMPARISON OF RATE CONTROL AND RHYTHM CONTROL IN PATIENTS WITH ATRIAL FIBRILLATION

THE ATRIAL FIBRILLATION FOLLOW-UP INVESTIGATION OF RHYTHM MANAGEMENT (AFFIRM) INVESTIGATORS*



NO. OF DEATHS		number (percent)				
Rhythm control	0	80 (4)	175 (9)	257 (13)	314 (18)	352 (24)
Rate control	0	78 (4)	148 (7)	210 (11)	275 (16)	306 (21)

Figure 1. Cumulative Mortality from Any Cause in the Rhythm-Control Group and the Rate-Control Group.

Time zero is the day of randomization. Data have been truncated at five years.

Editorials

MANAGEMENT OF ATRIAL FIBRILLATION — RADICAL REFORM OR MODEST MODIFICATION?

- **the goal is still the maintenance of sinus rhythm, and the quest for better drugs and techniques to achieve this goal will, and should, continue**

RODNEY H. FALK, M.D.
Boston University School of Medicine

AFFIRM

- **4060 pts, mean age: 69.7 y, 38% women, 1/3 enrolled after 1st episode of AF / anticoagulation mandated for rate control gp**
- **Rate Control group : • SR in 35% @ 5-y visit, & 15% crossed over to AAD due to Sx (HF) • anticoagulation in 85%**
- **Rhythm Control group: most Rxed c Amiodarone or Sotalol / 63% at least 1 trial of Amio • SR in 62% @ 5-y • anticoagulation in 70%**
- CVA: not signif. different between strategies, & most strokes occurred in pts who had D/C warfarin Rx or had subtherapeutic INRs
- Nonsignificant trend toward an ↑ risk for death in rhythm-control group
- Further analysis: AAD use was a/w an ↑ risk for non-CV (pulm. & malignant dis) but not CV mortality
- Presence of SR, independent of AAD, was a/w a significant ↓ in the risk for death

AFFIRM

- AFFIRM & other trials failed to define a survival advantage a/w AADs to maintain SR c/w rate control
- They have further defined the high rate of recurrence during therapy with AADs, and this probably contributes to the stroke risk a/w rhythm control
- Thus, this study & others have brought to light the importance of maintaining anticoagulation in pts with AF–related stroke risk independent of use of AADs
- In addition, AFFIRM has shown that while AADs may be a/w ↑ mortality, overall maintenance of SR (with or without AAD) is a/w improved survival compared with persistent AF
- This observation supports the long-recognized mortality risk a/w AF and mandates the development of new and safer methods to maintain SR

Effect of Rate (n=175) or Rhythm (n=177) Control on QOL in AF / RACE Study (2.3y)

- QOL is impaired in pts with AF c/w controls
- Treatment strategy does not affect QOL
- Pts with Sx related to AF, however, may benefit from rhythm control if SR can be maintained
- Presence of Sx of AF at baseline, a short duration of AF, & presence of SR at the end of F/U, rather than the assigned strategy, were a/w with QOL improvement

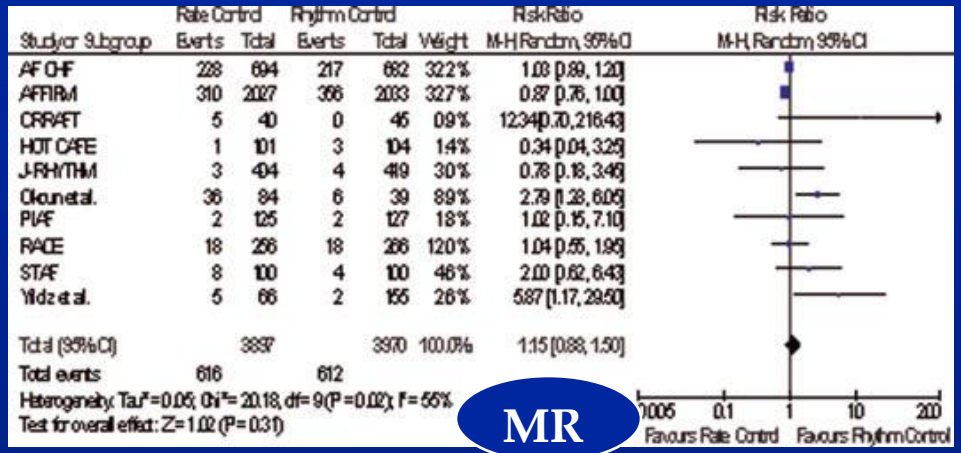
Hagens et al
JACC, Jan 2004

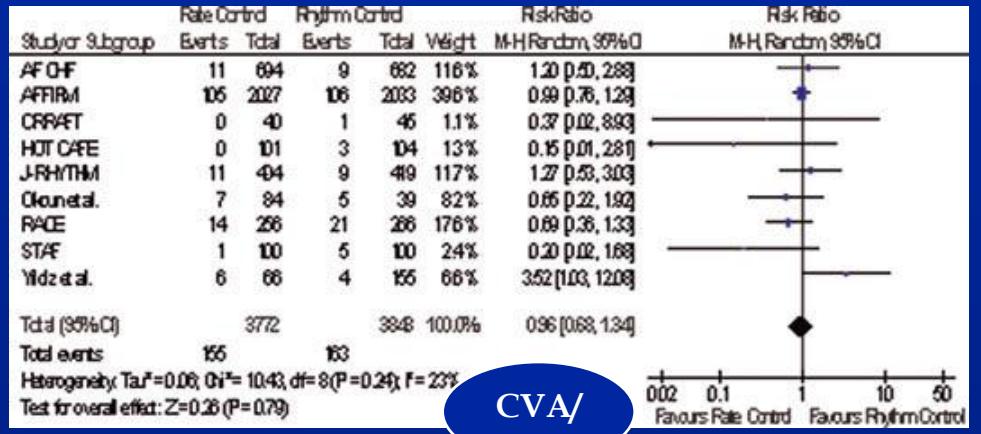
AFFIRM & other studies: cannot be generalized

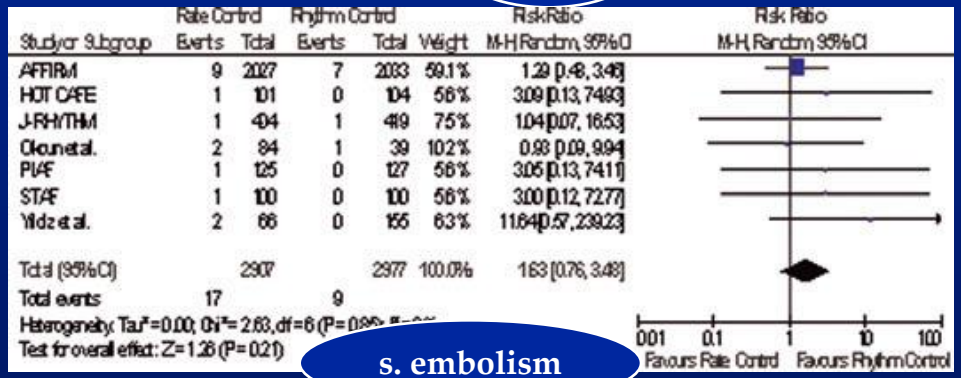
- enrolled pts with RFs for stroke & an average age of 69±10 y
- did not include important gps of pts, including younger pts with lone AF, pts with highly symptomatic AF who might not be candidates for rate control, & pts with severe CHF
- The elderly, particularly those > 80 y of age with contraindications to anticoagulation, were also not included
- Population estimates suggest that pts c lone AF represent ~15% of pts with AF. Pts >80 y, who are traditionally not represented in clinical trials, account for 35% of the AF population
- Therefore, the aforementioned trials will not reflect nearly 50% of the estimated 3.3 million adults who will have AF by the year 2025

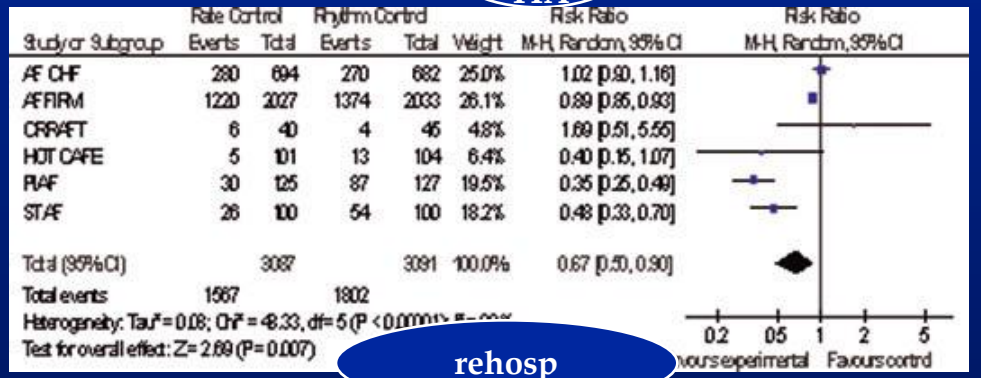
Rate vs Rhythm-Control in AF: Review & Meta-Analysis

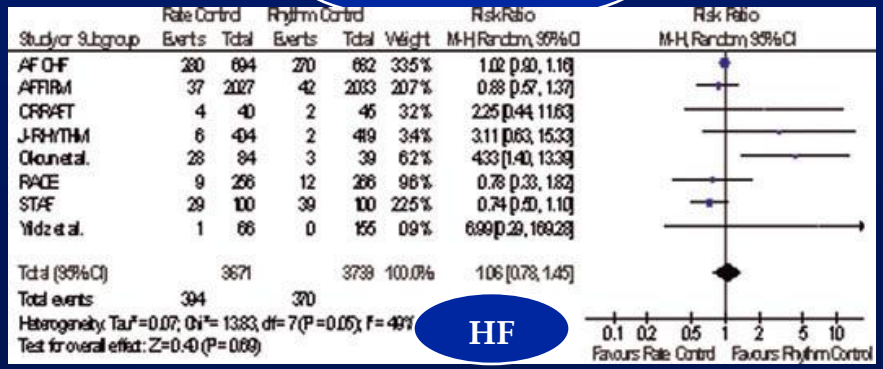
ASM

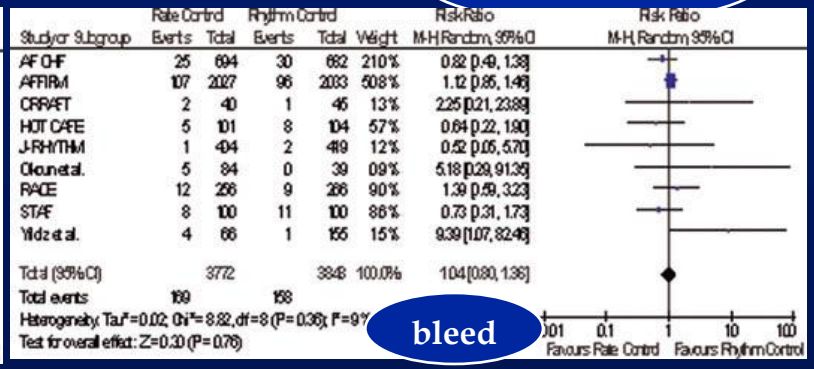










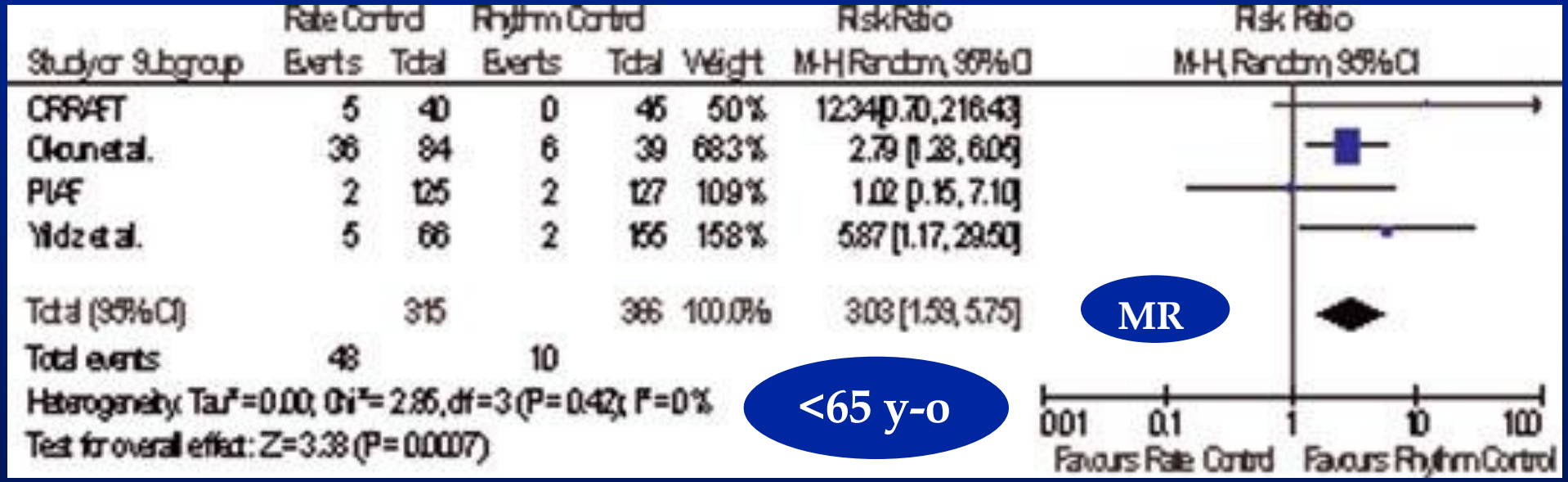


Chatterjee et al PACE 2012

ΕΚΠΑ

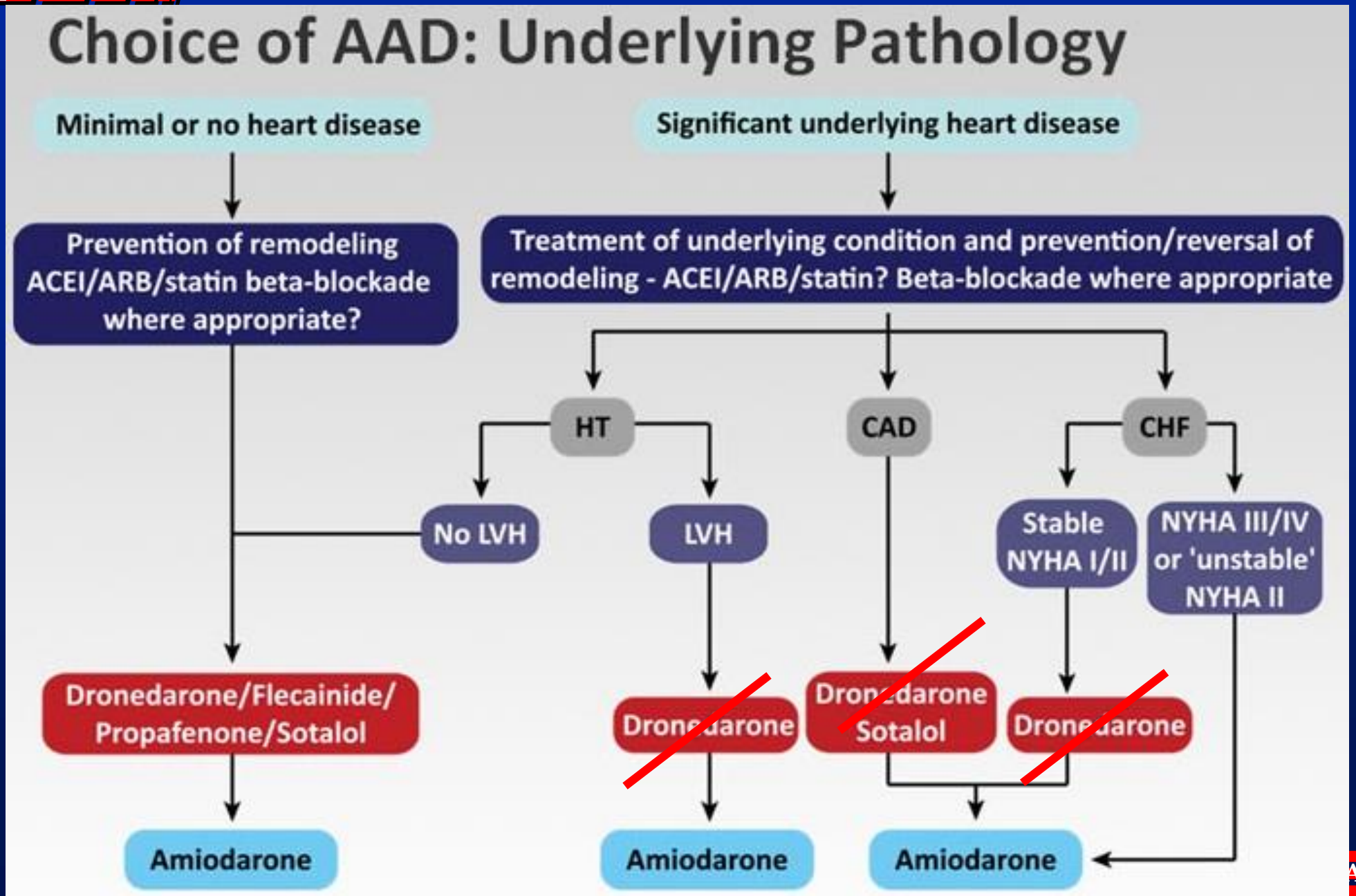
Rate vs Rhythm-Control in AF: Review & Meta-Analysis

favors a rate-control strategy in pts with AF, even in those with HTN, HF, or VHD, and permanent AF, with a possible role of rhythm control in younger patients with AF



Chatterjee et al, PACE 2012

AADs


Choice of AAD: Underlying Pathology
Minimal or no heart disease
Significant underlying heart disease
Prevention of remodeling ACEI/ARB/statin beta-blockade where appropriate?
Treatment of underlying condition and prevention/reversal of remodeling - ACEI/ARB/statin? Beta-blockade where appropriate
HT
CAD
CHF
No LVH
LVH
Stable NYHA I/II
NYHA III/IV or 'unstable' NYHA II
Dronedarone/Flecainide/ Propafenone/Sotalol
Dronedarone
Dronedarone Sotalol
Dronedarone
Amiodarone
Amiodarone
Amiodarone

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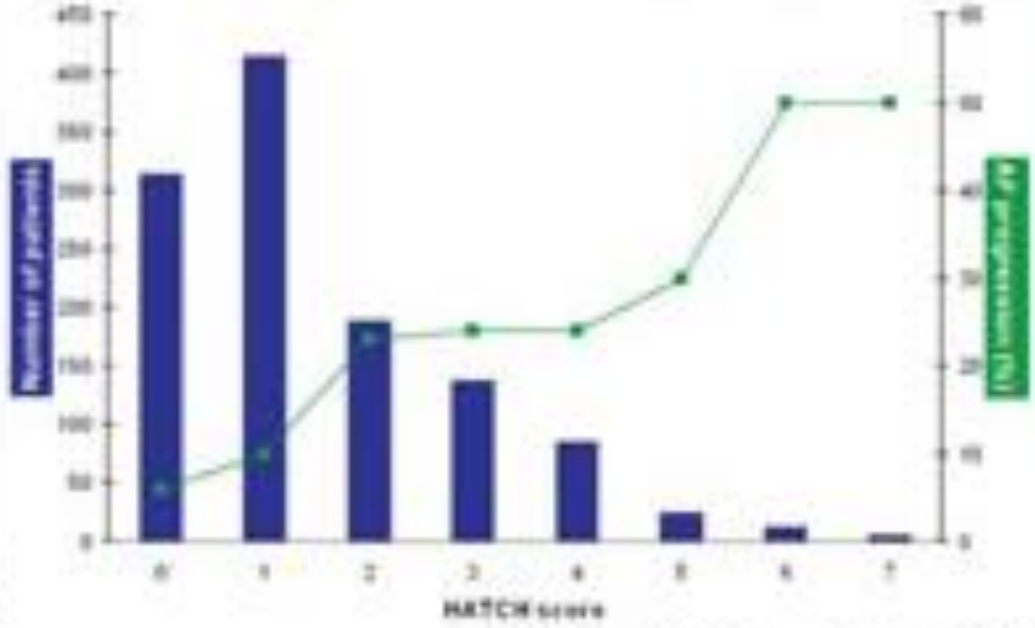
More than 50% of the patients with a HATCH score above 5 show progression, but only 6% of patients with a score of 0.

HATCH score and AF progression

1 Year AF progression in 1219 paroxysmal AF patients, EuroHeartSurvey on AF

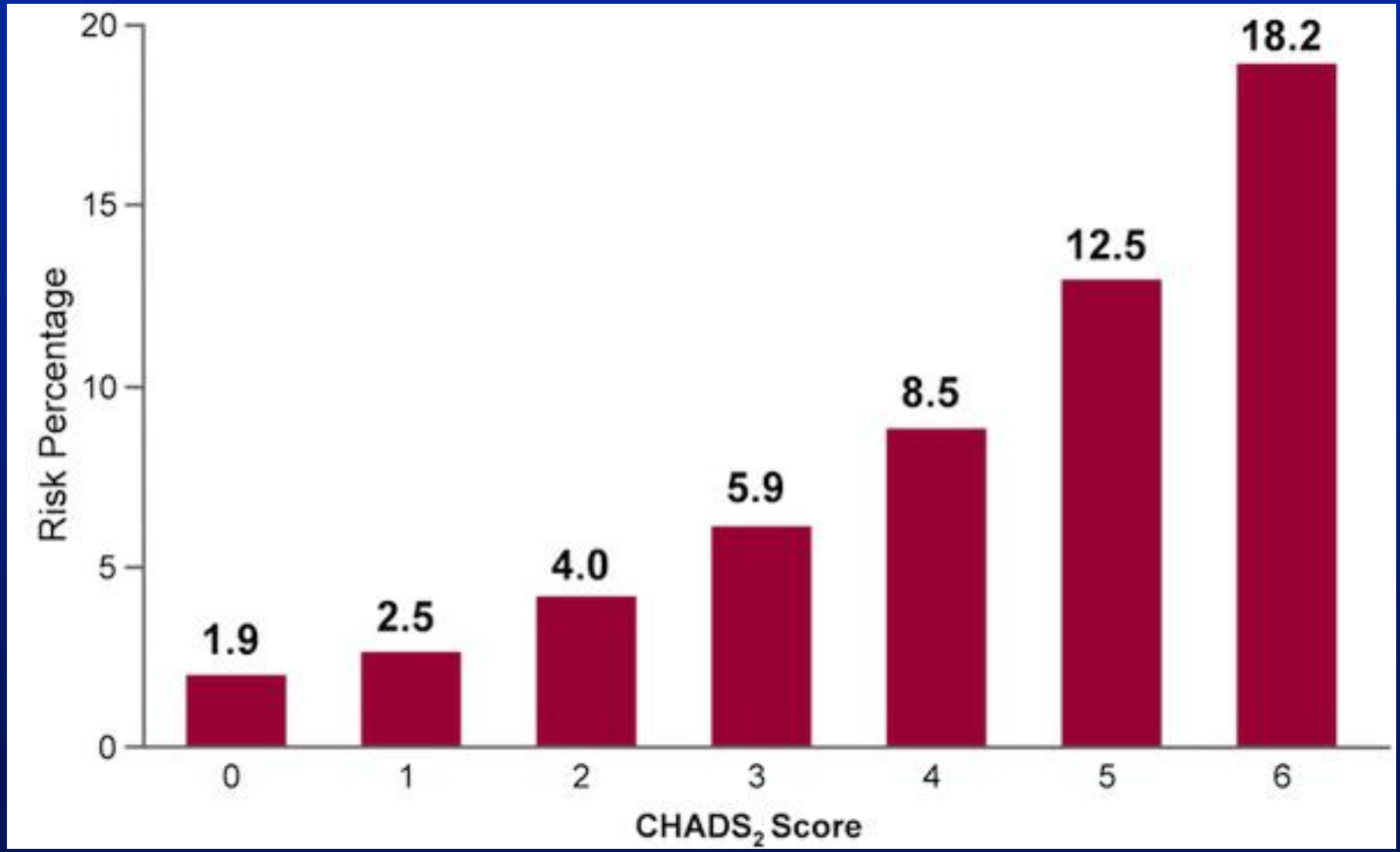


H – Hypertension
A – Age > 75 yrs
T – Tia or stroke (x2)
C – COPD
H – HF history (x2)

De Vos CB, et al. J Am Coll Cardiol 2010

ΕΚΠΑ

$CHADS_2$ Score



New CHA_2DS_2-VASc Score

CHA_2DS_2-VASc

Risk Factor	Score
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75	2
Diabetes mellitus	1
Stroke/TIA/thromboembolism	2
Vascular disease	1
Age 65-74	1
Sex category (ie, female sex)	1
Maximum Score	**9**

HAS BLED

Letter	Clinical characteristic*	Points awarded
H	Hypertension	1
A	Abnormal renal and liver function (1 point each)	1 or 2
S	Stroke	1
B	Bleeding	1
L	Labile INRs	1
E	Elderly (age >65)	1
D	Drugs or alcohol (1 point each)	1 or 2
		Maximum 9 points

- 'Hypertension' : systolic BP>160 mmHg.
- 'Abnormal kidney function' : chronic dialysis or renal transplantation or creatinine ≥200μmol/L
- 'Abnormal liver function' : chronic hepatic disease (eg. cirrhosis) or biochemical evidence of significant hepatic derangement (eg. bilirubin >2x ULN with AST/ALT/ALP >3x ULN, etc)
- 'Bleeding' : prior bleeding Hx &/or predisposition to bleeding eg. bleeding diathesis, anemia, etc
- 'Labile INRs' refers to unstable/high INRs or poor time in therapeutic range (eg. <60%)
- Drugs/alcohol use refers to concomitant use of drugs, such as antiplatelet agents, non-steroidal anti-inflammatory drugs, etc.

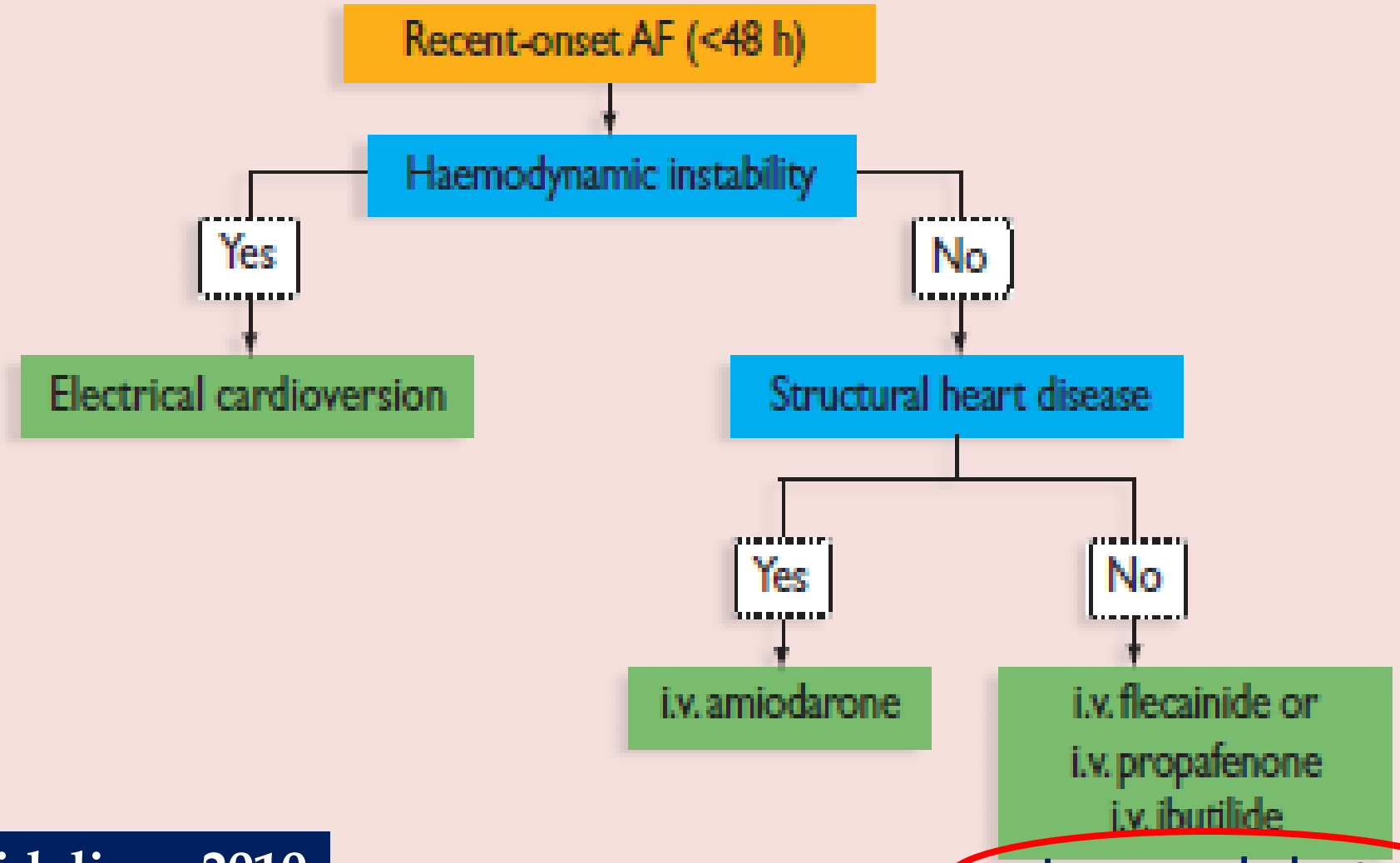
HEMOR2RHAGES

- **H**epatic or renal disease
- **E**thanol abuse
- **M**alignancy
- **O**lder age (>75 years)
- **R**e-bleeding
- **R**educed platelet count or function
- **H**ypertension (uncontrolled)
- **A**nemia
- **G**enetic factors
- **E**xcessive fall risk &
- **S**troke

Acute Rate Control

Drug	Loading Dose	Onset	Maintenance	SE
Esmolol	500 µg/kg IV over 1 min	5 min	60-200 µg/kg/min	↓BP, HB, ↓HR, asthma, HF
Diltiazem	0.25 mg/kg IV over 2 min	2-7 min	5-15 mg/h	↓BP, HB, HF
Verapamil	5-10 mg IV given slowly as 1 mg increments at a time (0.075-0.15 mg/kg over 2-5 min)	3-5 min	NA	↓BP, HB, HF
Propranolol	0.15 mg/kg IV	5 min	NA	↓BP, HB, ↓HR, asthma, HF
Metoprolol	2.5 to 5 mg IV bolus over 2 min; up to 3 doses	5 min	NA	↓BP, HB, ↓HR, asthma, HF
Digoxin	0.25 mg IV each 2 h, up to 1.5 mg	≥ 60 min	0.125 to 0.375 mg daily IV or orally	Digitalis toxicity, HB, ↓HR
Amiodarone	150 mg IV over 10 min (or 5 mg/kg over 30-60 min)	Hours/Days	0.5 to 1 mg/min IV (up to 1800 mg/24 h)	↓BP, HB, SB, pulm. /liver toxicity, hypo/hyper-thyroidism, warfarin interaction

Direct current CV & pharmacological CV of recent-onset AF in pts considered for pharmacological CV

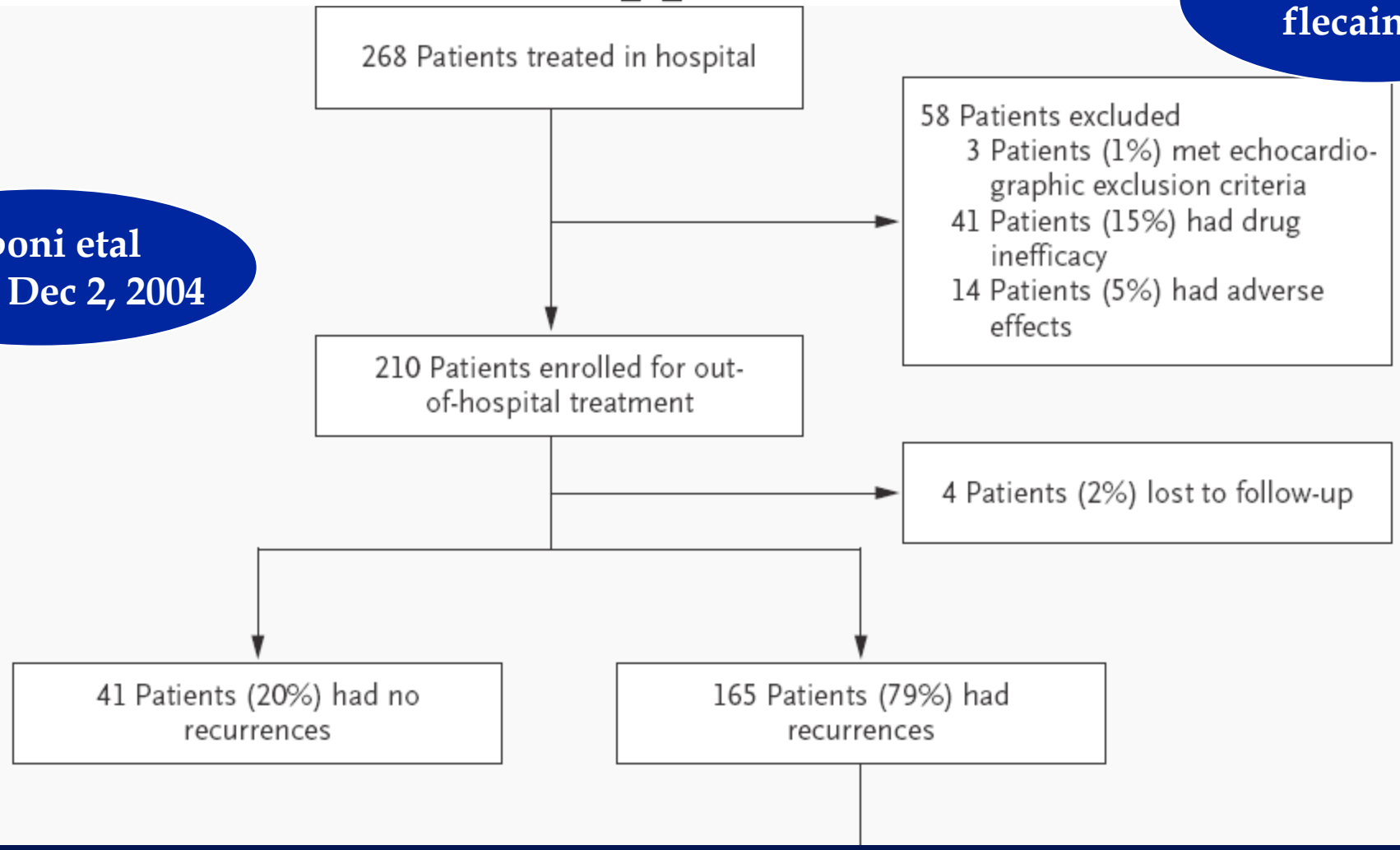


ESC guidelines 2010

Outpatient Treatment of Recent-Onset Atrial Fibrillation with the "Pill-in-the-Pocket" Approach

Propafenone/ flecainide

Alboni etal NEJM, Dec 2, 2004



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ESC guidelines 2010

Drugs & doses for pharmacological conversion of (recent-onset) AF

Drug	Dose	Follow-up dose	Risks
Amiodarone	5 mg/kg i.v. over 1 h	50 mg/h	Phlebitis, hypotension. Will slow the ventricular rate. Delayed AF conversion to sinus rhythm.
Flecainide	2 mg/kg i.v. over 10 min, or 200–300 mg p.o.	N/A	Not suitable for patients with marked structural heart disease; may prolong QRS duration, and hence the QT interval; and may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1:1 conduction to the ventricles.
Ibutilide	1 mg i.v. over 10 min	1 mg i.v. over 10 min after waiting for 10 min	Can cause prolongation of the QT interval and torsades de pointes; watch for abnormal T-U waves or QT prolongation. Will slow the ventricular rate.
Propafenone	2 mg/kg i.v. over 10 min, or 450–600 mg p.o.		Not suitable for patients with marked structural heart disease; may prolong QRS duration; will slightly slow the ventricular rate, but may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1:1 conduction to the ventricles.
Vernakalant	3 mg/kg i.v. over 10 min	Second infusion of 2 mg/kg i.v. over 10 min after15 min rest	So far only evaluated in clinical trials; recently approved. [68–70a]

ΕΚΠΑ

Vernakalant

- Recently approved by the EMA for rapid CV of recent-onset AF to SR in adults (≤7 d for non-surgical pts; ≤3 d for surgical pts)
- AVRO trial (direct comparison with amio): vernakalant was more effective than amio for rapid CV of AF to SR (52% vs 6% @ 90 min)
- To be given IV 3 mg/kg over 10 min, followed by 15 min of observation & a further IV 2 mg/kg over 10 min, if necessary
- Contraindicated in pts with sBP<100 mm Hg, severe AS, HF (class NYHA III/IV), ACS within the previous 30 d, or QT prolongation
- Before its use, pts should be adequately hydrated
- ECG & hemodynamic monitoring should be used, & the infusion can be followed by DCC if necessary
- Not contraindicated in pts c stable CAD, hypertensive HD, or mild HF
- Likely to be used for acute termination of recent-onset AF in pts with lone AF or AF associated with HTN, CAD, or mild to moderate (NYHA class I–II) heart failure

IBUTILIDE

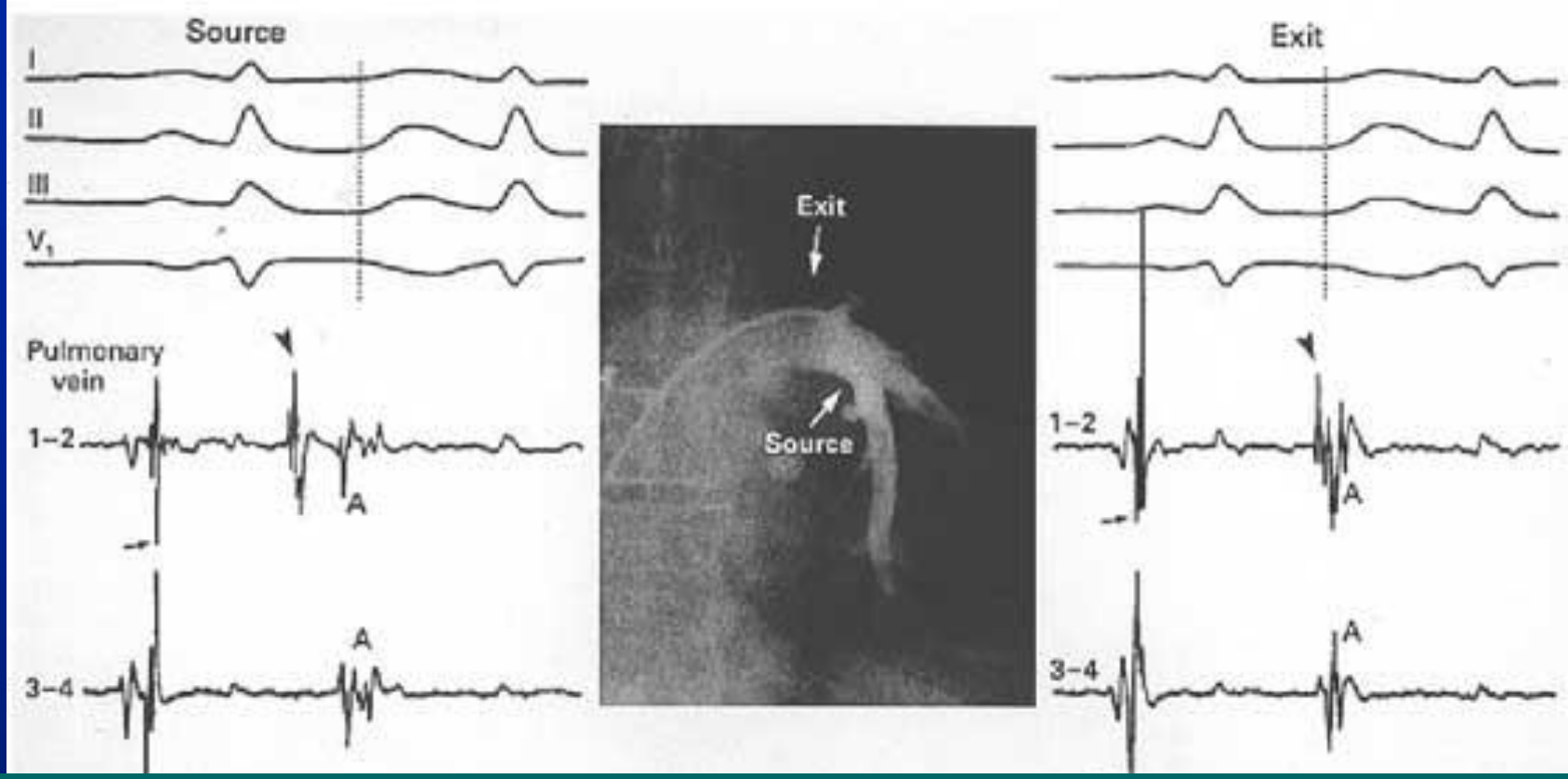
- In pts with recent-onset AF, ibutilide (1 or 2 infusions of 1 mg over 10 min each, with a wait of 10 min between doses), has CV rates within 90 min of 50% in several randomized studies, placebo controlled or with a control gp of drugs with known little effect. Time to CV is 30 min
- Most important SE is pVT (TdP), most often non-sustained, but DCC may be needed, & the QTc is expected to increase by 60 ms
- ECG monitoring for 4-6 h
- Ibutilide is more effective for conversion of AFlu than AF

VERNAKALANT

- Rapid CV of recent-onset AF (≤7 d /non-surgical pts; ≤3 d /surgical pts)
- Comparison with amio (AVRO trial) : CV of AF (51.7% vs. 5.7% at 90 min)
- Initial infusion (3 mg/ kg over 10 min), followed p 15 min c 2nd infusion (2 mg/kg over 10 min)
- Contraindicated in pts with BP<100 mm Hg, severe AS, HF (class III/IV), ACS within prior 30 d, or ↑QT
- Before use: pts adequately hydrated
- ECG/hemodynamic monitoring: 2h
- Followed by DCC if necessary
- ok: stable CAD, HTN/HD, mild HF
- N.B.: ↓BP / ↓HR / dysgeusia, sneezing, nausea, paresthesias

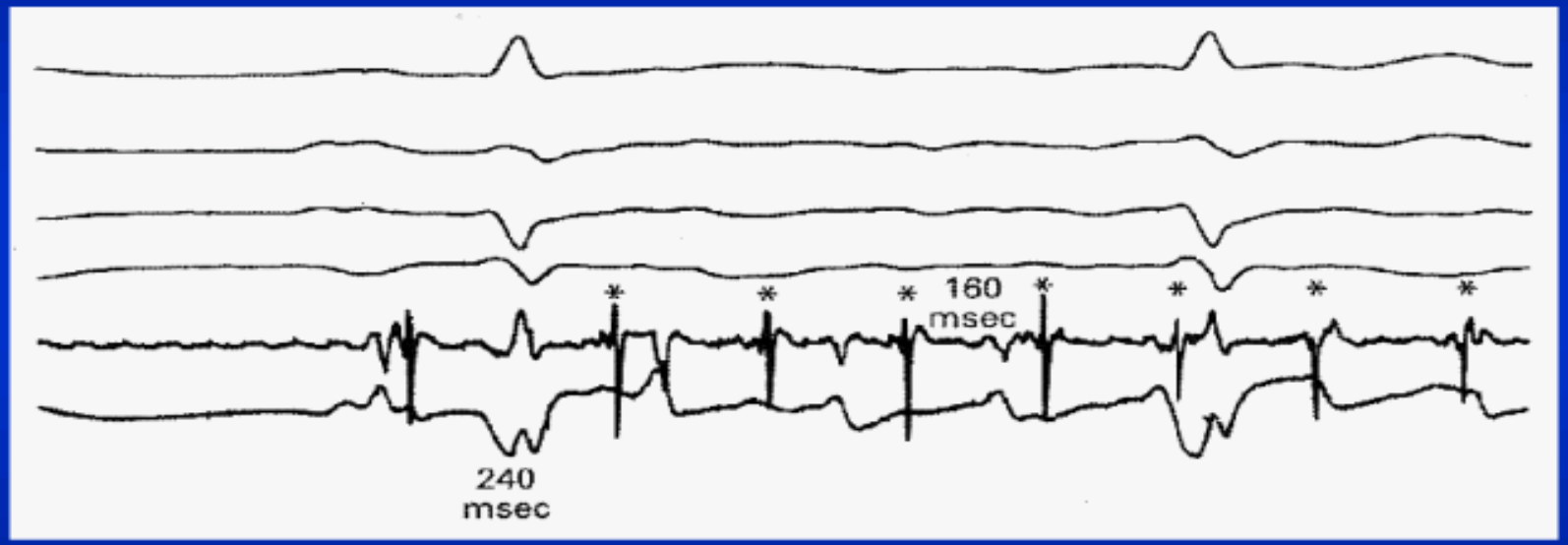
Nonpharmacologic Therapies for Maintenance of SR

- RF ablation around the orifices of the PVs is increasingly offered as an option for maintenance of SR
- most effective in pts with PAF and relatively normal cardiac anatomy; success rates range: 60%-85%
- It is expected that the efficacy of this procedure will increase as catheter mapping and ablation technology improve
- Major complications in ~1%-5%: PV stenosis, stroke, cardiac perforation & tamponade. Rare complication: esophageal fistula presenting with air emboli (stroke) or GI bleeding
- AVN ablation + PPM
- LAA occlusion
- PPM (SSS/AVB)



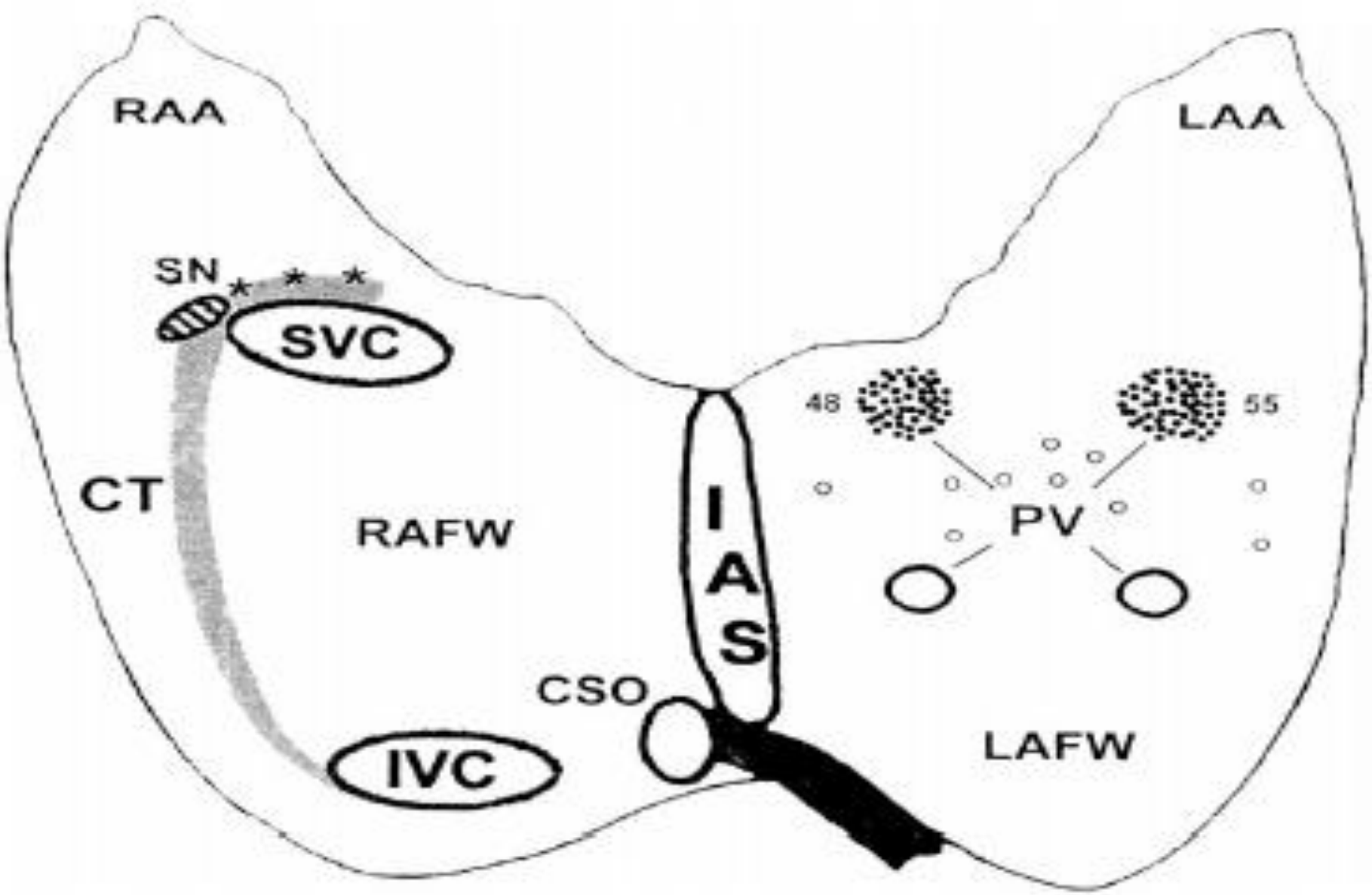
ECG: characteristic changes in timing depending on the position of the recording catheter in the specific PV. With an increasingly distal catheter position (toward the source), the spike was recorded progressively later during SR (left panel, arrows) & correspondingly earlier during ectopic activity(arrowhead). Conversely, in a proximal position at its exit into the LA (right panel), the spike was not as delayed during SR (arrows) or as precocious during ectopic activity (arrowhead). The application of RF energy at the source of ectopic activity eliminated the local spike during SR and ectopic beats and AF on a short-term basis.

Pulmonary Vein Ectopy II



Haissaguerre et al. NEJM 1998;339:659-666.

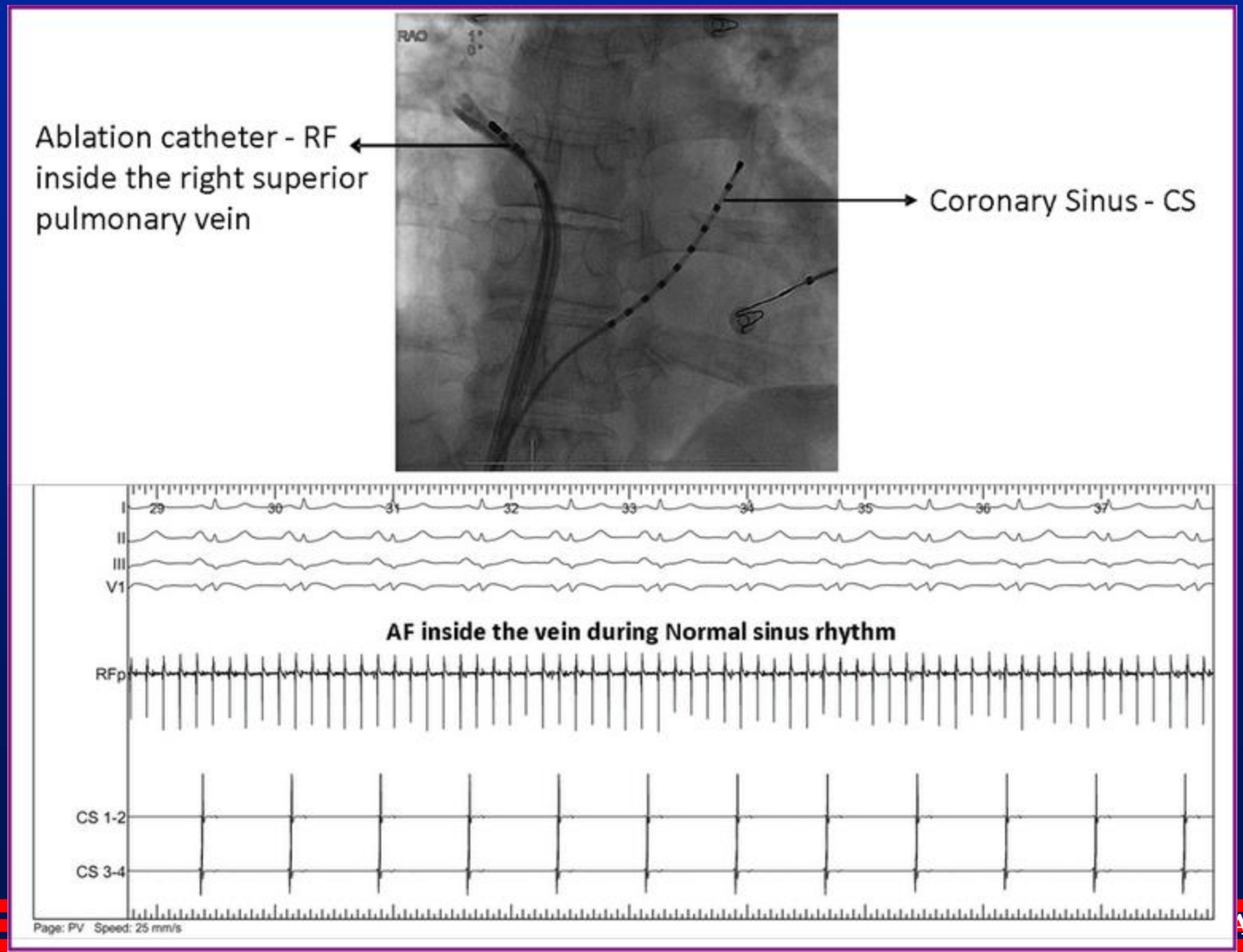
Ectopic Foci Initiating AF



AF RFA

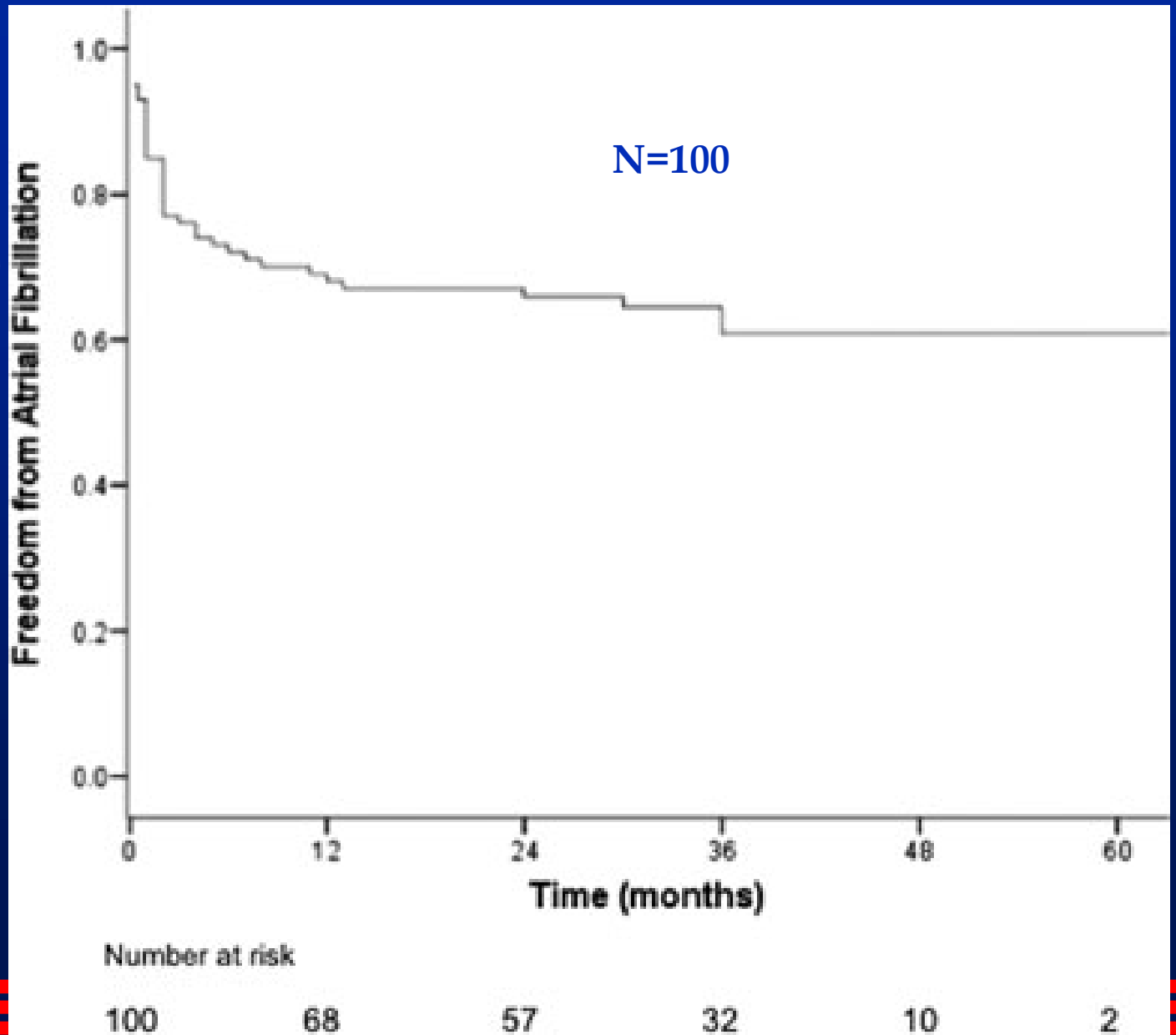
- PV isolation (ostial or antral): cornerstone in Rx for PAF
- Electrical isolation of all PVs is the endpoint of ablation
- The role of additional substrate modification in PAF is controversial (targeting of complex fractionated atrial EGMs -CFAE) (addition of linear lesions : roof line connecting left & right SPVs, &/or a mitral line connecting MA to the IPV)
- Question: how to determine which pts require substrate modification in addition to PV isolation?
- Noninducibility of AF can be used as an endpoint in PAF & the subsequent need for substrate modification, yet this may lead to an overRx, i.e., excessive ablation, in some pts
- An alternative option is to perform substrate modification during a 2nd procedure in pts with rec. AF despite proven PV isolation

Catheter (RFp) in RSPV records rapid firing of impulses from the vein. Impulses are restricted inside the vein, & atrial chambers are in SR, proving that paroxysmal variety of AF is primarily a venous disorder



After single procedure, 68% pts remain in SR @ 12 mos
At 60 mos, 61% pts remained in SR

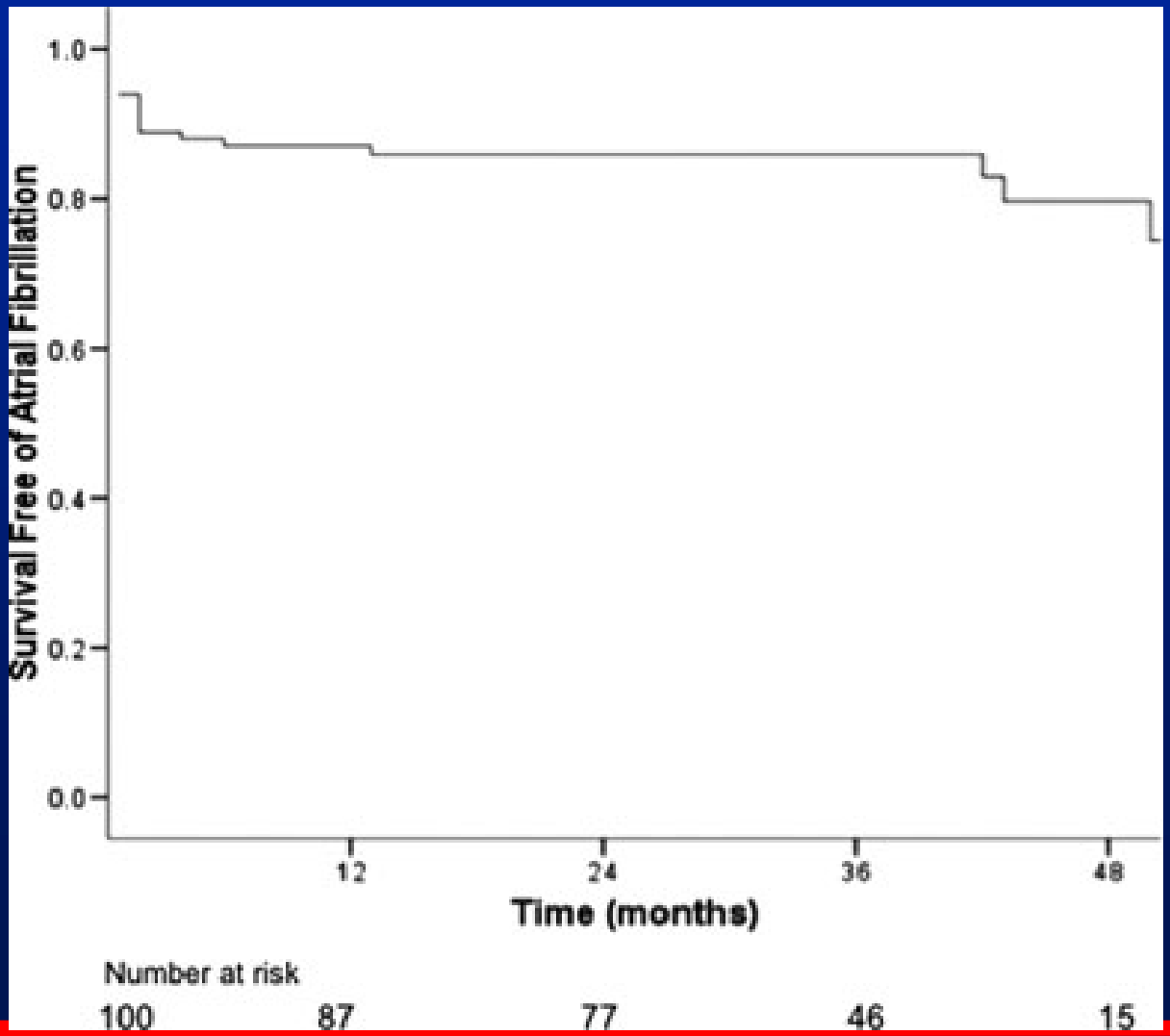
Medi et al, JCE 2010



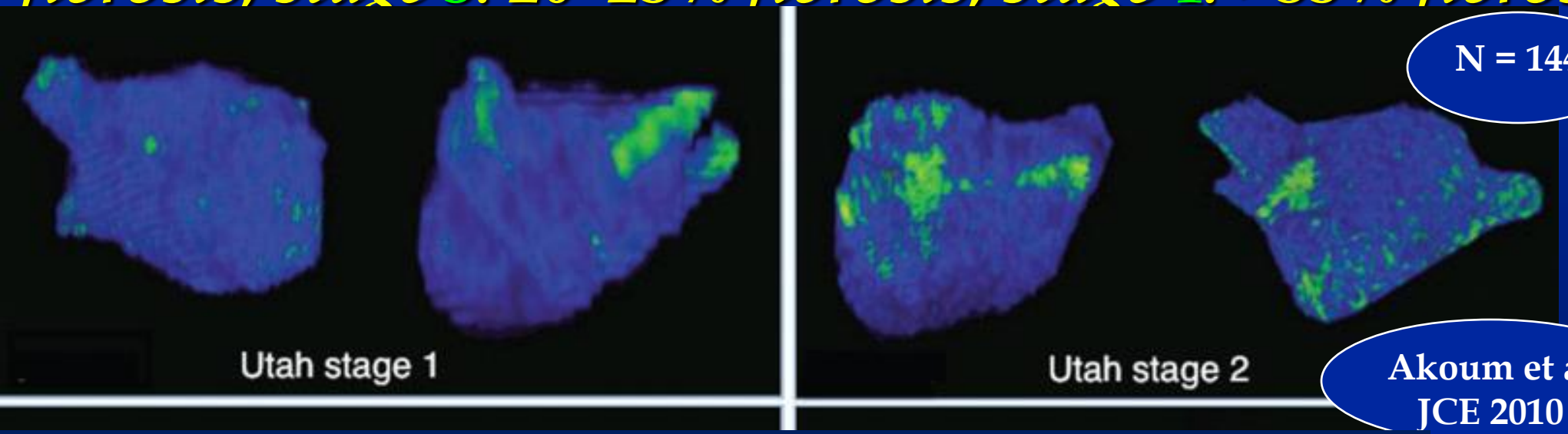
Repeat Procedure

- In pts experiencing arrhythmia **recurrences** post AF ablation, on the repeat procedure in the experience of many investigators, **reisolating the reconnected veins alone can achieve long-term AF control rates of ≥80-90%**
- research efforts towards developing **alternative energy sources** that can achieve more lasting PV isolation may be worthwhile
- Similarly, strategies that can **better identify dormant PV conduction** (adenosine infusion, etc) during the initial or redo ablation procedure may also be useful

Freedom from AF, including outcomes after repeat procedures (22 pts). At 12 mos post-PVI, 87% of pts were in SR. At 48 mos post-PVI, 80% of pts remained in SR



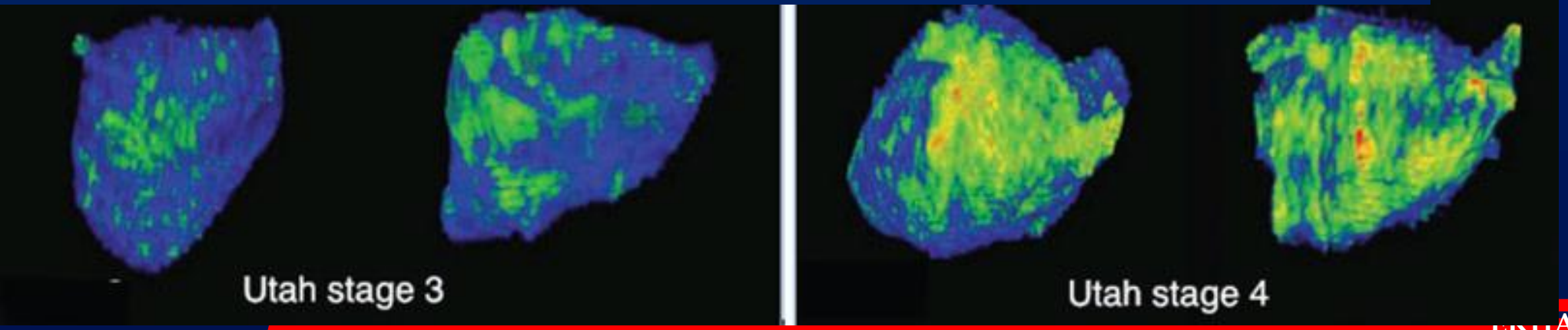
LA MRI 3D reconstructions (RAO & PA projections) illustrating areas of fibrosis (bright green) @ 4 stages of fibrosis. Utah stage 1: <5% fibrosis, stage 2: 5–20% fibrosis, stage 3: 20–25% fibrosis, stage 4: >35% fibrosis



N = 144

Akoum et al
JCE 2010

Recurrence was 0% in Utah stage 1, 28% in stage 2, 35% in stage 3, & 56% in stage 4



RFA Complications

Worldwide Survey on the Methods, Efficacy, and Safety of Catheter Ablation for Human Atrial Fibrillation

Riccardo Cappato, MD; Hugh Calkins, MD; Shih-Ann Chen, MD; Wyn Davies, MD;

TABLE 4. Major Complications

Complication Type	No. of Patients	% of Patients
For all types of procedures (n=8745 patients)		
Periprocedural death	4	0.05
Tamponade	107	1.22
Grand total	524	5.9

RFA Complications

Complications of Catheter Ablation for Atrial Fibrillation: Incidence and Predictors

- 32 major complications occurred in 641 procedures (5%).
- Among the pts with major complications, & had CVA, 8 had tamponade, 1 had PV occlusion with hemoptysis, and 11 had vascular injury requiring surgical repair and/or transfusion.
- No periprocedural deaths occurred, and no instances of esophageal injury were seen.
- Complication rates were higher during the first 100 cases (9.0%) than during the subsequent 541 (4.3%).
- Major adverse clinical events were associated with age > *70 y (P = 0.007; odds ratio 3.7) and female gender* (P = 0.014; odds ratio 3.0).

Spragg et al, JCE, June 2008

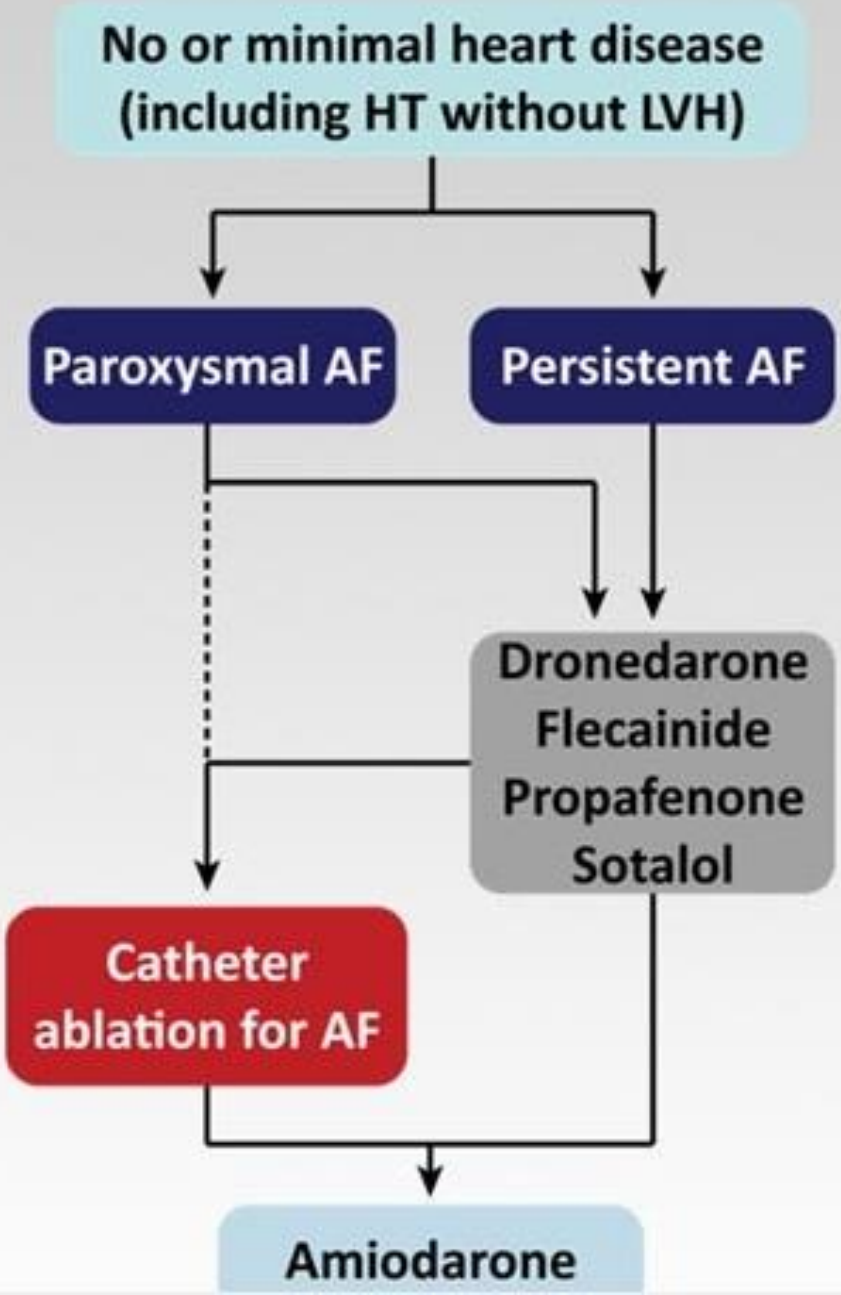
Approach to AF

- **First step** in the management of pts with AF : determine their **stroke risk & need for anticoagulation** according to published guidelines
- **Next step:** determine whether they have Sx that warrant a strategy directed at **restoration & maintenance of SR**
- By experience most **younger pts, active pts, & those with HF** will require an initial approach aimed at maintaining SR
- Even pts without overt palpitations or symptoms of HF may be found to be significantly affected by AF upon careful questioning & examination

ESC Guidelines 2010

Indication for LA Catheter Ablation

Catheter ablation for paroxysmal AF should be considered in symptomatic patients who have previously failed a trial of antiarrhythmic medication.	IIa	A
Ablation of persistent symptomatic AF that is refractory to antiarrhythmic therapy should be considered a treatment option.	IIa	B
Catheter ablation of AF may be considered prior to antiarrhythmic drug therapy in symptomatic patients despite adequate rate control with paroxysmal symptomatic AF and no significant underlying heart disease.	IIb	B



Complications of Atrial Fibrillation Ablation in a High-Volume Center in 1,000 Procedures: Still Cause for Concern?

NIKOLAOS DAGRES, M.D.,* GERHARD HINDRICKS, M.D., PH.D.,†

JCE Sep 2009

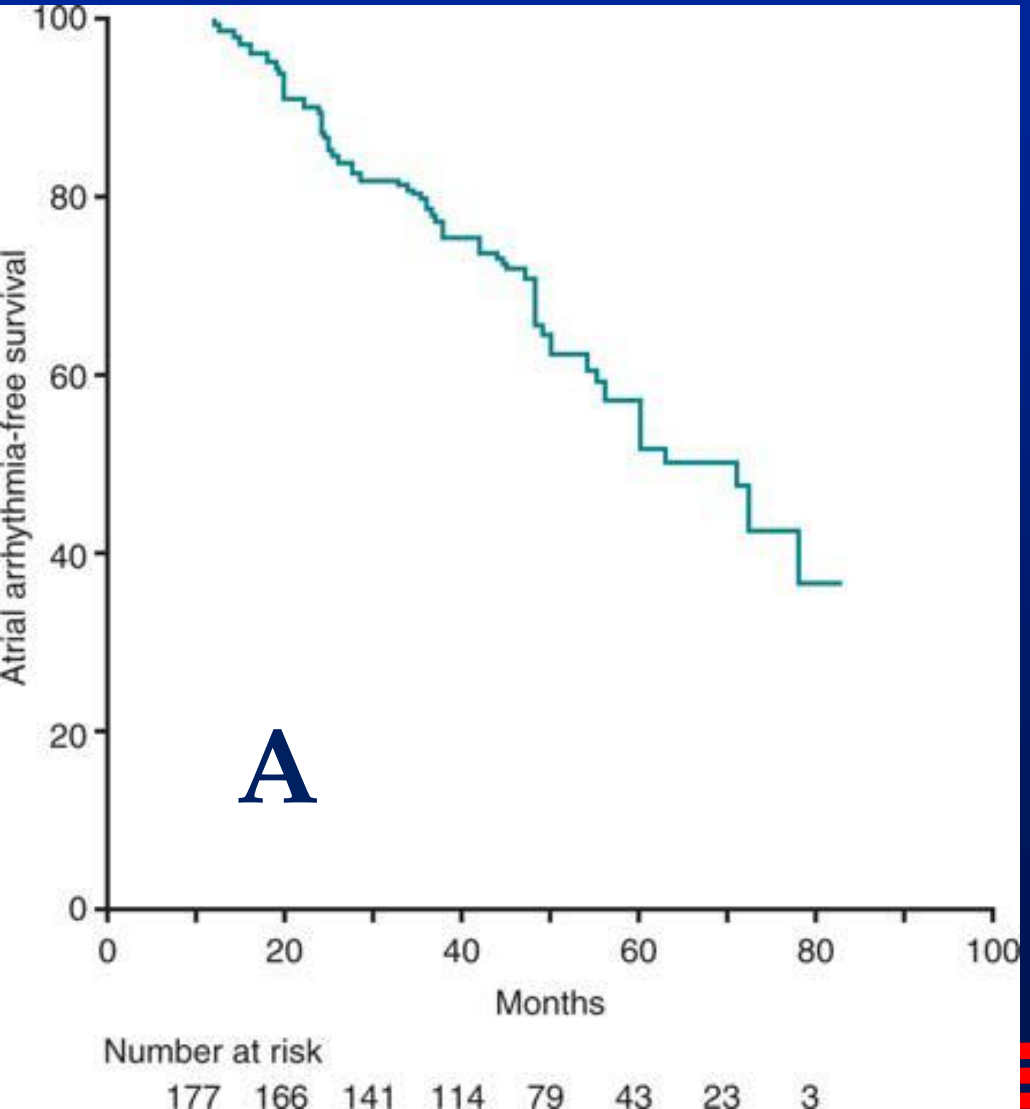
- 39 (3.9%) major periprocedural complications
- **2 deaths (0.2%)** of unclear cause, 14 d & 4 w after ablation
- Most common complications: **tamponade (1.3%)**, treated by percutaneous drainage, & **vascular complications (1.1%)**
- **4 thromboembolic events (0.4%)**: 3 nonfatal strokes & 1 TIA
- **2 cases (0.2%) of atrial-esophageal fistula** & **2 (0.2%) SBEs**
- Factors a/w an ↑ complication risk were: age ≥75 yrs (hazard ratio 3.977, P = 0.022) & CHF (HR 5.174, P = 0.001)

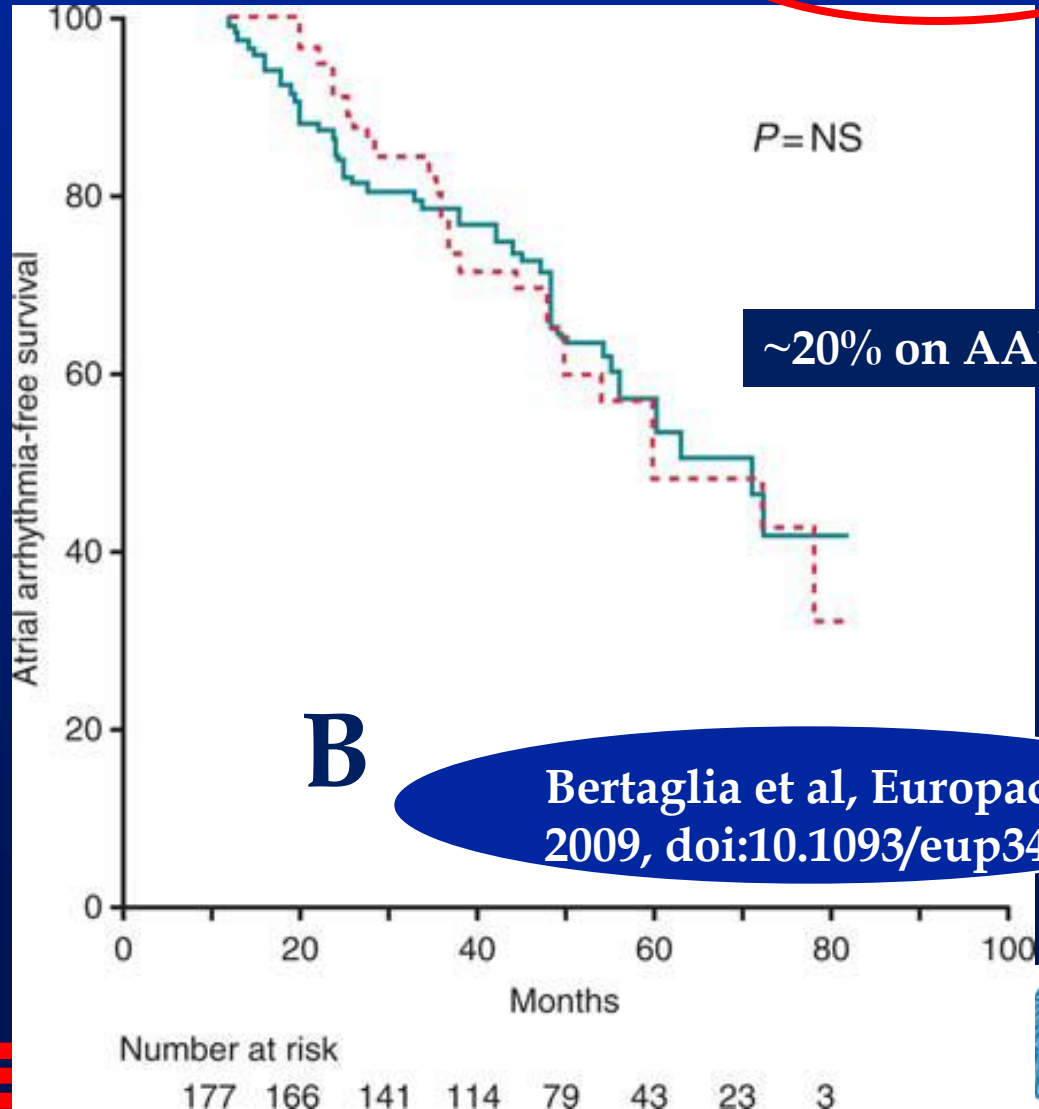
Although use & efficacy of catheter ablation-based approaches in AF Rx have ↑ significantly in the last decade, pharmacological agents remain the first-line therapy for rhythm management of AF

time to AF occurrence after RFA in total study gp (A) & in pts on (solid) or off (dotted) AADs (B)

177/229 (78%)

13.0% at 2 yrs, 21.8% at 3 yrs, 35.0% at 4 yrs, 46.8% at 5 yrs, & 54.6% at 6 yrs

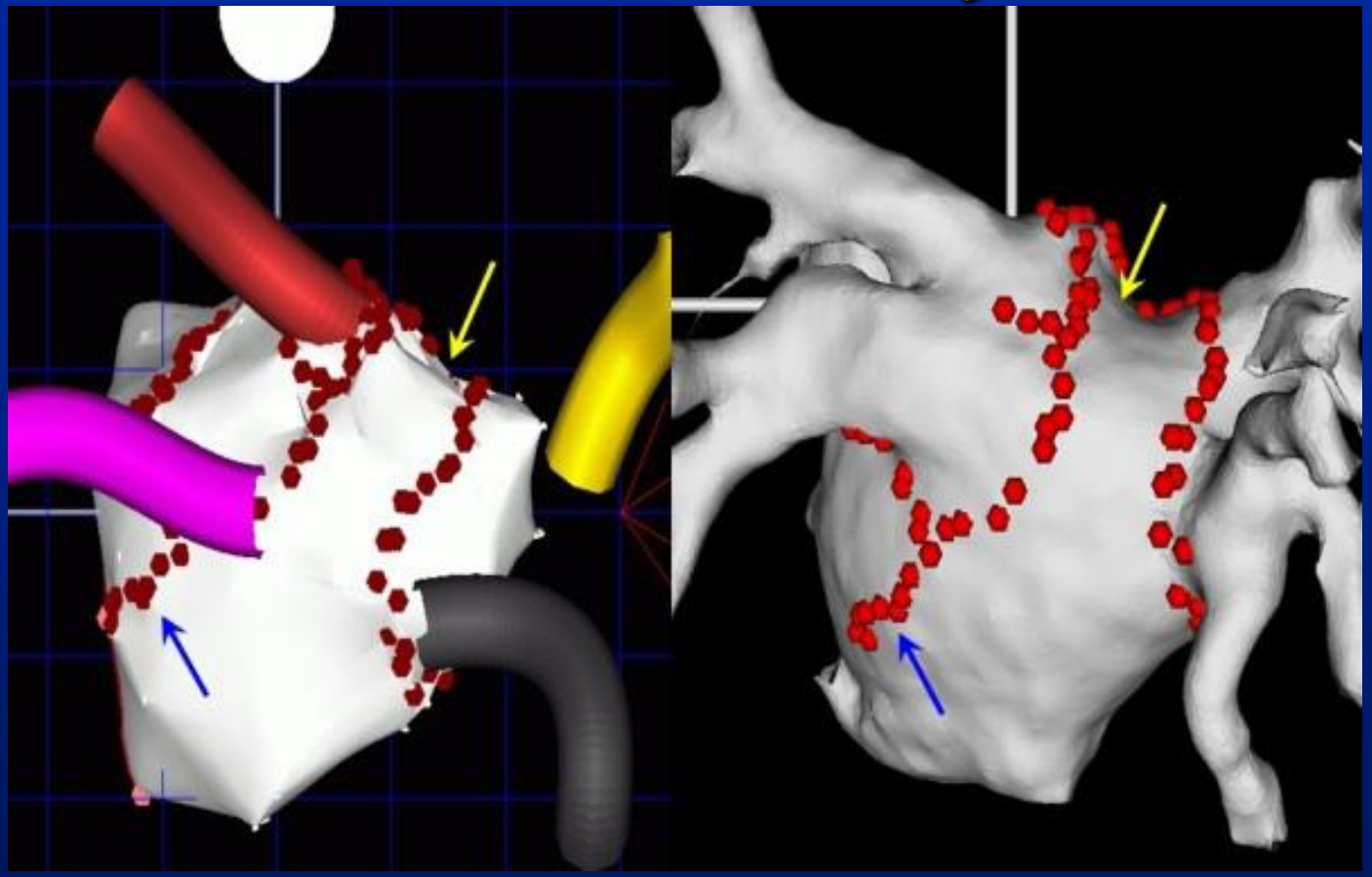




~20% on AADs

Bertaglia et al, Europace 2009, doi:10.1093/eup349

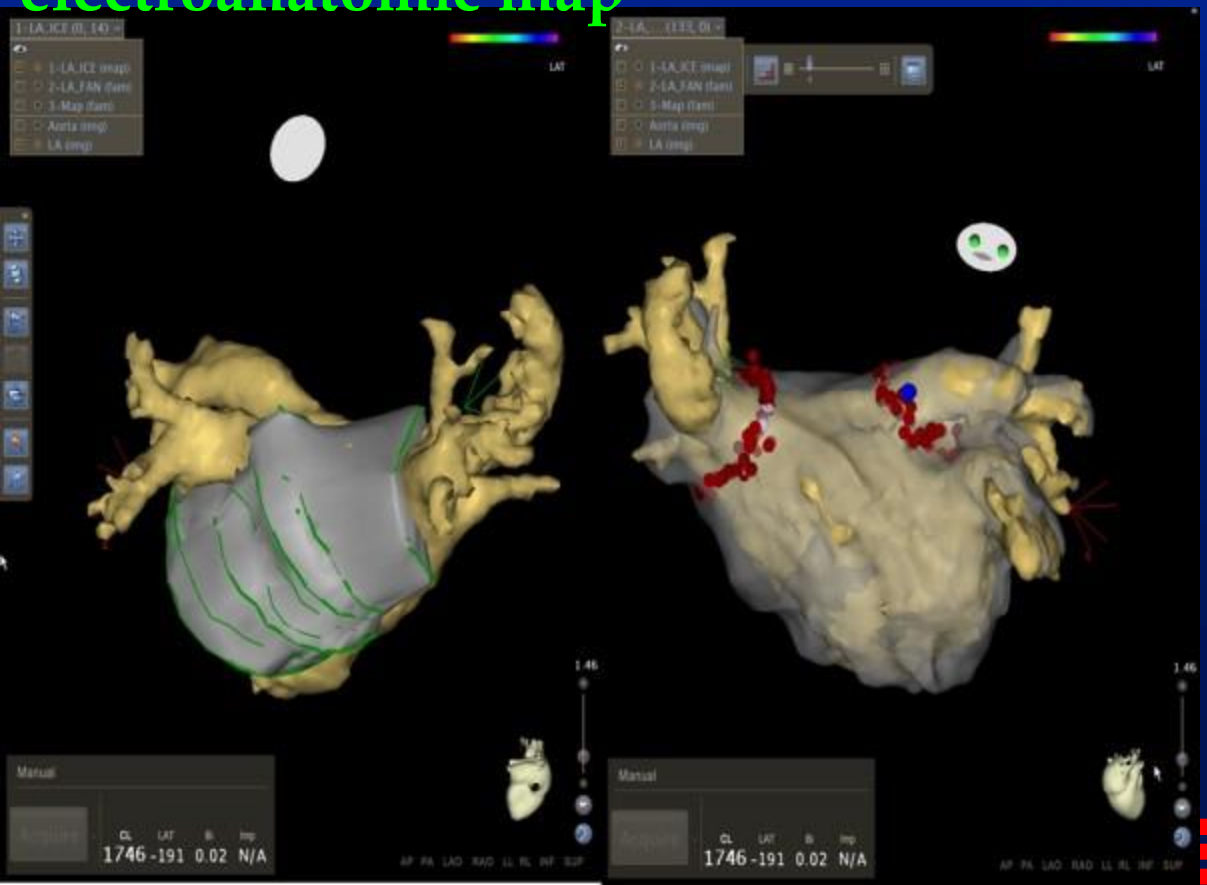
Recent Trends in Imaging in AF Ablation: CARTO-3™ system

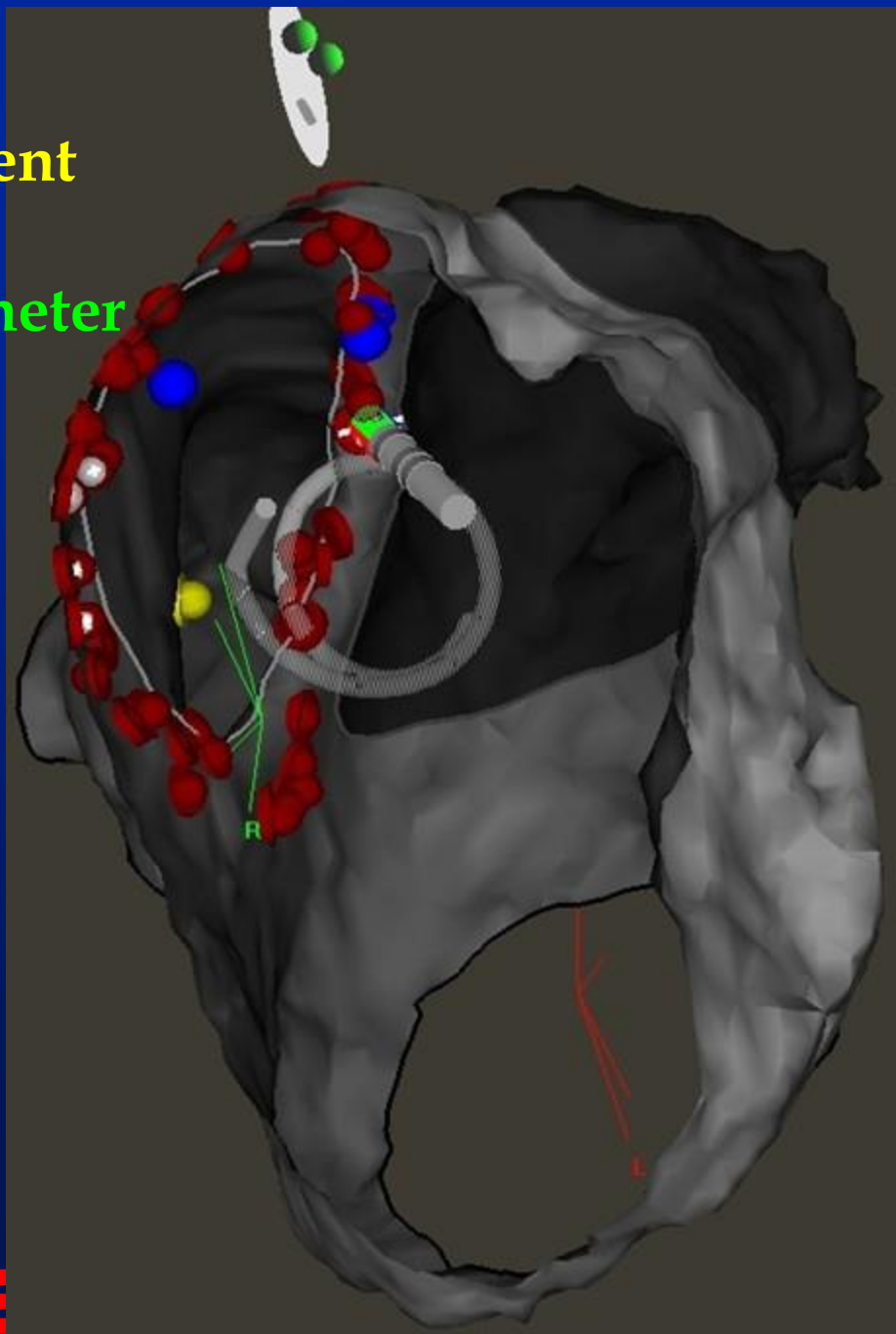


The electroanatomic map of the LA using CARTO (left) can be integrated with the CT/MRI images using CARTOMERGE Module (right). The arrows depict the corresponding points on the two maps

CARTO 3

A significant advancement was the development of a hybrid magnetic & current based mapping system (CARTO 3™: generation platform) where multiple catheter tips & curves can be visualized on the electroanatomic map





AF Ablation

- Can be a complex procedure
- Needs to be a simple procedure
- Can be a simple procedure

To effectively ablate AF on a larger scale the procedure must be:

- Quick
- Simple

& most importantly

Novel techniques to simplify AF RFA/ Requirements:

- Be Effective in both PAF & Persistent AF
- Quick and Easy
- Proven
- Safe

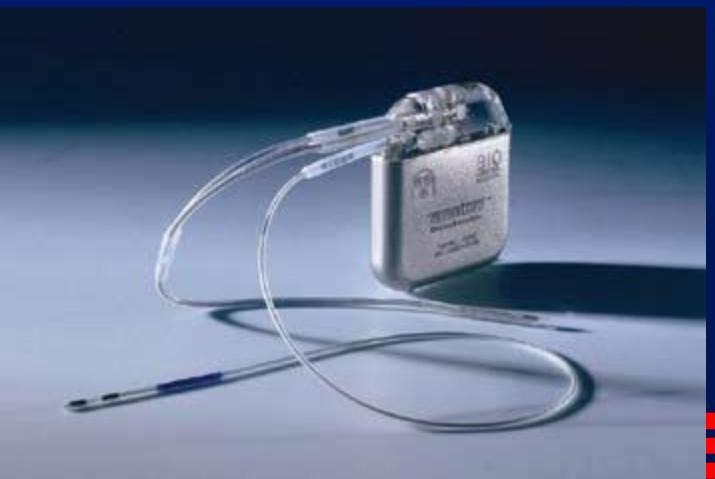
Cryoballoon

Multi-Electrode Ablation Catheters

Novel Technologies

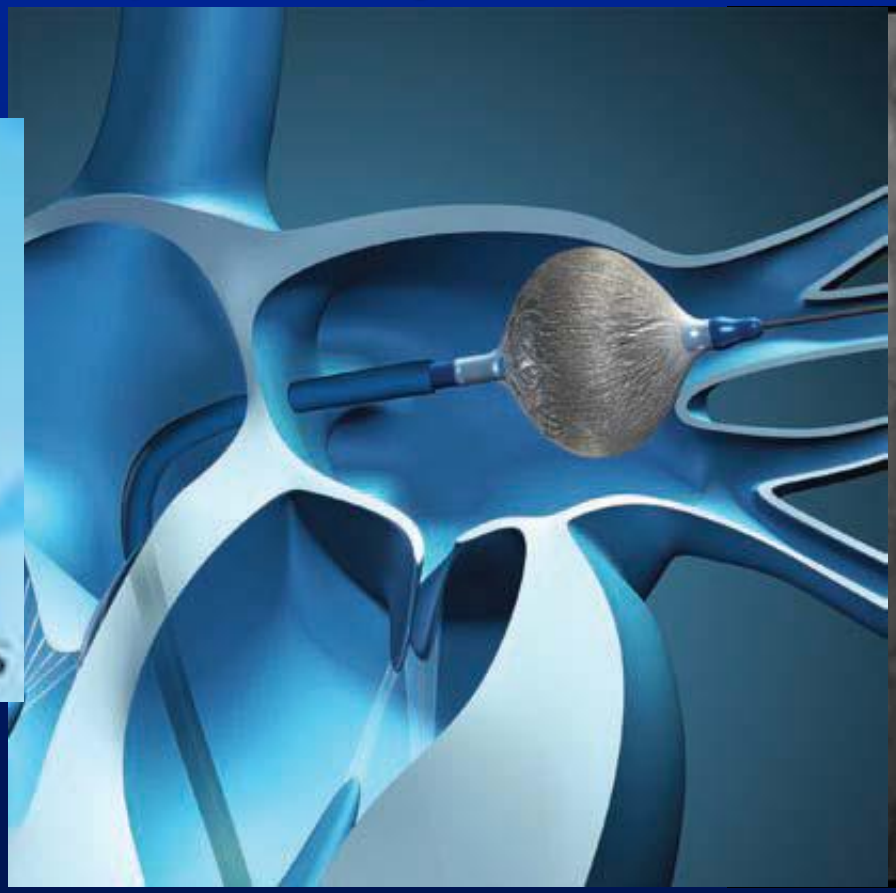
- PVAC

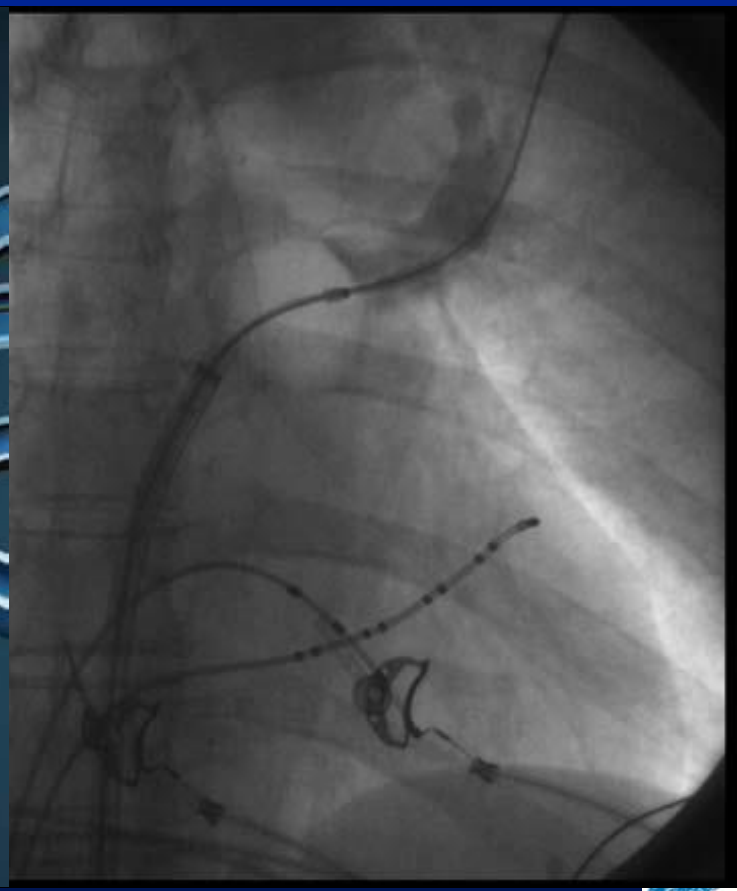
- TVAC
- Cryoballoon
- Fluoroless RFA
- Cervical Vagus nerve stimulation
- Electrical stimulation of the epicardial ganglia

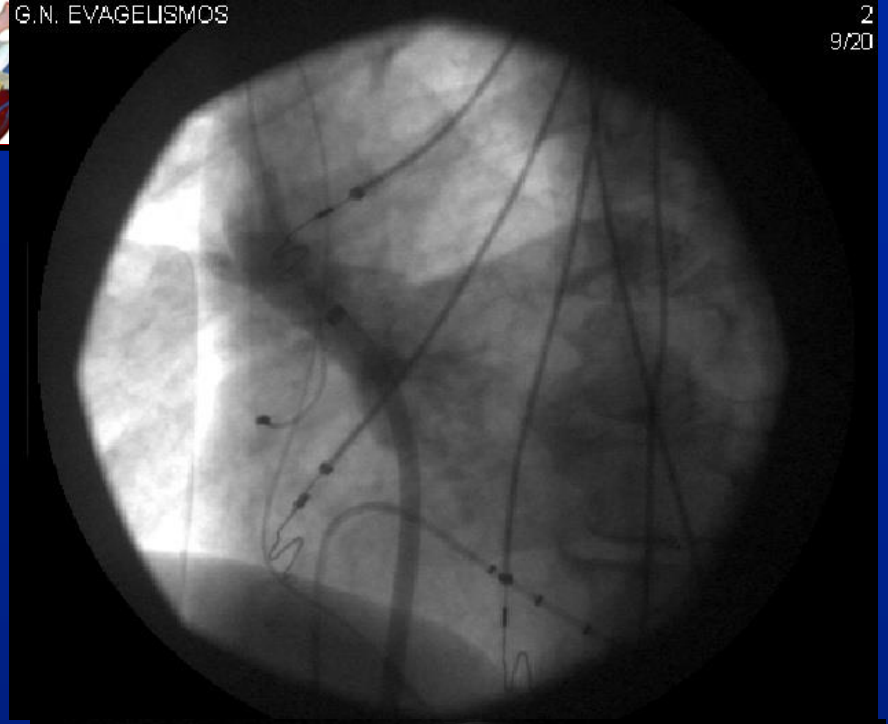


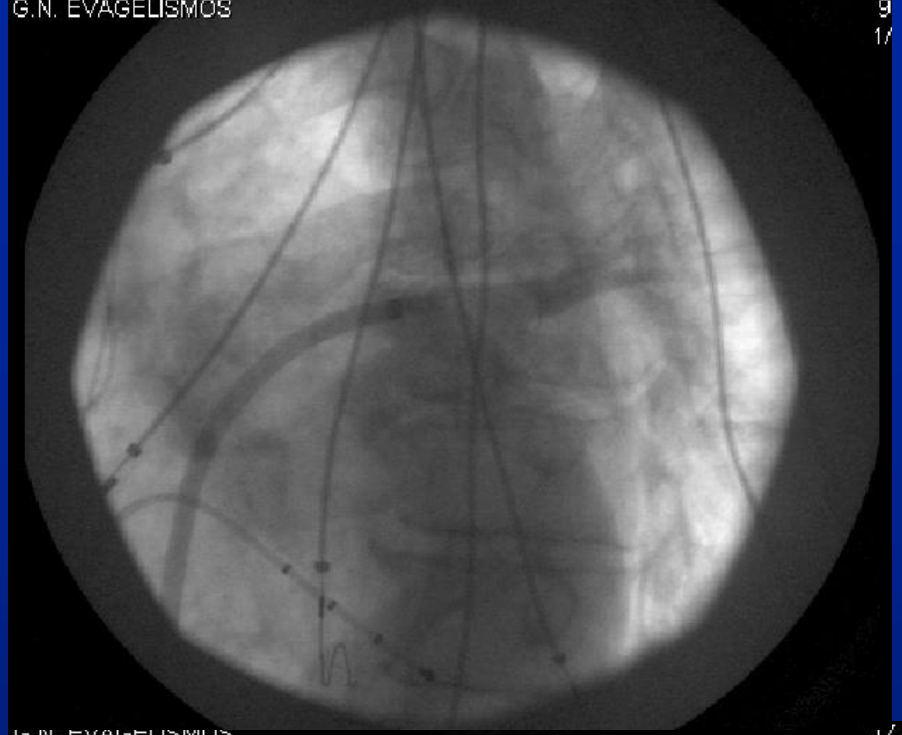
Cryoballoon

- Freezing balloon
- "Stop Arrhythmias Cold"






G.N. EVAGELISMOS
2
9/20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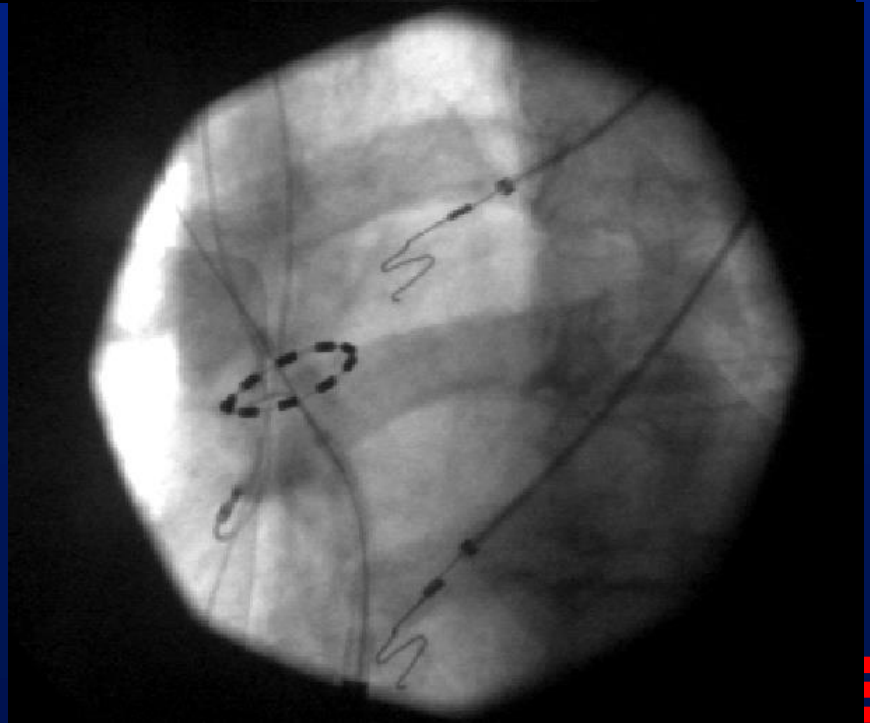

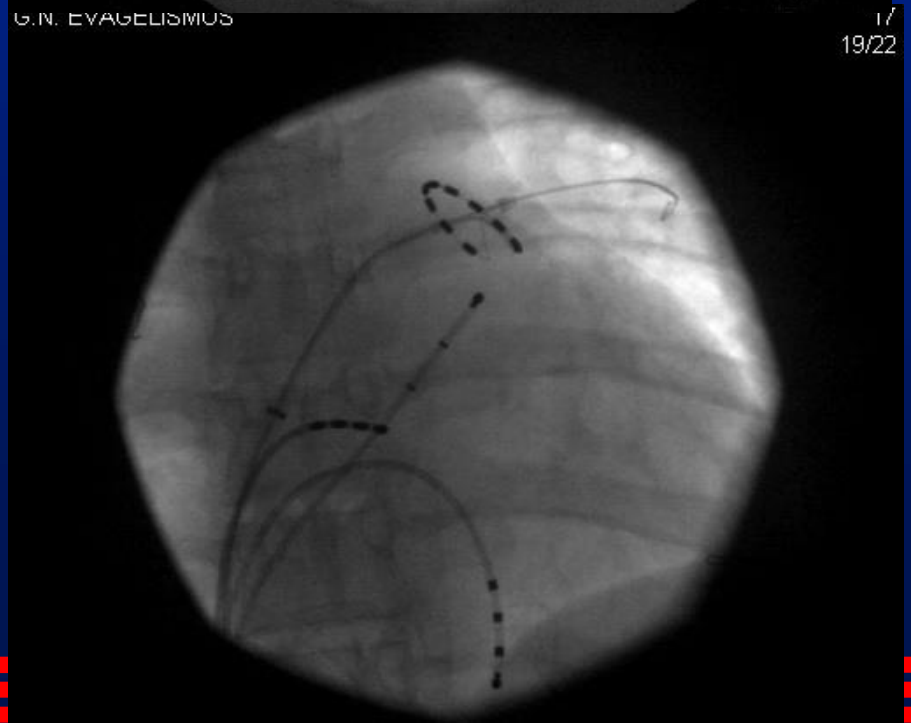
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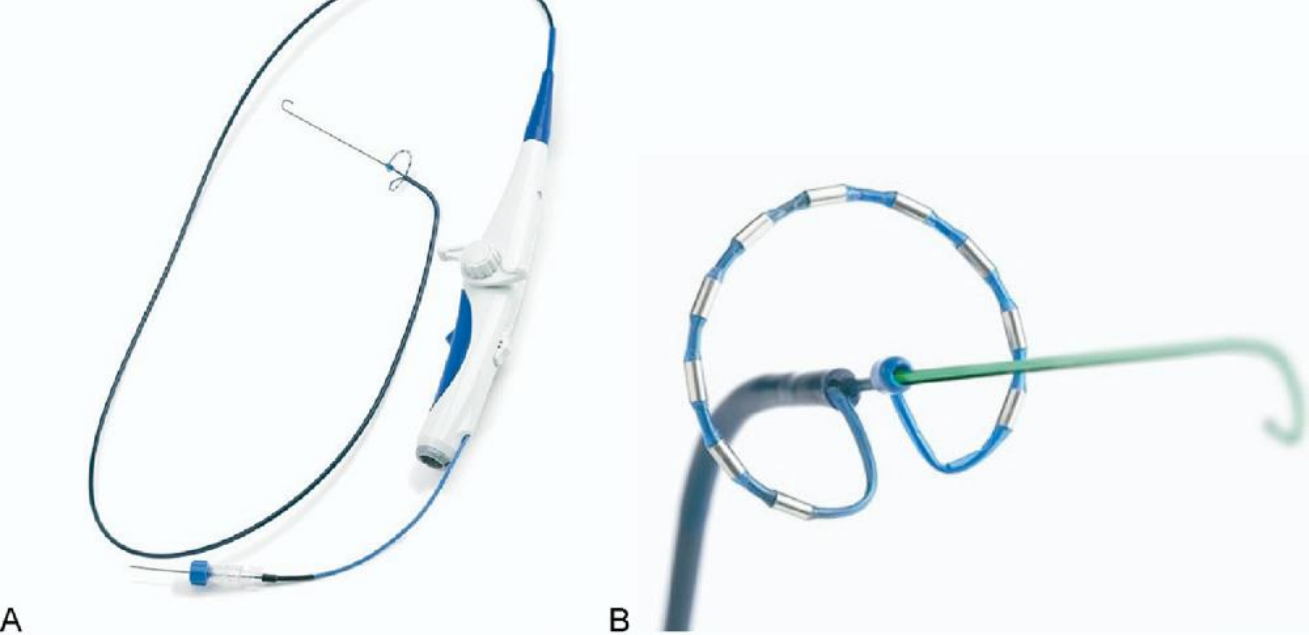
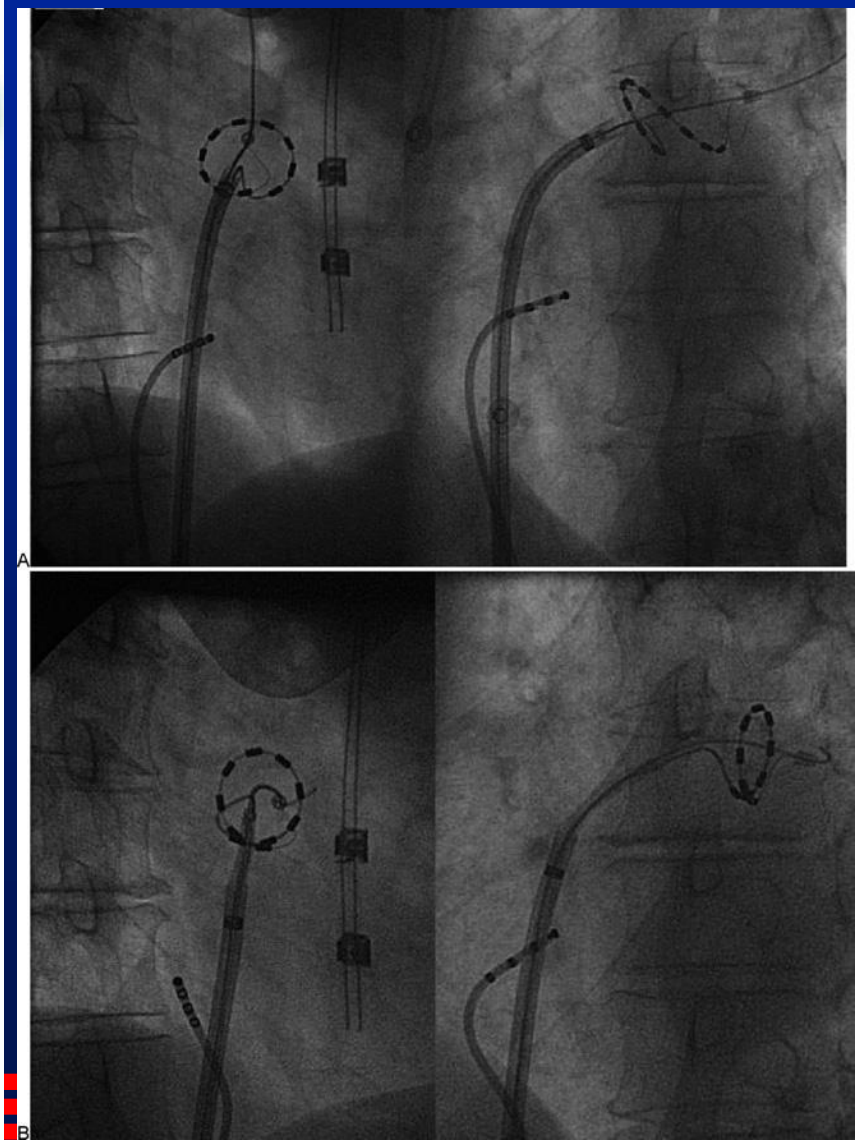
ΕΚΠΑ

PVAC


A
B


PVAC
Ablation Time: 24 sec
4:1
80C
70C
60C
60C
50C
40C
30C
20C
6 W
4 W
6 W
6 W
7 W
6 W
5 W
5 W
5 W
6 W
19 s
18 s
18 s
18 s
19 s
20 s
17 s
19 s
19 s
19 s
Pair 1
Pair 2
Pair 3
Pair 4
Pair 5
C


A
B

PVAC: PAF / Pers AF

ASM

Results in PAF

- Single Centre 98 pts
- Procedural time: 84 ± 29 min
- Fluoroscopy time 18 ± 9 min
- Freedom from AF / 7-day

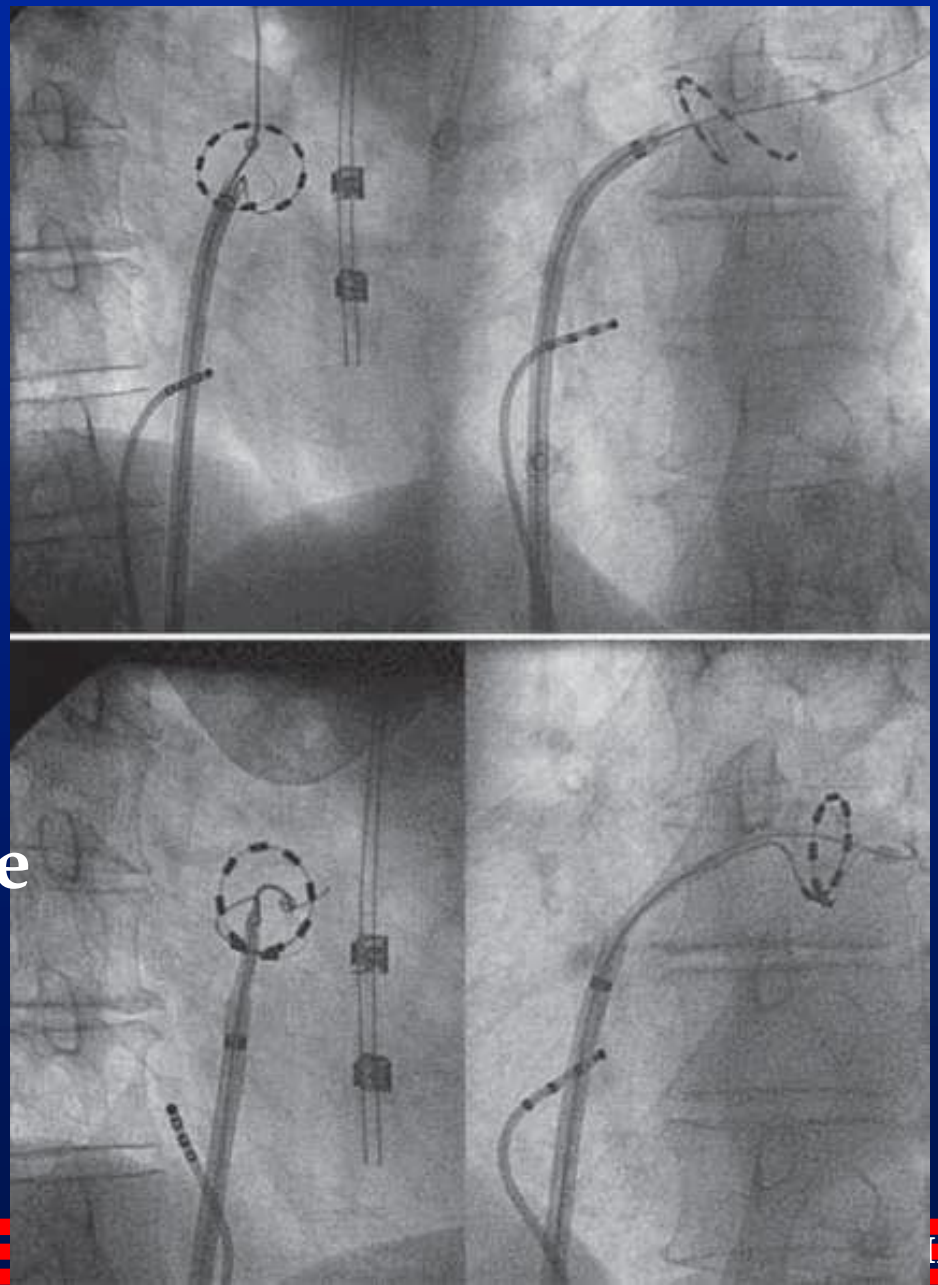
Holter at 6 months: 44/53 (83%)

Boersma et al Heart Rhythm 2008

Results in Pers AF

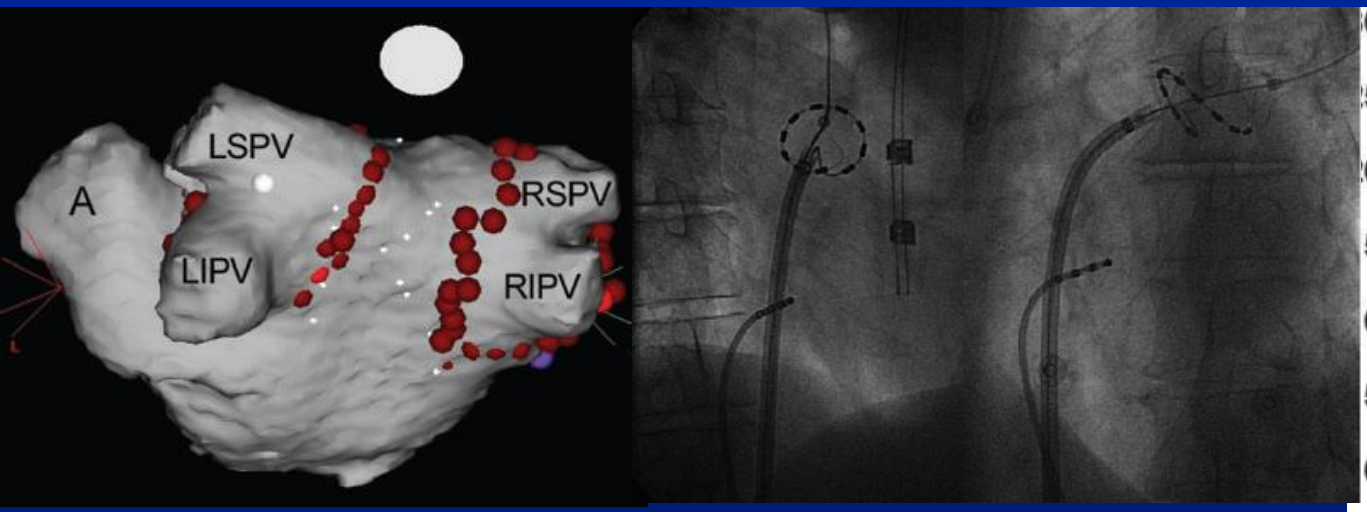
- 50 pts
- Single procedure Success Rate 46%
- Procedure time: 2 h 35 min
- No PV stenosis, 1 tamponade

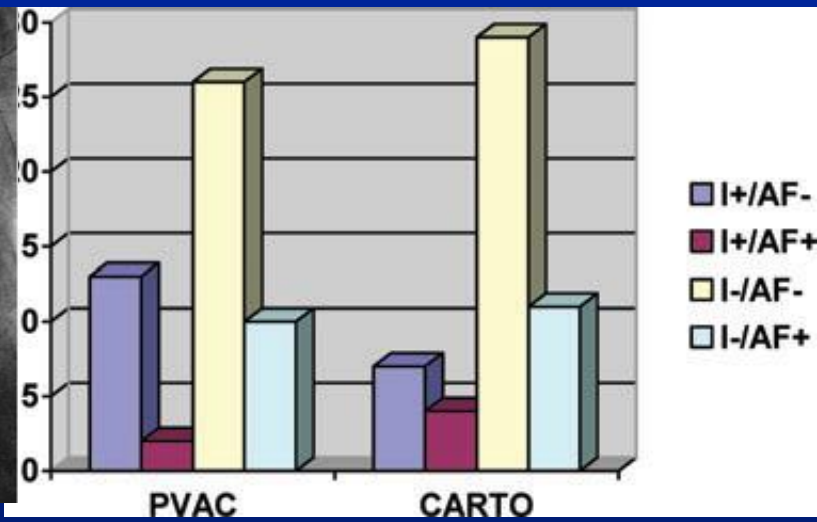
Scharf et al JACC 2009

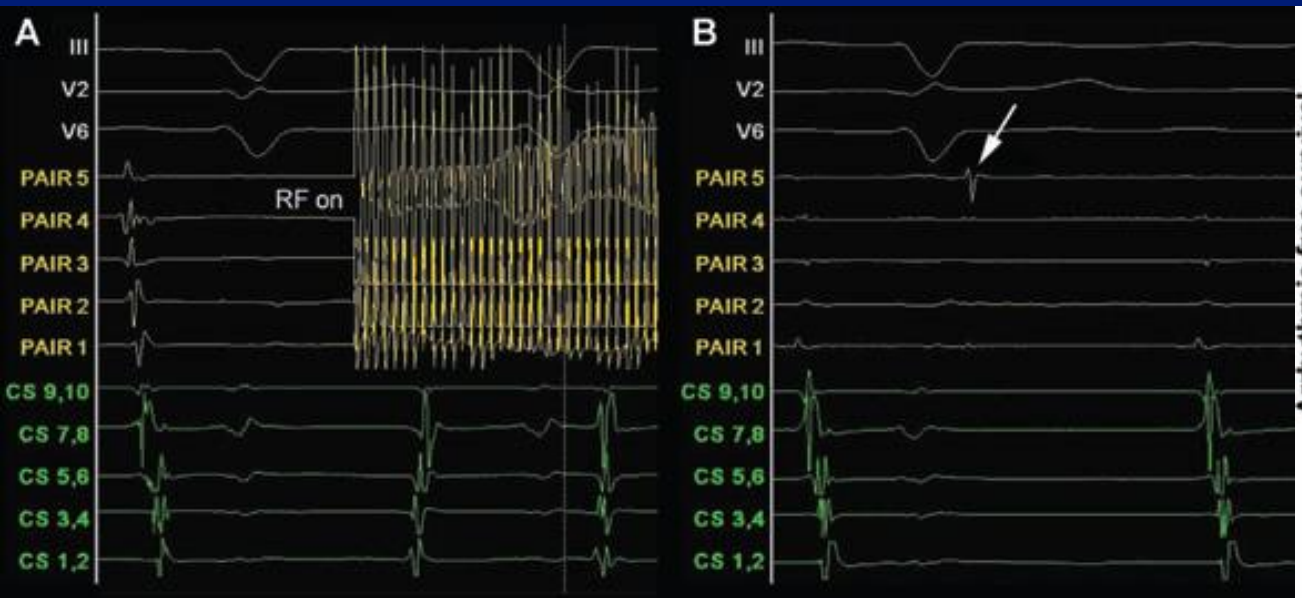


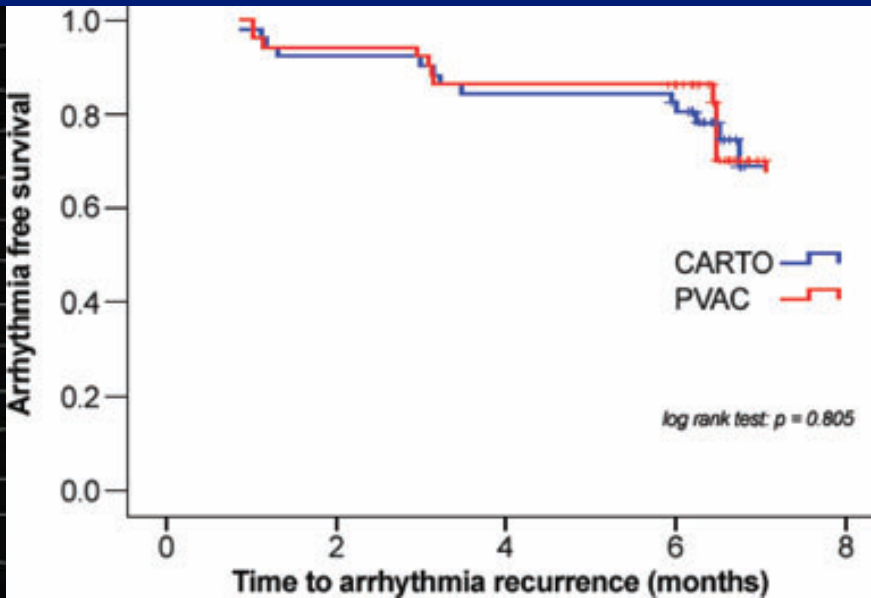
CARTO vs PVAC (N=102) *Bulava et al, PACE 2010*

Procedure & fluoroscopy times were signif. shorter in PVAC gp (107 ± 31 min vs 208 ± 46 min, P < 0.0001 & 16 ± 5 min vs 28 ± 8 min, P < 0.0001, resp.

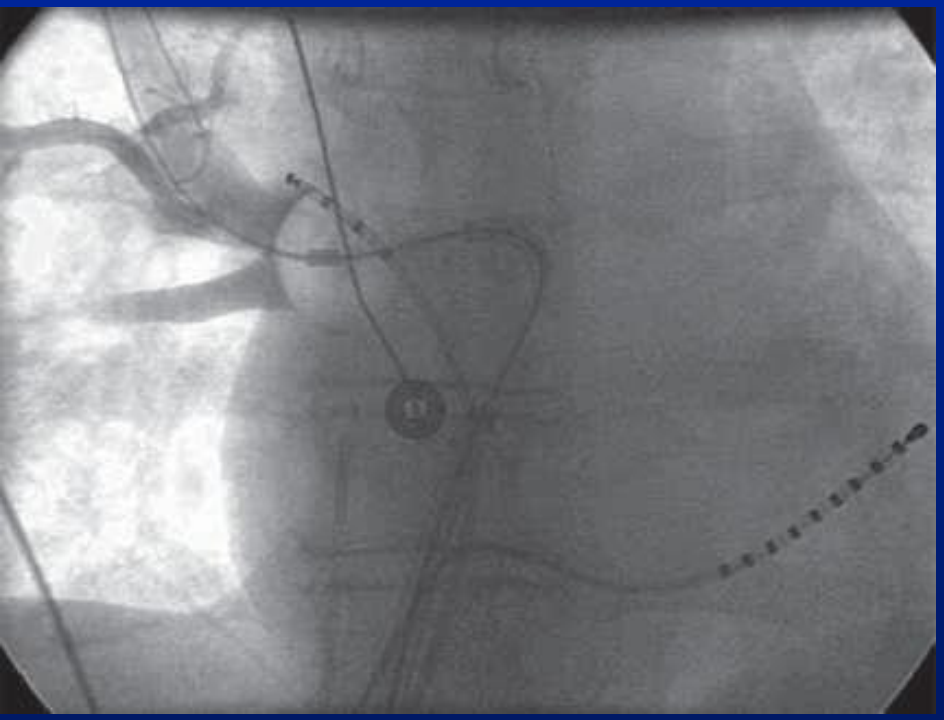


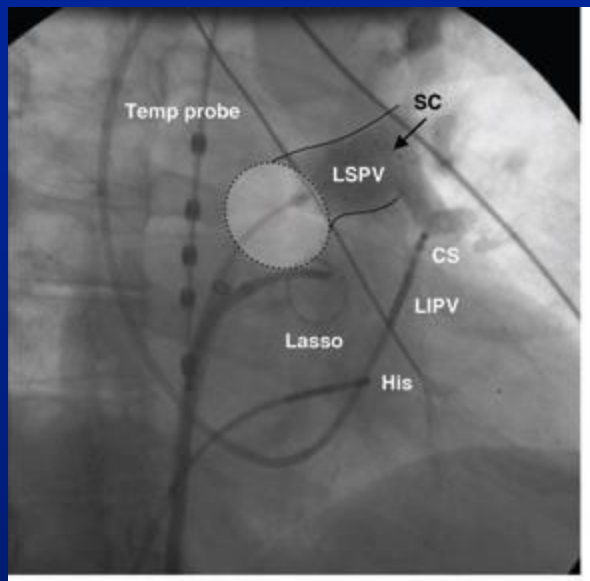


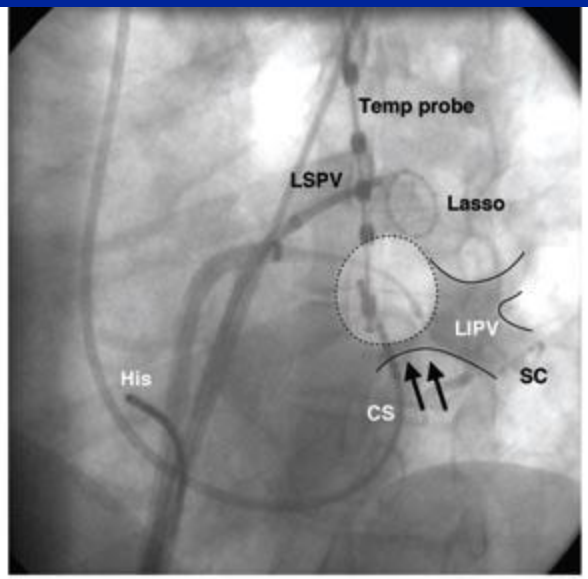


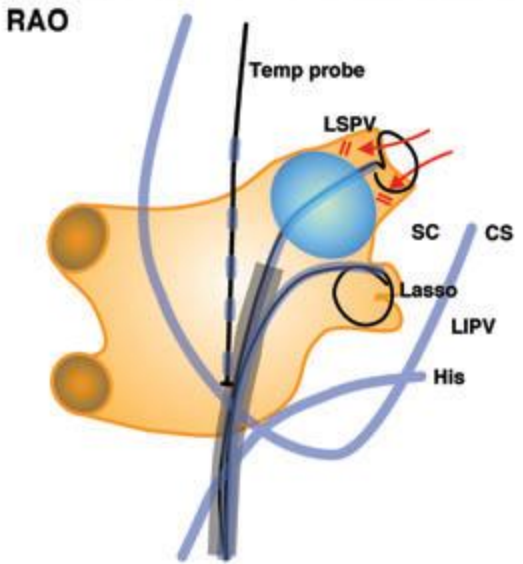


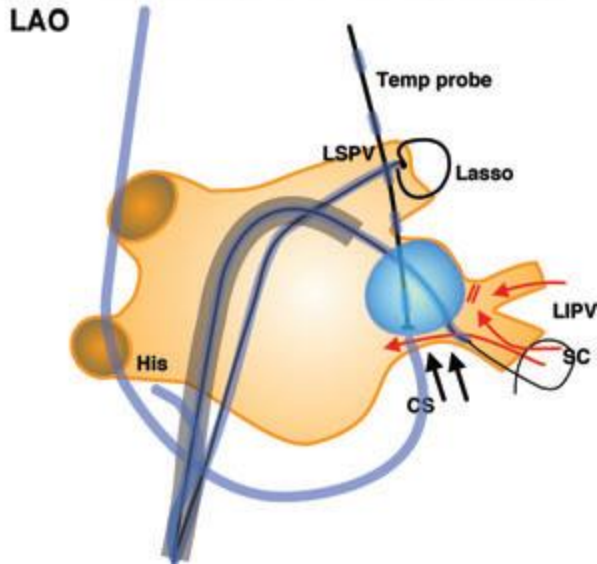
Cryoballoon







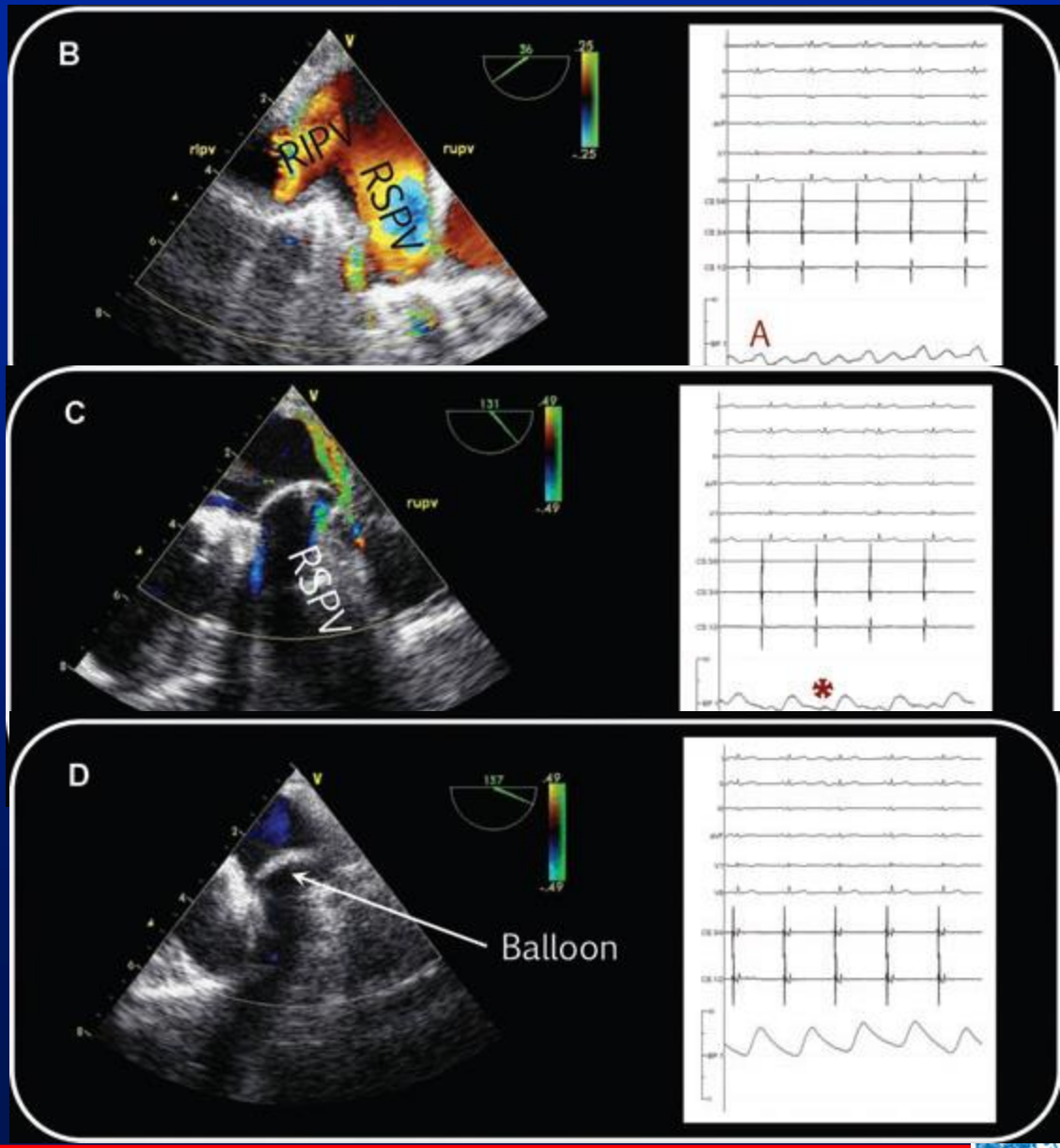




Cryoballoon

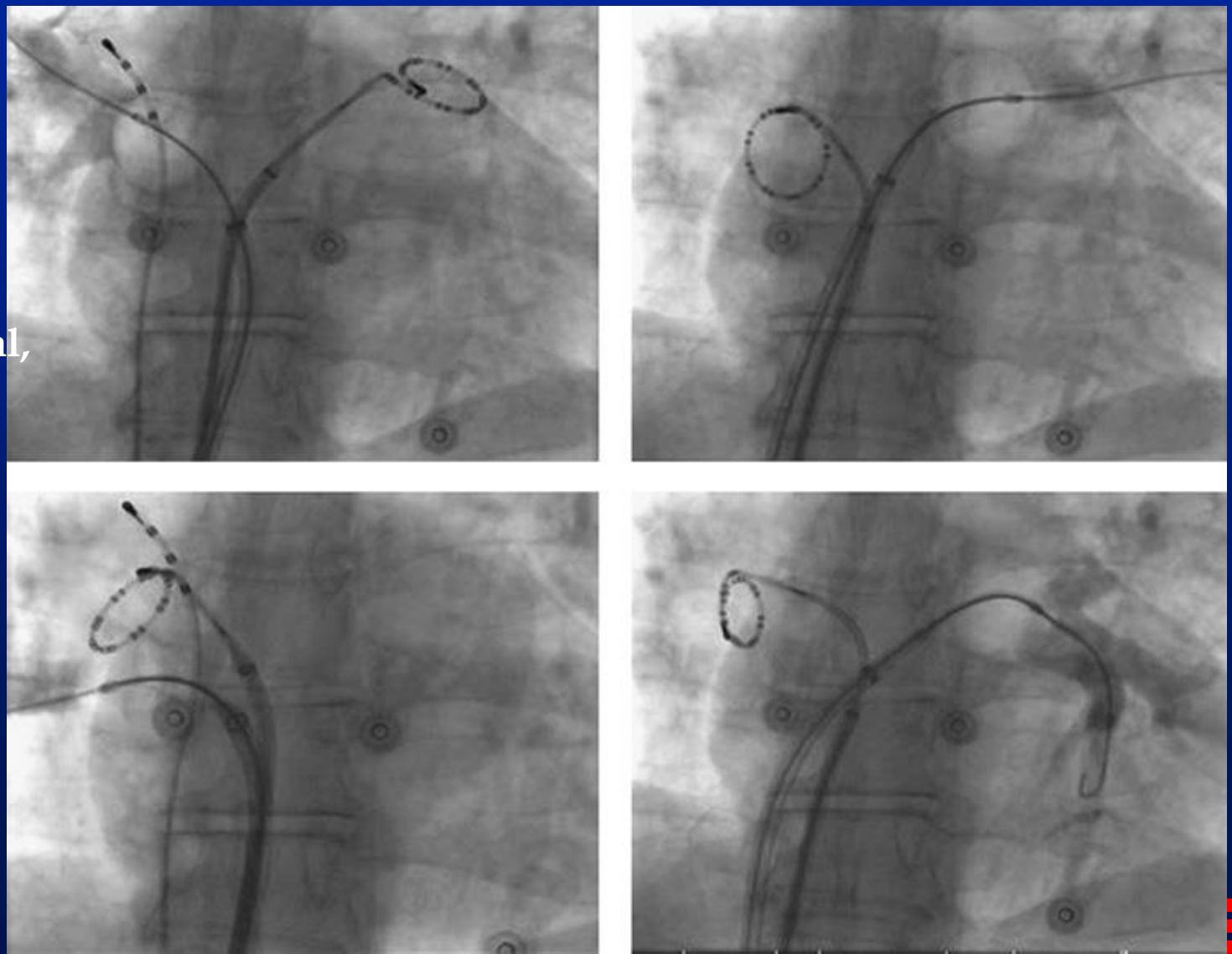
Procedure

- Phrenic Nerve Palsy:
  - 26/346 (7%) Phrenic Nerve Palsy with 23 mm balloon
  - Only 2 with 28 mm balloon
- No PV stenosis
- Procedure time 2 h 50 min



Inflated 28 mm cryoballoon at the 4 PV antra

Note the hold-up of contrast in the PVs due to balloon occlusion of the antra. A quadripolar catheter @ SVC to capture the Rt phrenic nerve. All 4 PVs were isolated after 2 cryoballoon applications to each PV



Kojodjojo et al, Heart 2010

Nonpharmacologic Therapies for Maintenance of SR

- Maze surgery is an intraoperative procedure consisting of a series of lesions around the PVs and down to the MV. The LAA is also suture closed
- This procedure targets both the presumed areas of AF initiation (PVs) & tissue necessary to maintain SR (LA)
- This procedure is generally performed as a component of a valve or coronary bypass operation but may be offered as a stand-alone procedure
- The efficacy of this procedure approaches 80%, and the complications include those seen with percutaneous AF ablation procedures

Nonpharmacologic Therapies for Maintenance of SR

- Single- or dual-site atrial pacing techniques have been studied as methods to prevent AF.
- Compared with VVI, synchronized AV conduction facilitated through atrial pacing significantly reduces the frequency of AF
- Randomized studies of dual- or alternative-site atrial pacing to prevent AF have produced conflicting results, and no consensus currently exists for the efficacy of this approach as primary preventive therapy for AF

Enalapril Decreases the Incidence of Atrial Fibrillation in Patients With Left Ventricular Dysfunction

Insight From the Studies Of Left Ventricular Dysfunction (SOLVD) Trials

Emmanuelle Vermes, MD; Jean-Claude Tardif, MD; Martial G. Bourassa, MD; Normand Racine, MD;

2930 *Circulation* June 17, 2003

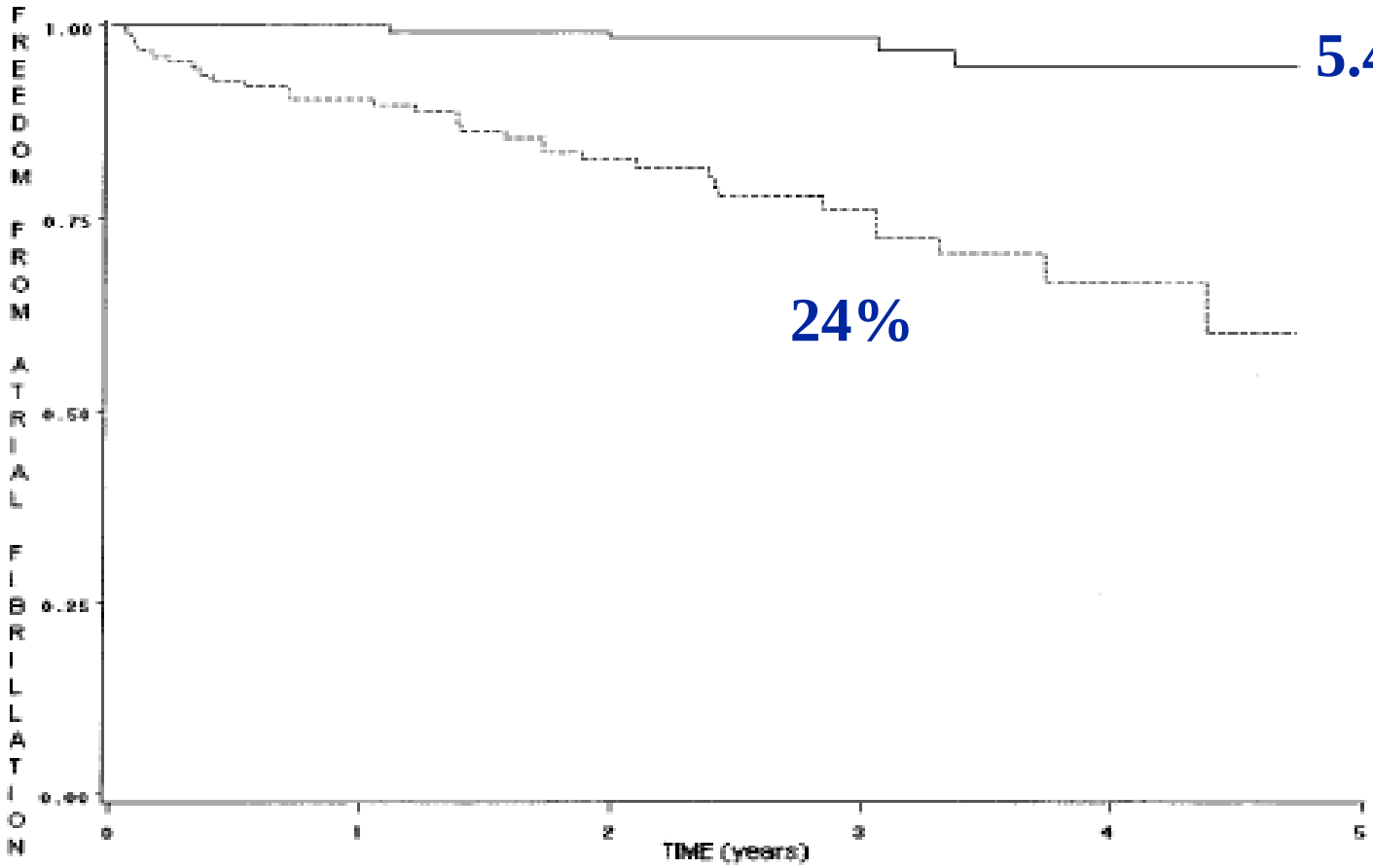


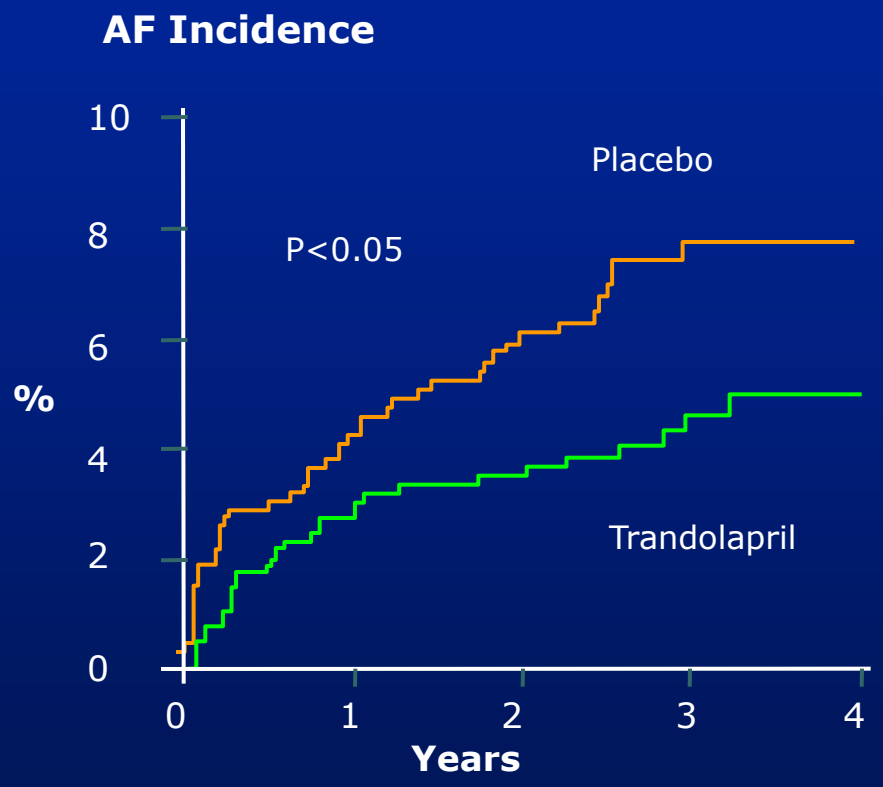
Figure 2. Kaplan-Meier curves for time to first occurrence of AF in subgroup of 251 patients of prevention arm randomly assigned to enalapril (solid line) or placebo (dotted line) ($P<0.0001$), including patients with LVEF ≤0.35 and no history of overt HF requiring treatment at entry in the trial.

PARADIGM-HF: Effect of LCZ696 (Entresto) vs enalapril on other secondary endpoints

	LCZ696 (n=4187)	Enalapril (n=4212)	Treatment effect	P Value
KCCQ clinical summary score at 8 months	- 2.99 ± 0.36	- 4.63 ± 0.36	1.64 (0.63, 2.65)	0.001
New onset atrial fibrillation	84/2670 (3.1%)		Hazard ratio 0.97 (0.72,1.31)	0.83
Protocol-defined decline in renal function*	94/4187 (2.2%)	108/4212 (2.6%)	Hazard ratio 0.86 (0.65, 1.13)	0.28

*1) ESRD or 2) a decrease ≥50% in eGFR from value at randomization or 3) a decrease in eGFR >30 ml/min/1.73 m² to <60 ml/min/1.73 m²

Effect of ACE-I on AF in CHF Patients



- **TRACE (1570 low EF patients post MI)**
- **Trandolapril vs Placebo**
- **LVF 33%, HBP 22%**
- **Reduced risk of AF**
- **RR: 0.45 (0.26-0.76)**

Pedersen OD, *et al. Circulation* 1999; 100: 376.

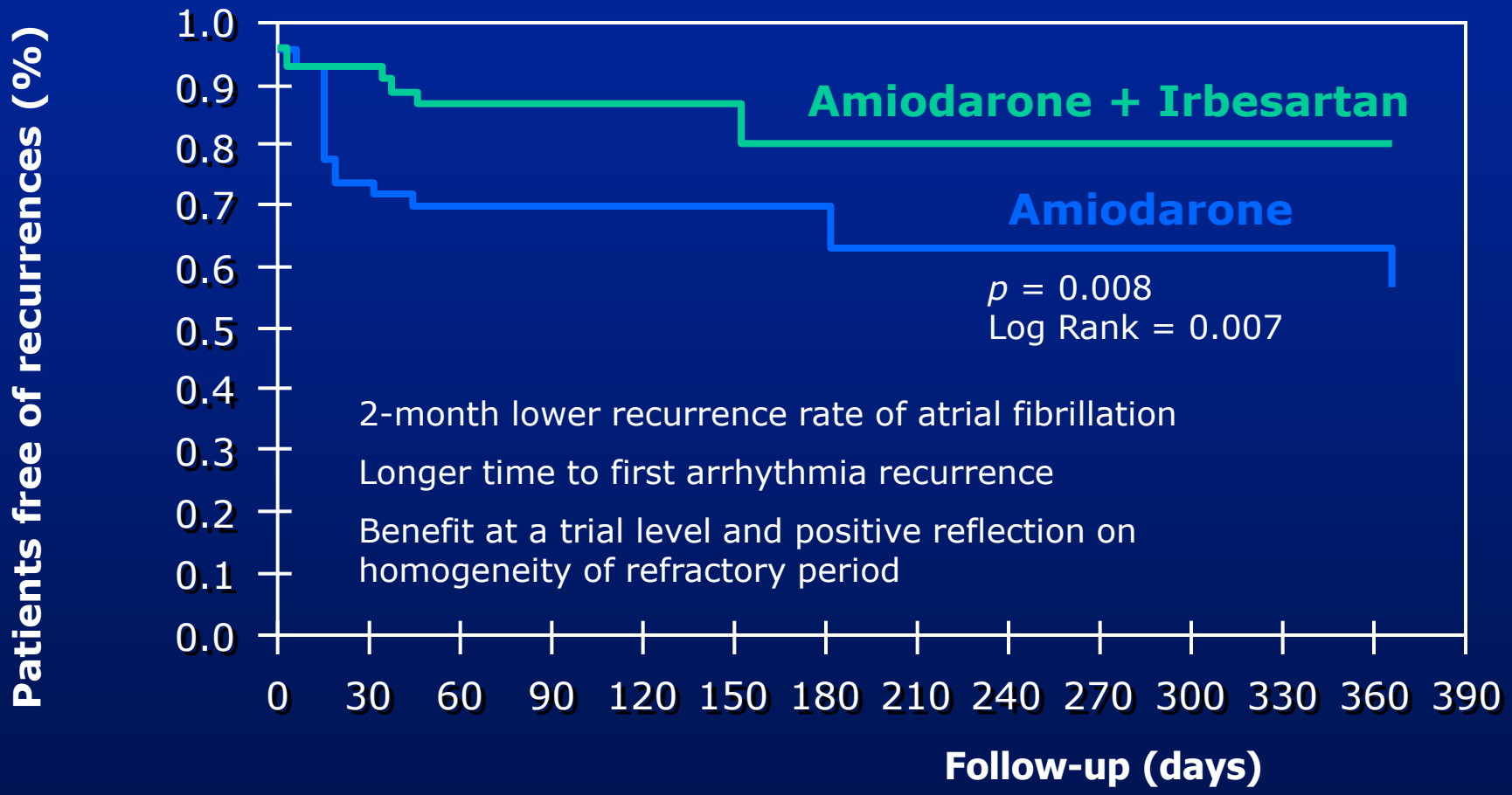
Use of Irbesartan to Maintain Sinus Rhythm in Patients With Long-Lasting Persistent Atrial Fibrillation

A Prospective and Randomized Study

Antonio H. Madrid, MD; Manuel G. Bueno, MD; Jose M.G. Rebollo, MD; Irene Marín, MD; Gonzalo Peña, MD; Enrique Bernal, MD; Aníbal Rodriguez, MD; Lucas Cano, MD; José M. Cano, MD; Pedro Cabeza, MD; Concepción Moro, MD, FESC

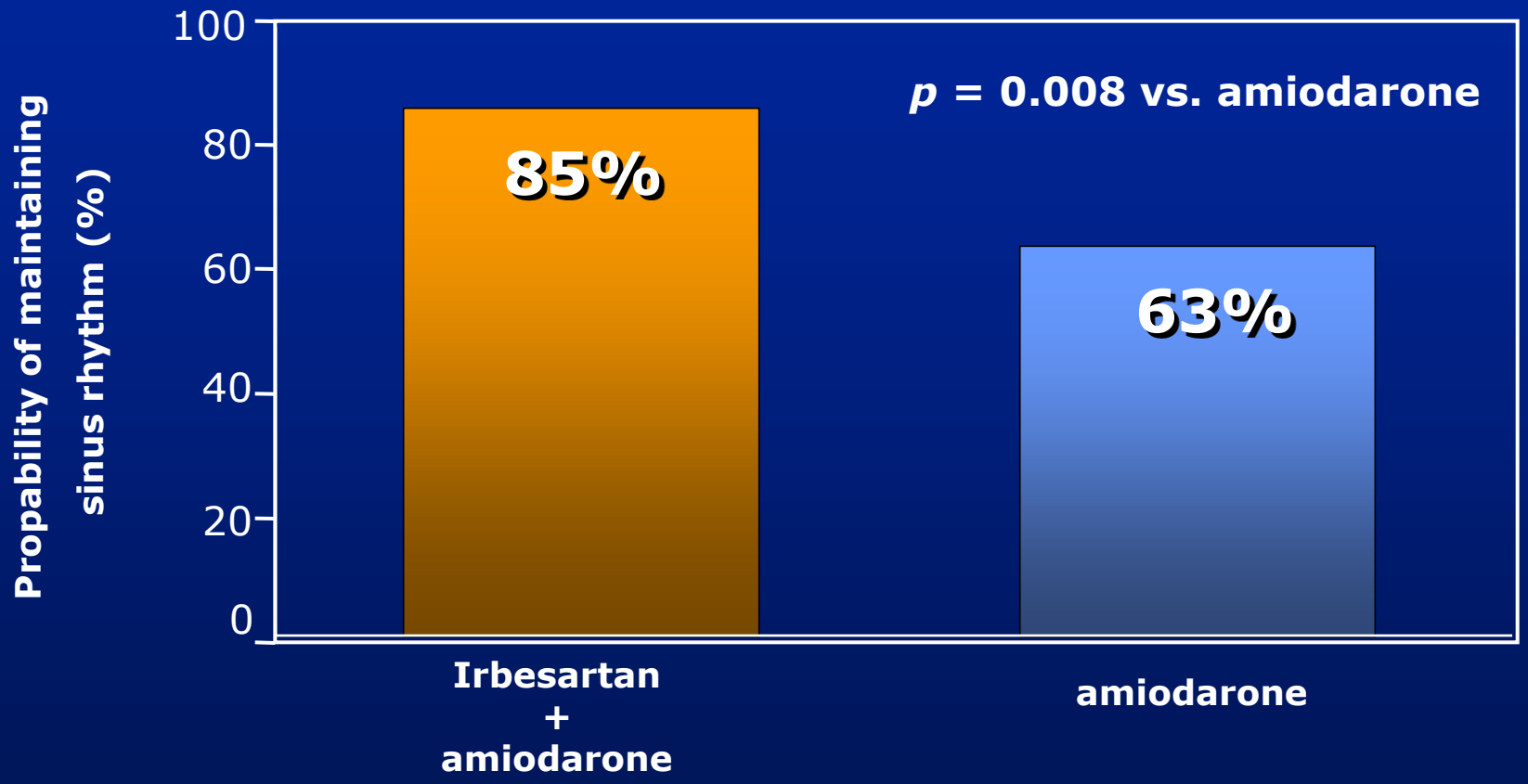
Circulation 2002 (July 16)

Maintenance of sinus rhythm after conversion from persistent AF



Madrid AH, Moro C et al. Circulation 2002;106:331–6.

Irbesartan significantly increased probability of maintaining sinus rhythm



159 patients with persistent atrial fibrillation were randomized to either amiodarone or amiodarone + irbesartan
Results are taken at 2-month follow-up visit

Madrid A et al. *Circulation* 2002;106:331–6.

Effects of Angiotensin II Type 1 Receptor Antagonist on Electrical and Structural Remodeling in Atrial Fibrillation

Koichiro Kumagai, MD, Hideko Nakashima, MD, Hidenori Urata, MD, I

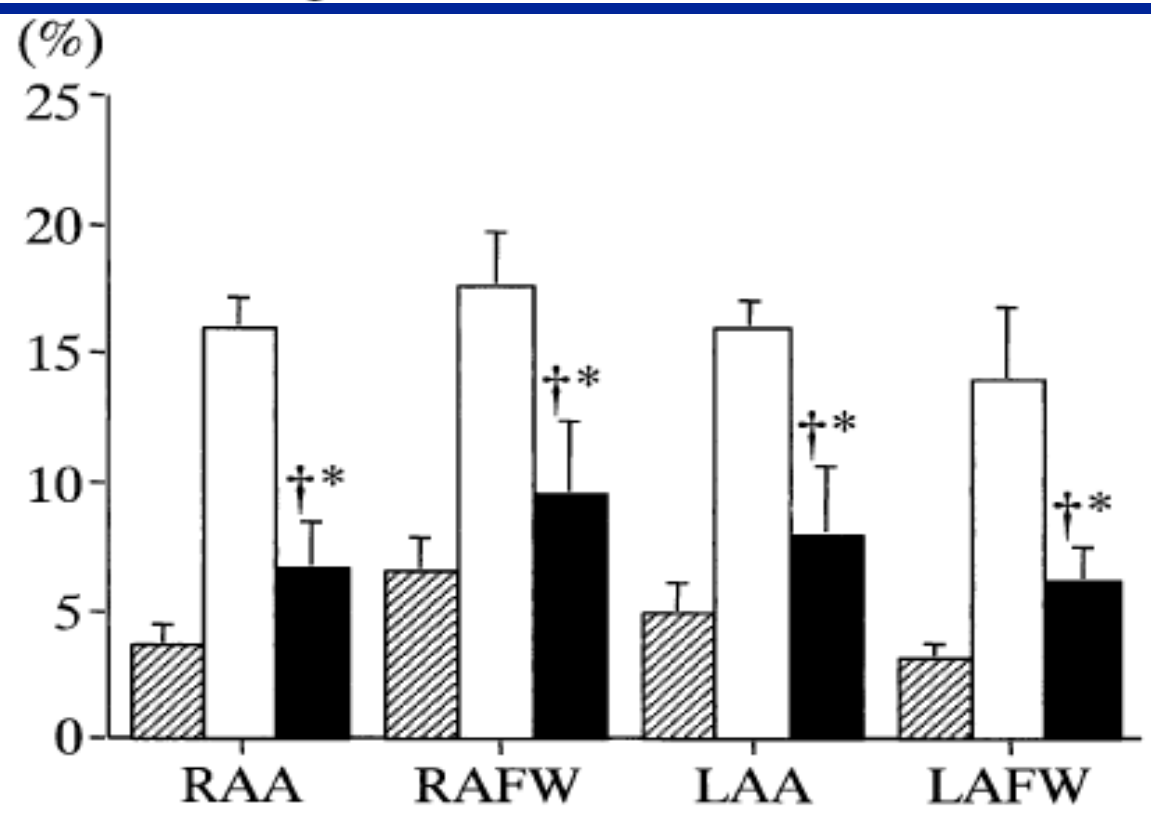
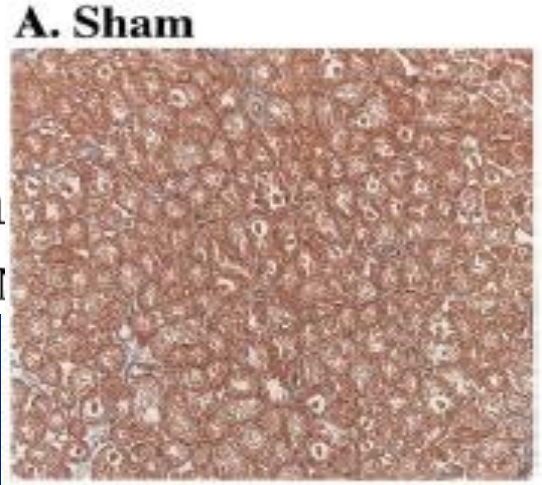
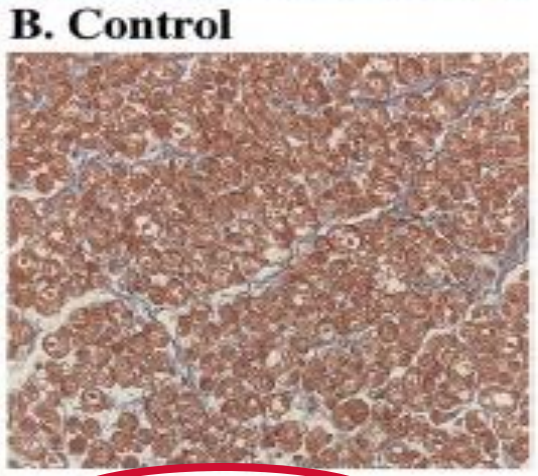
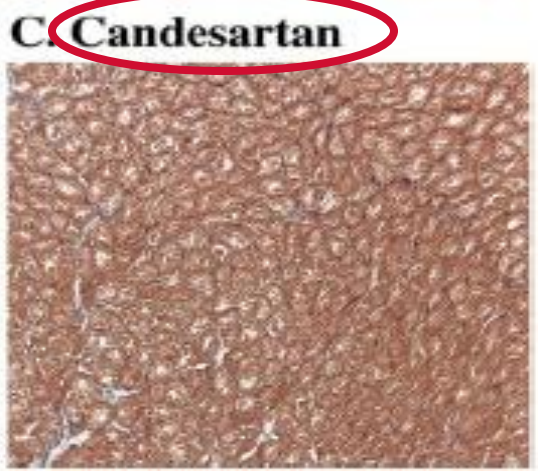


Figure 3. The percentage of fibrosis of the free walls and appendages in both atria after five weeks of pacing. The percentage of fibrosis in all atrial regions in the candesartan group was markedly lower than that in the control, although greater than that in the sham group. **Hatched bars** = sham group; **white bars** = control group; **black bars** = candesartan group. †$p < 0.001$ compared with the control group. *$p < 0.05$ compared with the

JACC 6/2003







Atrial remodeling: potential mechanisms of efficacy of irbesartan

- **Hemodynamic effect:**
  - Decreased atrial stretch
  - Lowering end-diastolic left ventricular pressure
- **Prevention of electrical remodeling:**
  - Direct action on ionic currents at the atrial level
  - Modifying the sympathetic tone
- **Preventing structural remodeling**
  - Reduction of atrial fibrosis
- **Reduction of atrial dilation and apoptosis**

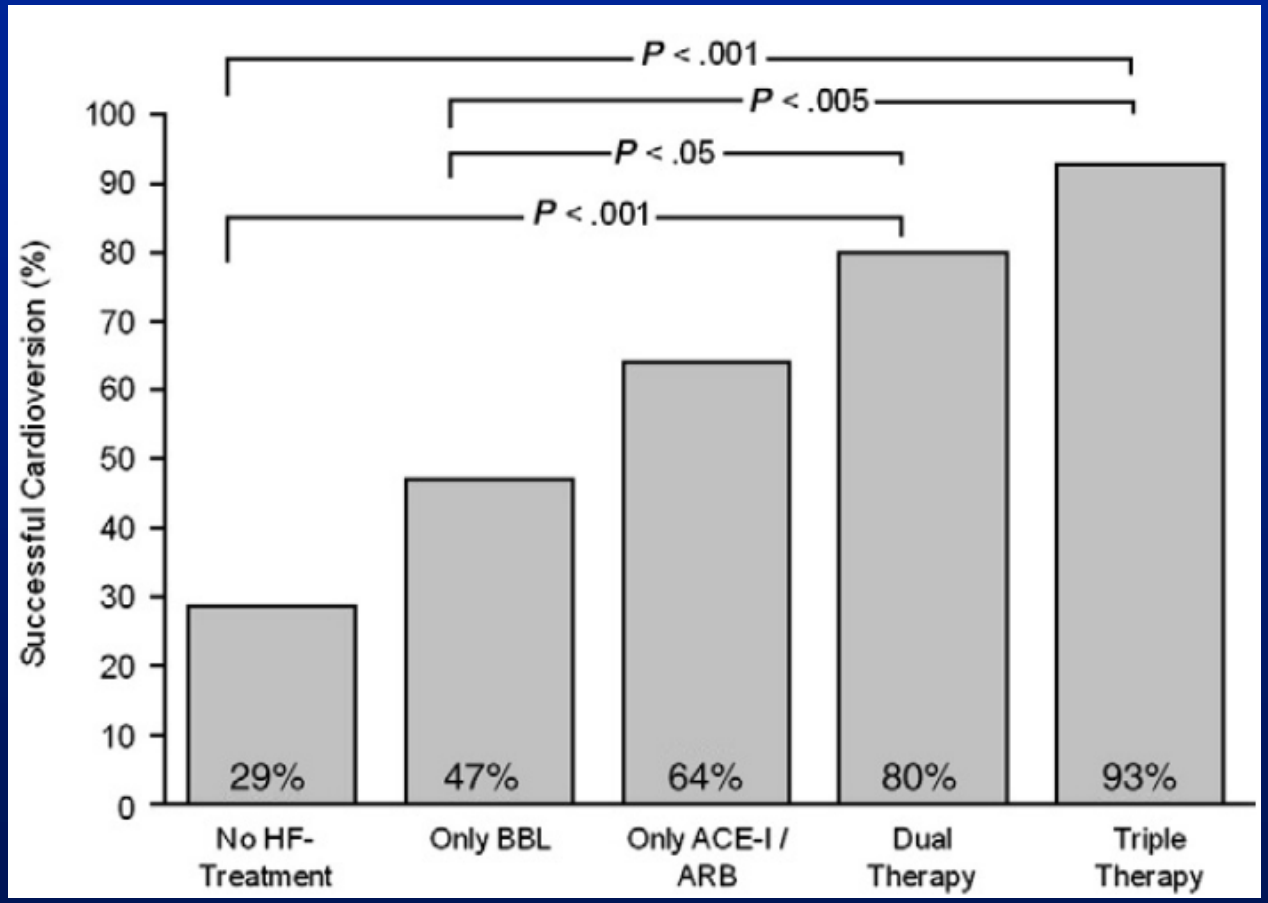
Madrid A et al. *Circulation* 2002;106:331–6.

ACEI / ARBs / β-Blockers in AF

- 4661 pts with AF & 18 642 matched controls from a population of 682 993 pts Rx for HTN
- Results: long-term therapy with
- • ACEI (OR, 0.75)
- • ARBs (OR, 0.71) or
- • β-blockers (OR, 0.78)
- was a/w a lower risk for AF than current exclusive therapy with CCBs
- Conclusion: In hypertensive pts, long-term receipt of ACEIs, ARBs, or β-blockers reduces the risk for AF c/w receipt of CCBs

Schaer et al, Ann Intern Med, Jan 18, 2010

success of cardioversion according to heart failure treatment before cardioversion



Boldt et al, Am Heart J 2008;155:890-5

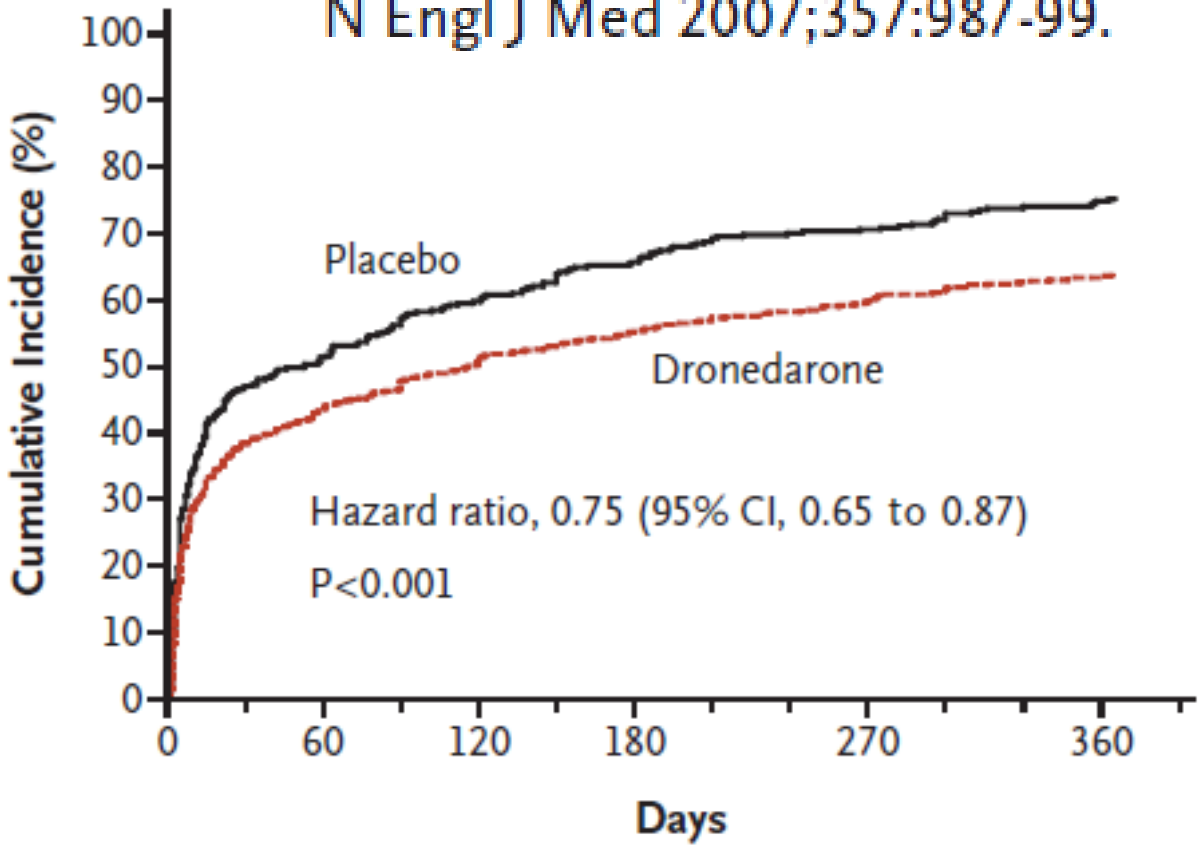
Dronedarone for Maintenance of Sinus Rhythm in Atrial Fibrillation or Flutter

Bramah N. Singh, M.D., D.Sc., Stuart J. Connolly, M.D., Harry J.G.M. Crijns, M.D., Denis Roy, M.D., Peter R. Kowey, M.D., Alessandro Capucci, M.D., Ph.D., David Radzik, M.D., Etienne M. Aliot, M.D., and Stefan H. Hohnloser, M.D., for the EURIDIS and ADONIS Investigators*

N Engl J Med 2007;357:987-99.

Dronedarone

C



No. at Risk

Placebo	409	192	156	133	112	90
Dronedarone	828	450	389	347	307	262

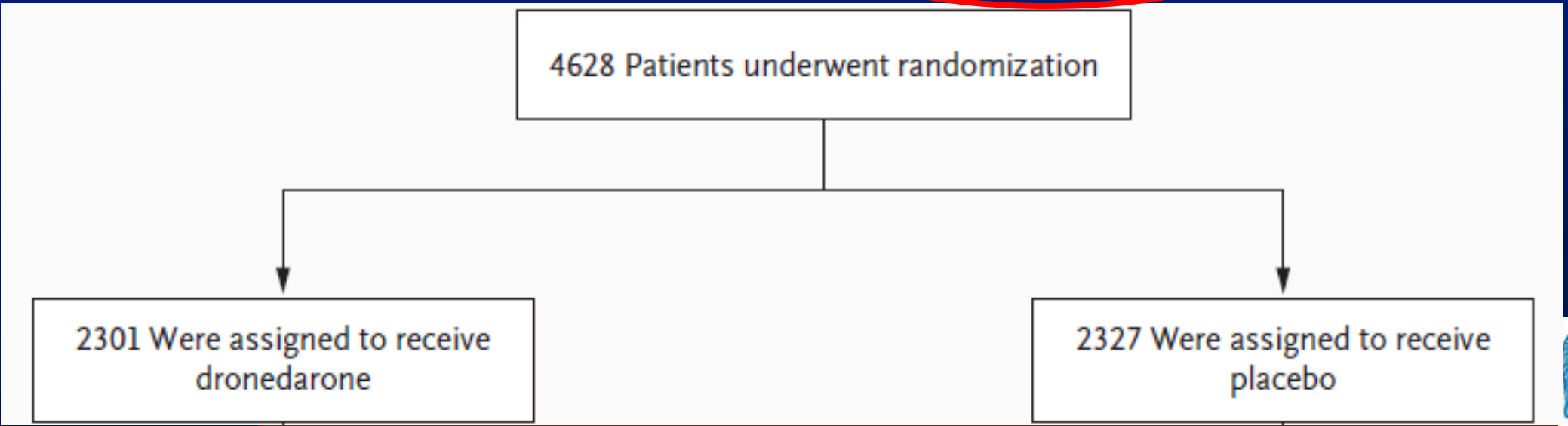
Dronedarone

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Effect of Dronedarone on Cardiovascular Events in Atrial Fibrillation

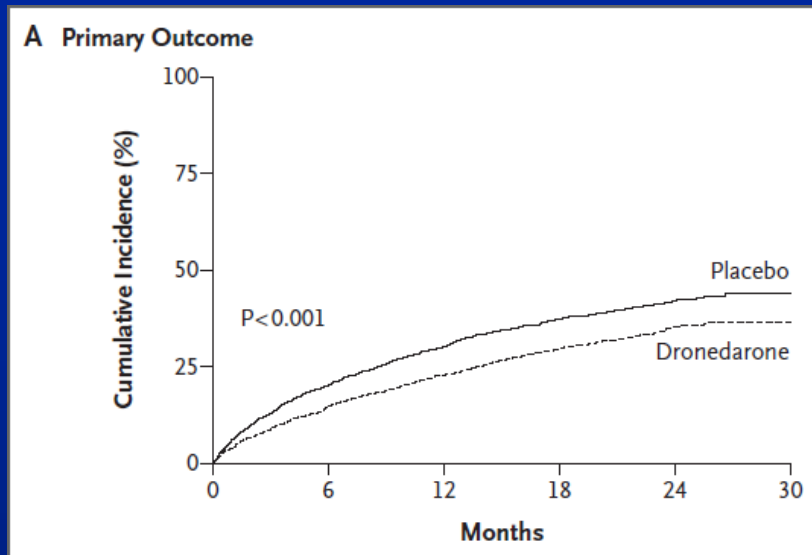
Stefan H. Hohnloser, M.D., Harry J.G.M. Crijns, M.D., Martin van Eickels, M.D., Christophe Gaudin, M.D., Richard L. Page, M.D., Christian Torp-Pedersen, M.D., and Stuart J. Connolly, M.D., for the ATHENA Investigators*



ATHENA Trial

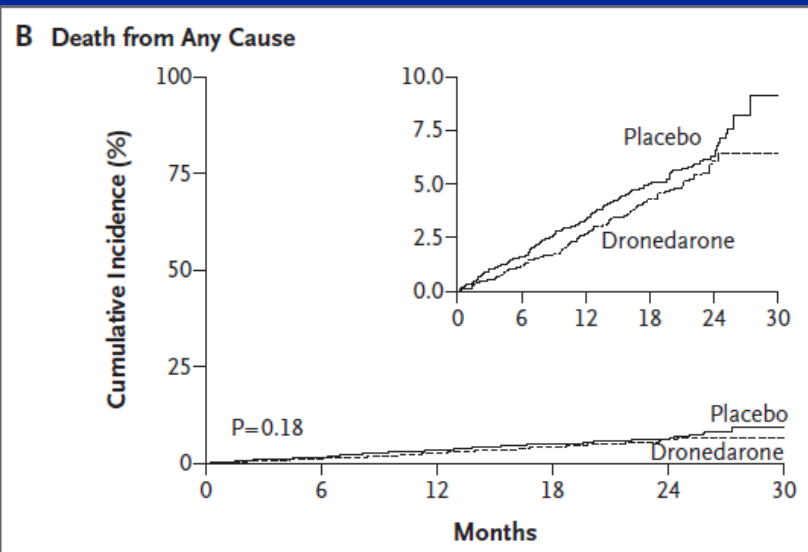
ASM

Dronedarone reduced the incidence of hospitalization due to CV events or death in pts with AF



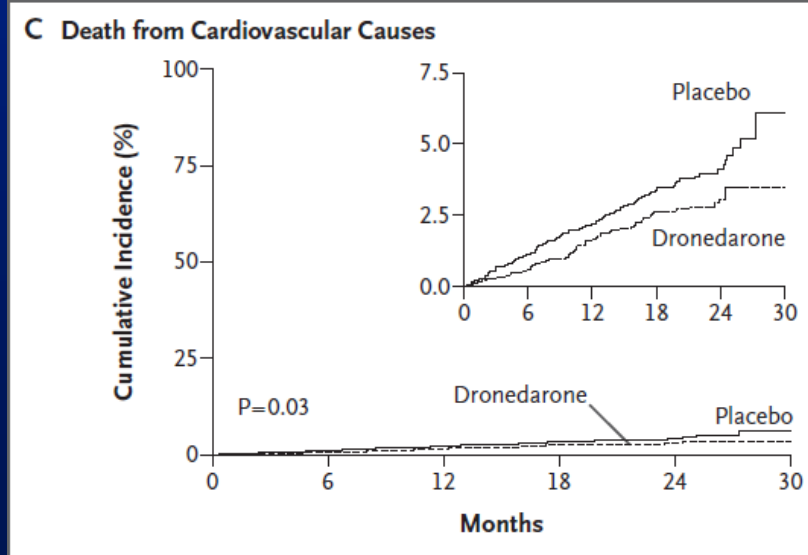
No. at Risk

Placebo	2327	1858	1625	1072	385	3
Dronedarone	2301	1963	1776	1177	403	2



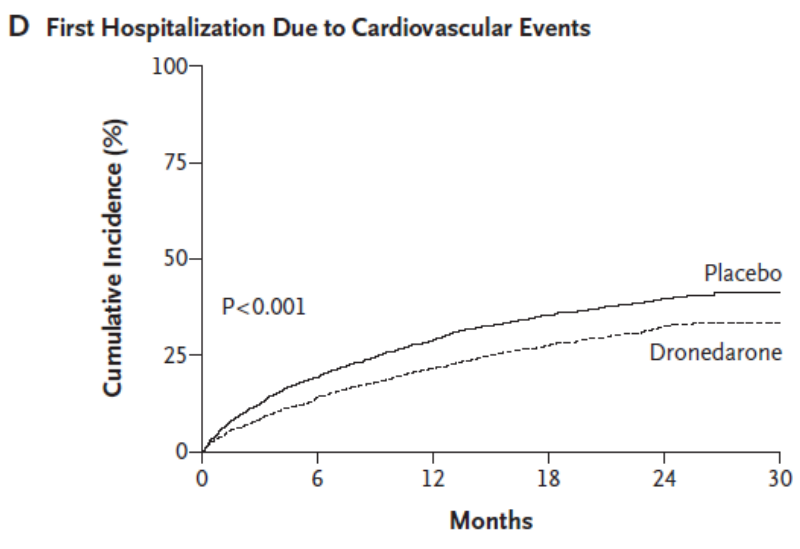
No. at Risk

Placebo	2327	2290	2250	1629	636	7
Dronedarone	2301	2274	2240	1593	615	4



No. at Risk

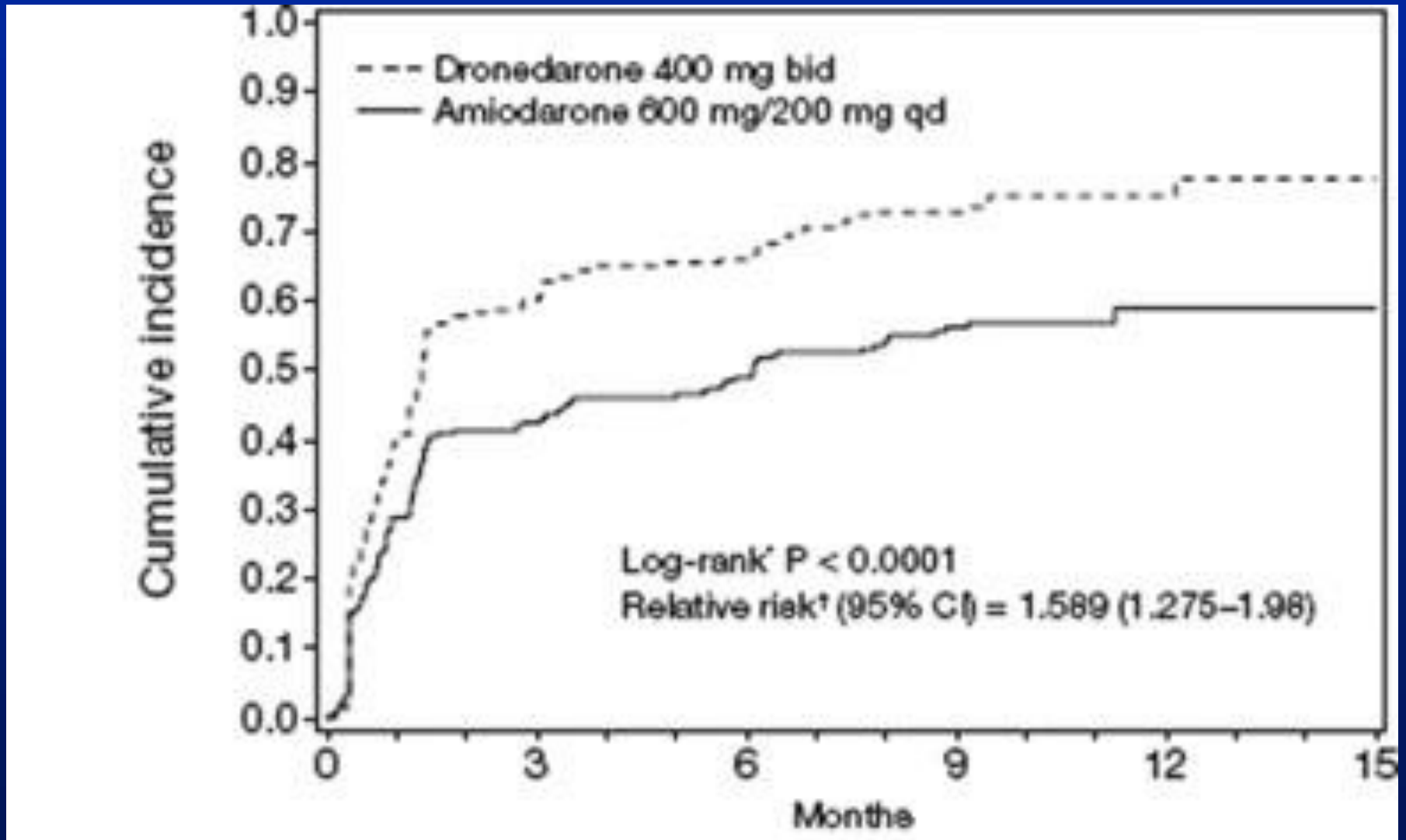
Placebo	2327	2290	2250	1629	636	7
Dronedarone	2301	2274	2240	1593	615	4



No. at Risk

Placebo	2327	1858	1625	1072	385	3
Dronedarone	2301	1963	1776	1177	403	2

DIONYSOS Study



Patients at risk:						
Dronedarone	249	99	84	40	12	0
Amiodarone	255	146	126	61	13	0

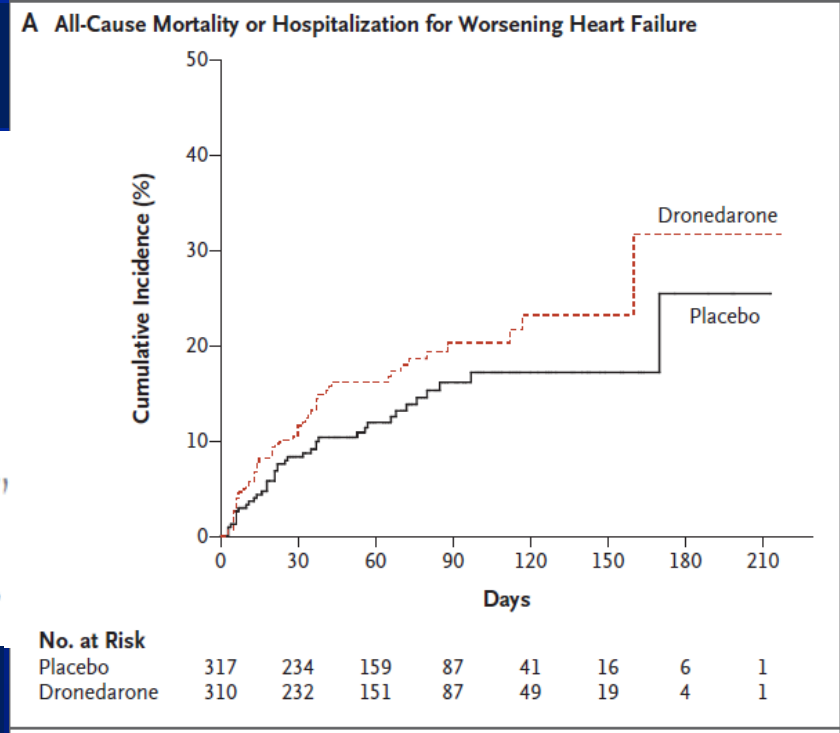
ANDROMEDA

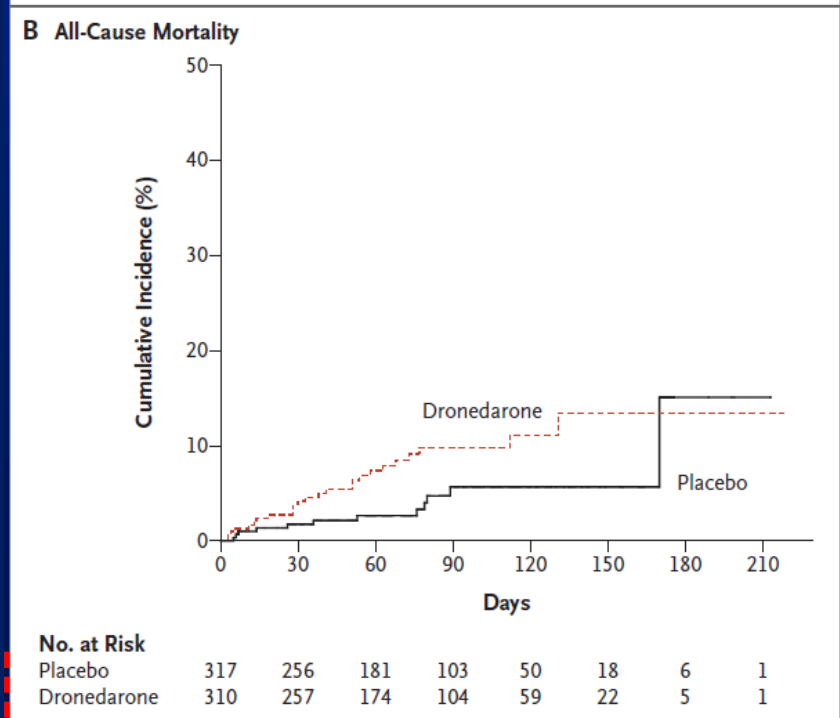
Increased Mortality after Dronedarone Therapy for Severe Heart Failure

Lars Køber, M.D., Christian Torp-Pedersen, M.D., John J.V. McMurray, M.D., Ole Gøtzsche, M.D., Samuel Lévy, M.D., Harry Crijns, M.D., Jan Amlie, M.D., and Jan Carlsen, M.D., for the Dronedarone Study Group*

After inclusion of 627 pts (310 in the dronedarone gp & 317 in the placebo gp), the trial was prematurely terminated for safety reasons

During a median FU of 2 mos, 25 pts in the dronedarone gp (8.1%) & 12 pts in the placebo gp (3.8%) died (hazard ratio, 2.13; P = 0.03). The excess mortality was related to worsening of HF — 10 deaths in the dronedarone gp and 2 in the placebo gp



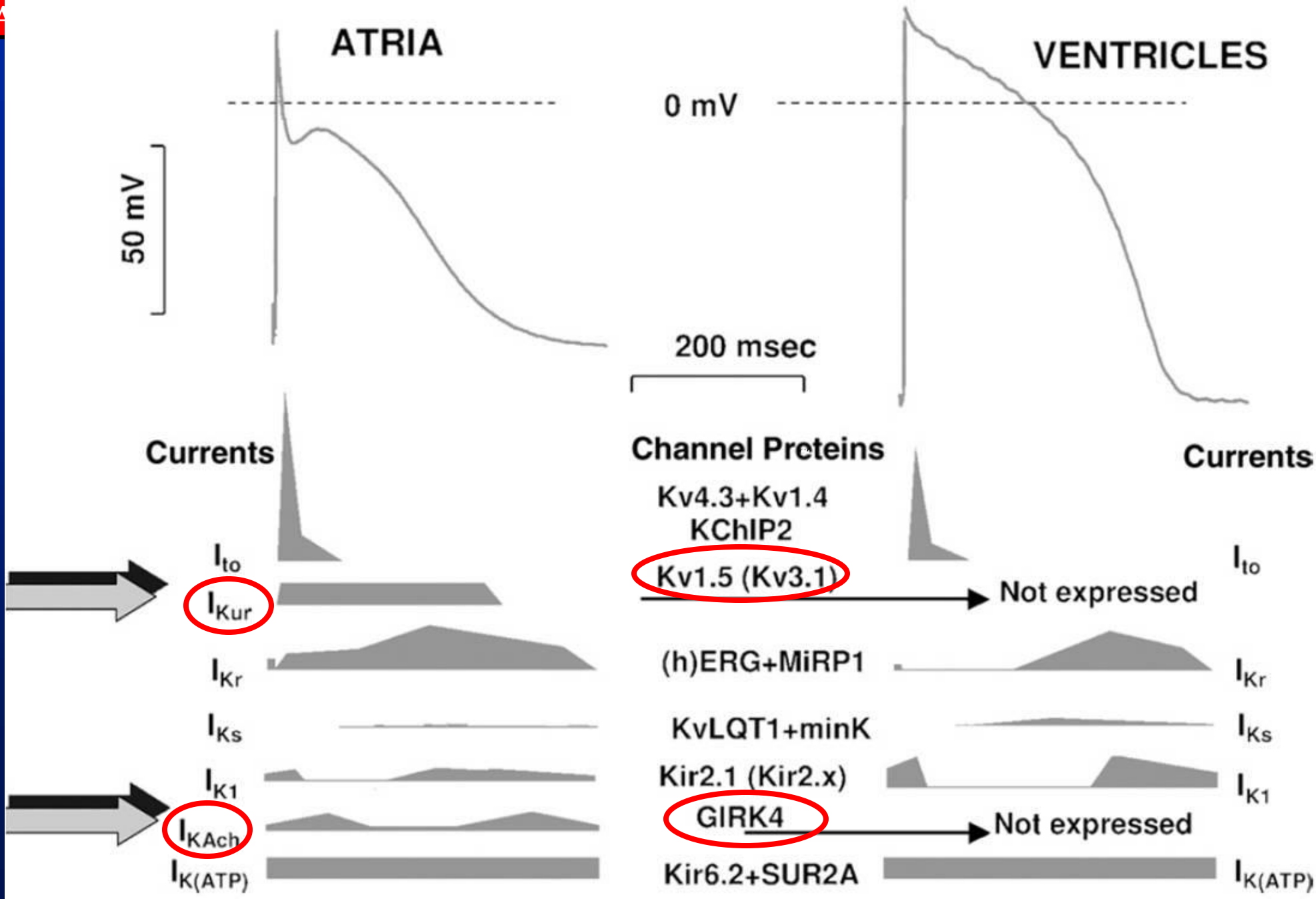


Class III–Harm

1. Dronedarone should not be administered to patients with class IV heart failure or patients who have had an episode of decompensated heart failure in the past 4 weeks, especially if they have depressed left ventricular function (left ventricular ejection fraction ≤35%).[30] *(Level of Evidence: B)*

New recommendation

Active currents in the atria and ventricles



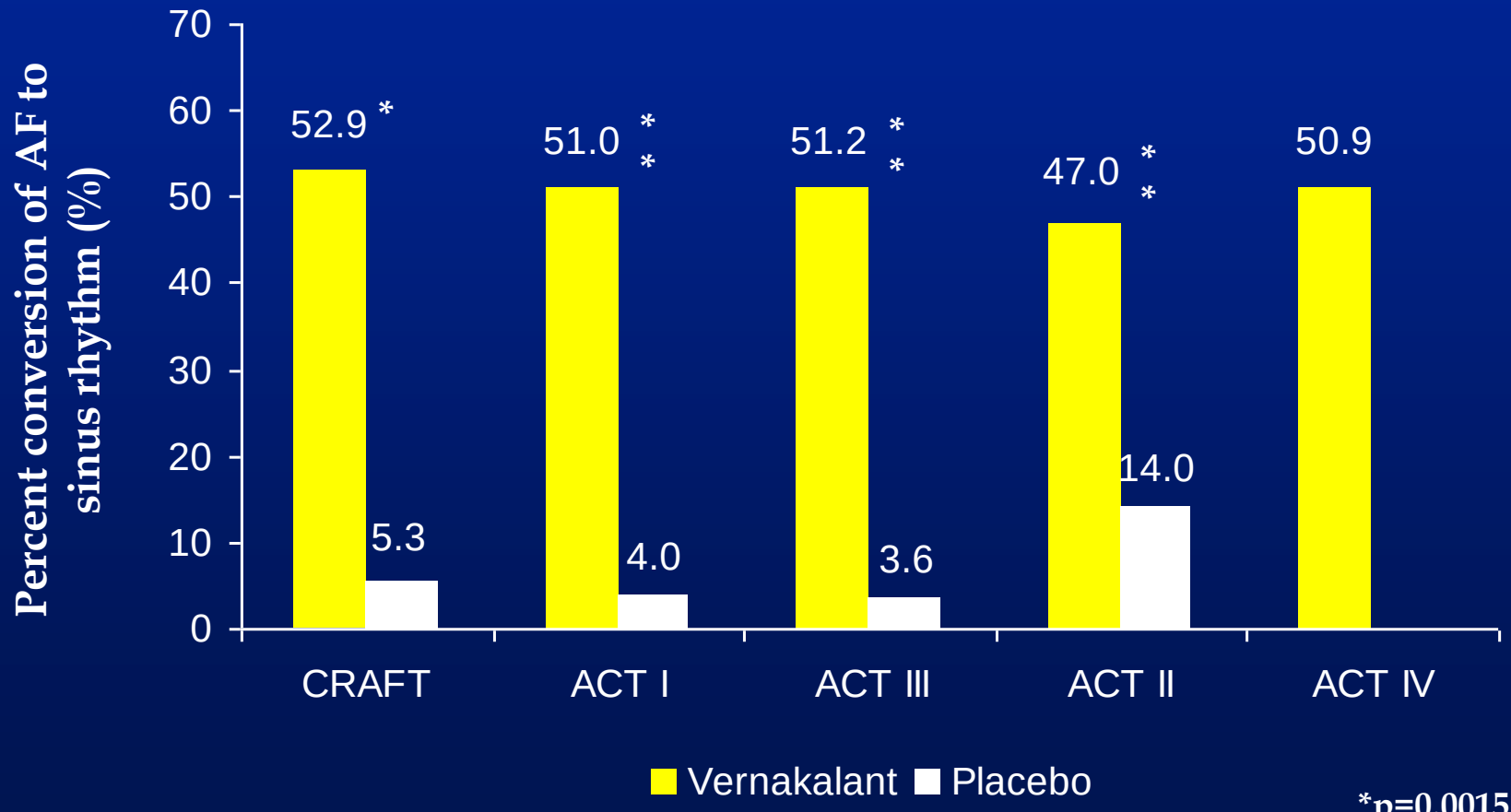
Vernakalant, an atrial selective AAD

- Current AADs
  - Block I_{kr} current, with subsequent QT ↑ & risk of VAs (TdP)
  - Amiodarone is a week I_{kr} blocker & VA is extremely infrequent (but has other toxic effects)
- Need of atrial selective AADs

- **Vernakalant** is an **atrial selective** AAD:
  - Vernakalant blocks potassium currents that control repolarization at all phases of the atrial action potential (I_{TO} I_{kur} I_{kAch})
  - Blockage of I_{kr} is 30- to 100-fold less potent than with other AADs
  - Vernakalant blocks the peak sodium current (I_{Na}) with enhanced potency in depolarized (voltage dependent) & rapidly activating (frequency dependent) atria

Primary efficacy endpoint in the ACT studies

- **Proportion of pts in the short-duration AF (3 h to 7 d) group who had conversion to SR for at least 1 min within 90 min of drug initiation**

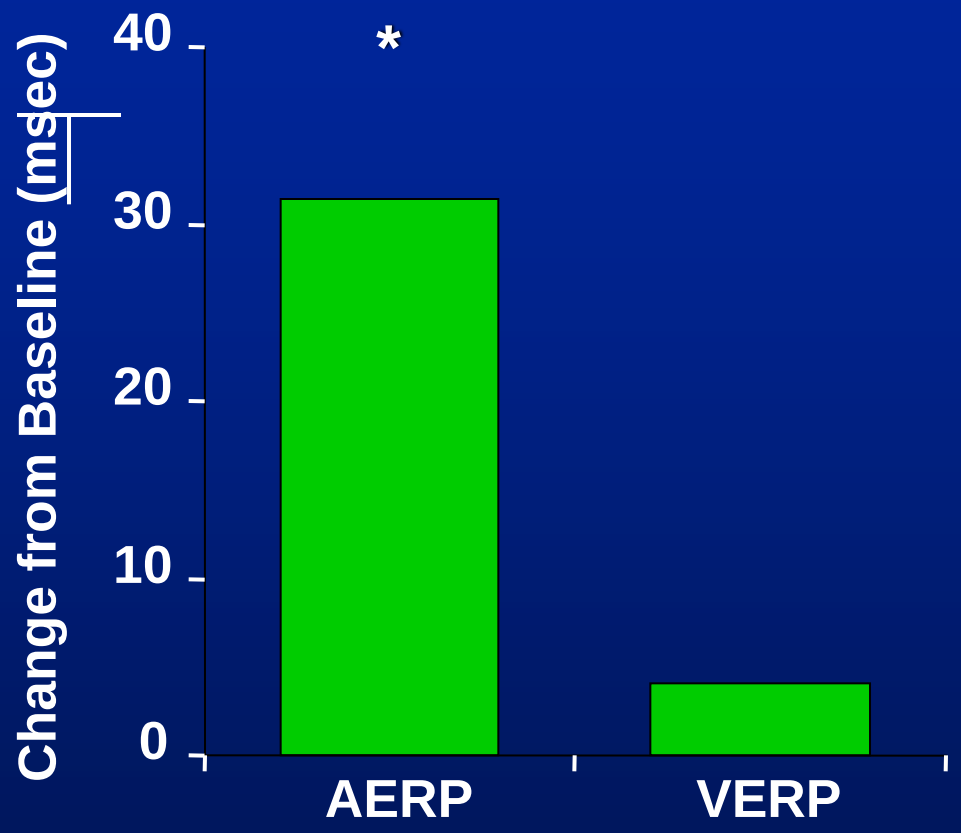


*p=0.0015

**p≤0.0001

AF: Atrial fibrillation

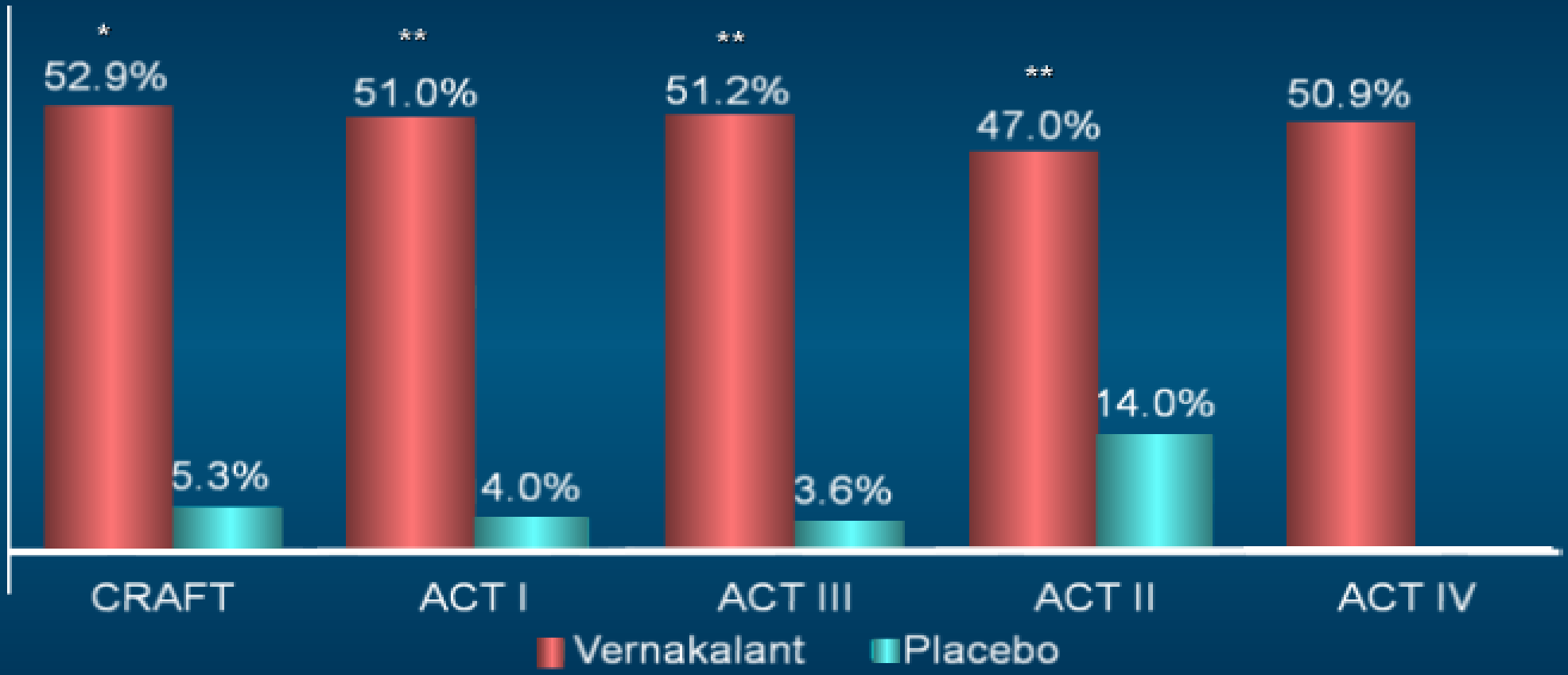
Vernakalant Prolongs Atrial Refractory Period: Human EP Study



- p = <0.05 vs. baseline
- *Dorian et al. J Cardiovasc Pharmacol 2007*

Median C_p = 2-3 mcg/mL
100 bpm pacing

Consistent Conversion Rates
All Patients



Source: Figure 7, page 52

CRAFT: Dosing was 2+3 mg/kg; data represents % converted at 60 min post last dose; AF duration 3-72 hours

ACT I, III & IV: AF <7 days

ACT II: Post CABG and valvular AF study; AF duration 3-72 hours

ACT IV: A placebo group was not included in the ACT IV study

* P=0.0015

** P≤0.0001

Serious Adverse Events
Hypotension and Bradycardia
0-24 Hours – All Patients

Hypotension

- 10 vernakalant patients (1.3%)
  - Onset during the first or second infusion or within 15 min of the end of the infusion; one case at 7 hours
- 2 placebo patients (0.6%)
  - 1 occurred after electrical cardioversion (atropine)

Bradycardia

- 13 vernakalant patients (1.7%)
  - Onset during the first or second infusion or within 10 minutes of the end of the infusion; 4/13 occurred around the time of conversion
- 2 placebo patients (0.6%)
  - 1 occurred after electrical cardioversion (atropine)

Guidelines for the management of atrial fibrillation

The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC)

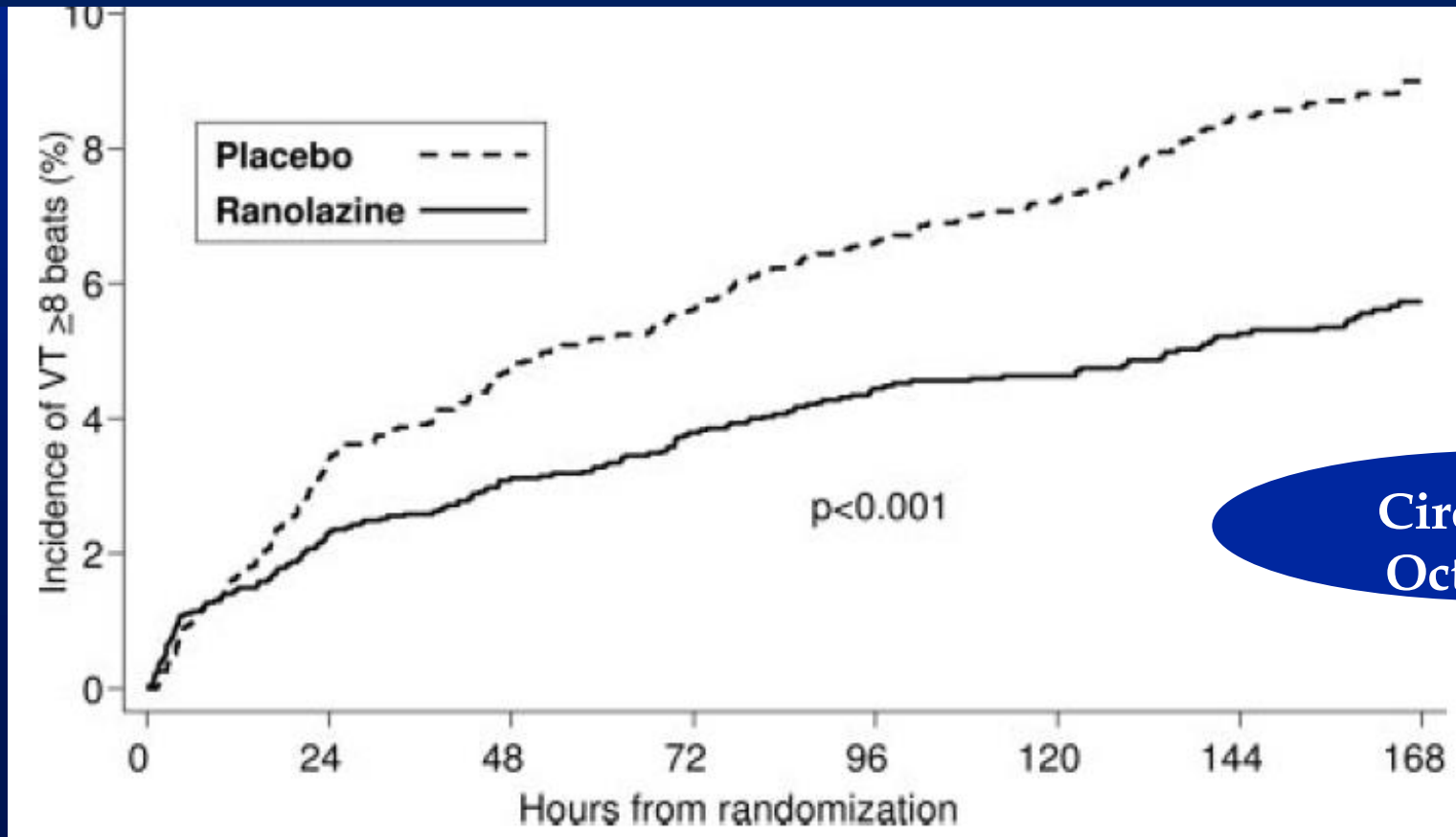
Table 12 Drugs and doses for pharmacological conversion of (recent-onset) AF

Drug	Dose	Follow-up dose	Risks
Amiodarone	5 mg/kg i.v. over 1 h	50 mg/h	Phlebitis, hypotension. Will slow the ventricular rate. Delayed AF conversion to sinus rhythm.
Flecainide	2 mg/kg i.v. over 10 min, or 200–300 mg p.o.	N/A	Not suitable for patients with marked structural heart disease; may prolong QRS duration, and hence the QT interval; and may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1:1 conduction to the ventricles.
Ibutilide	1 mg i.v. over 10 min	1 mg i.v. over 10 min after waiting for 10 min	Can cause prolongation of the QT interval and torsades de pointes; watch for abnormal T-U waves or QT prolongation. Will slow the ventricular rate.
Propafenone	2 mg/kg i.v. over 10 min, or 450–600 mg p.o.		Not suitable for patients with marked structural heart disease; may prolong QRS duration; will slightly slow the ventricular rate, but may inadvertently increase the ventricular rate due to conversion to atrial flutter and 1:1 conduction to the ventricles.
Vernakalant	3 mg/kg i.v. over 10 min	Second infusion of 2 mg/kg i.v. over 10 min after 15 min rest	So far only evaluated in clinical trials; recently approved. [68–70a]

Effect of Ranolazine, an Antianginal Agent With Novel Electrophysiological Properties, on the Incidence of Arrhythmias in Patients With Non–ST-Segment–Elevation Acute Coronary Syndrome

MERLIN-TIMI 36

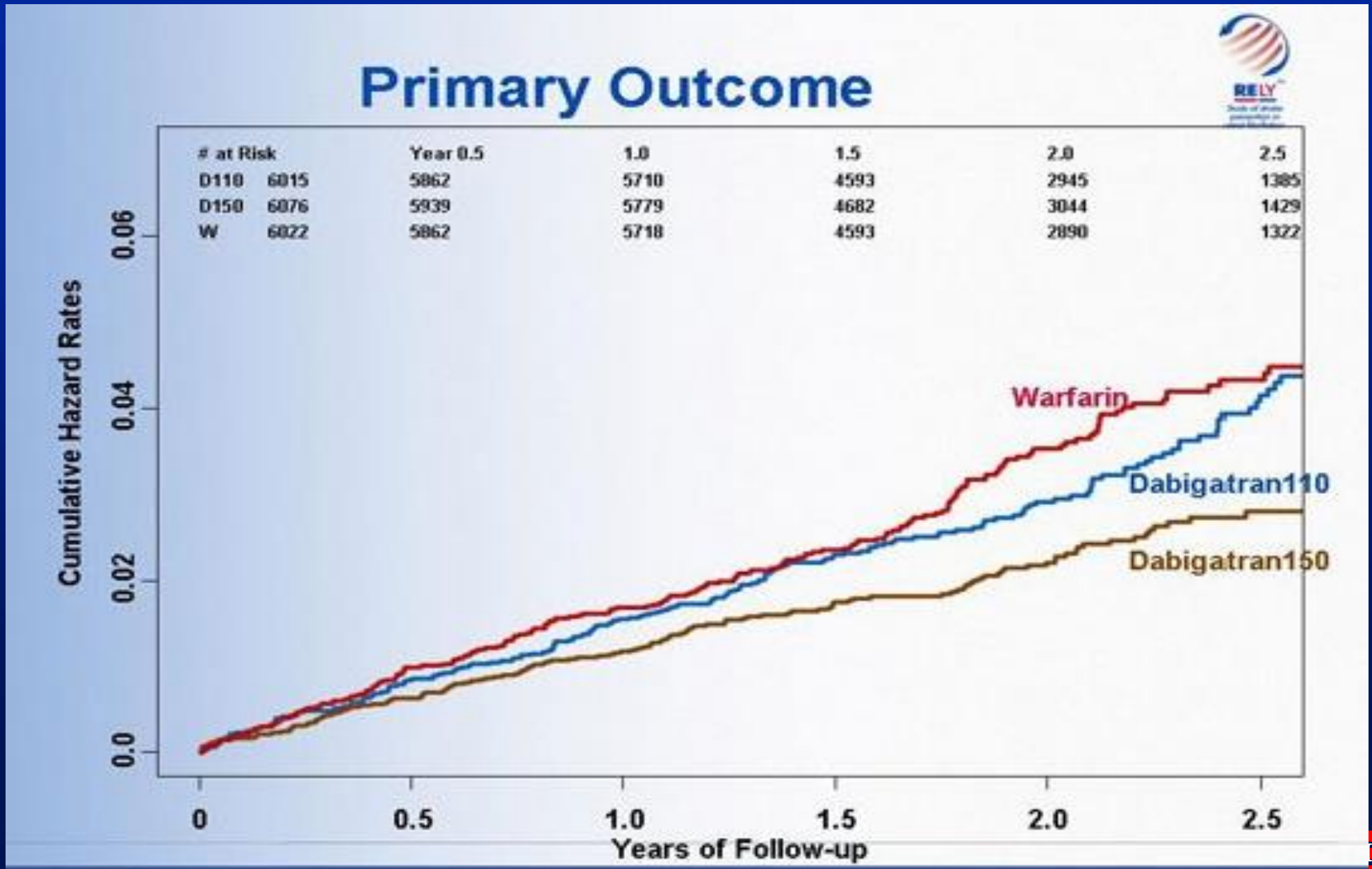
Estimated rates of the first occurrence of an episode of VT lasting at least 8 beats. The incidence of VT was significantly lower in pts treated with ranolazine vs placebo at 24 h after randomization (2.3% vs 3.4%; RR, 0.67; *P0.008) & 48 h (3.1% vs 4.7%; RR, 0.65; P0.001)*



Circulation
Oct 9, 2007

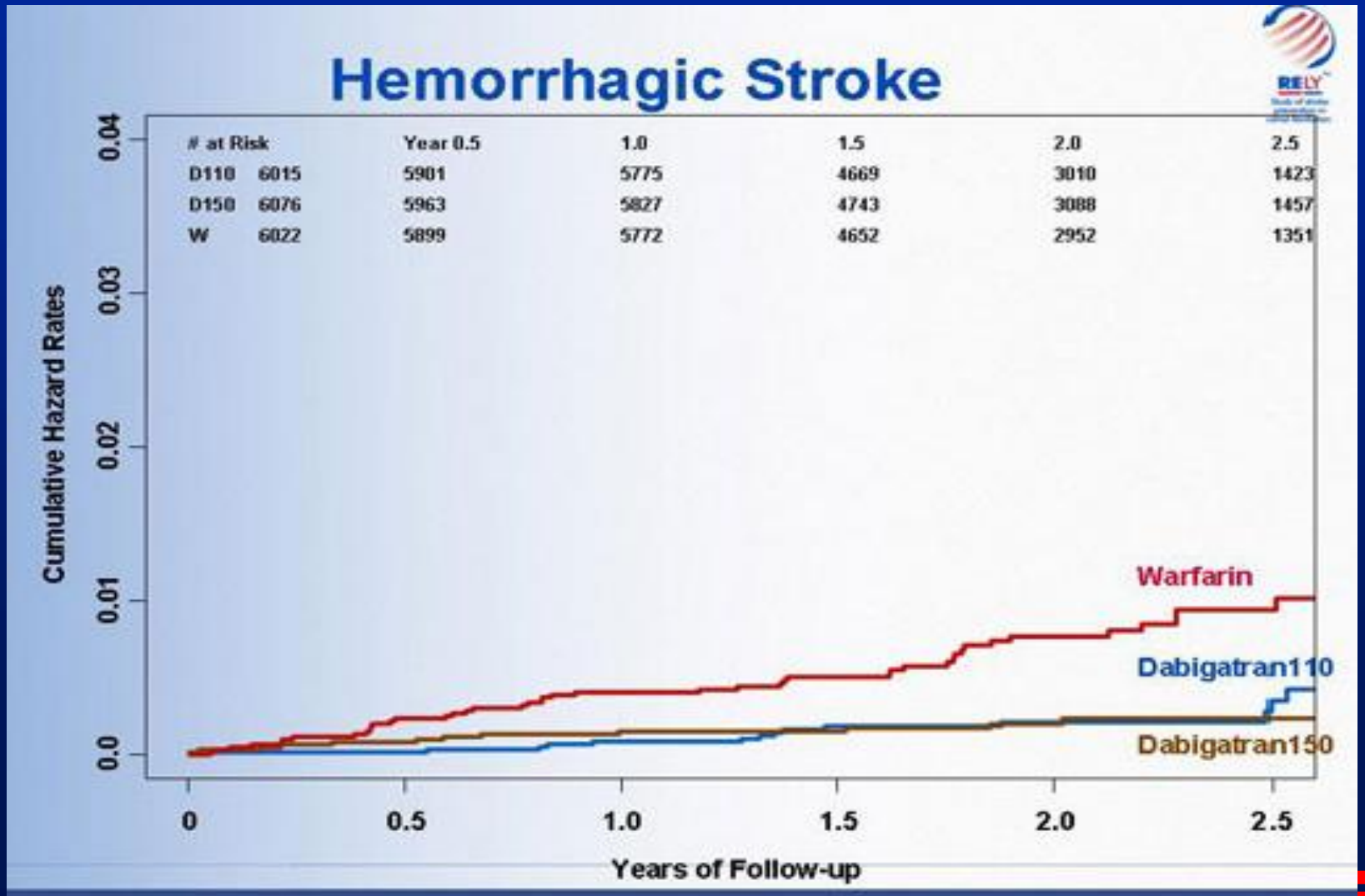
ΕΚΠΑ

RELY


Primary Outcome
at Risk
D110 6015 5862 5710 4593 2945 1385
D150 6076 5939 5779 4682 3044 1429
W 6022 5862 5718 4593 2890 1322
Year 0.5 1.0 1.5 2.0 2.5
Cumulative Hazard Rates
0.0
0.02
0.04
0.06
Warfarin
Dabigatran110
Dabigatran150
0
0.5
1.0
1.5
2.0
2.5
Years of Follow-up

ASM

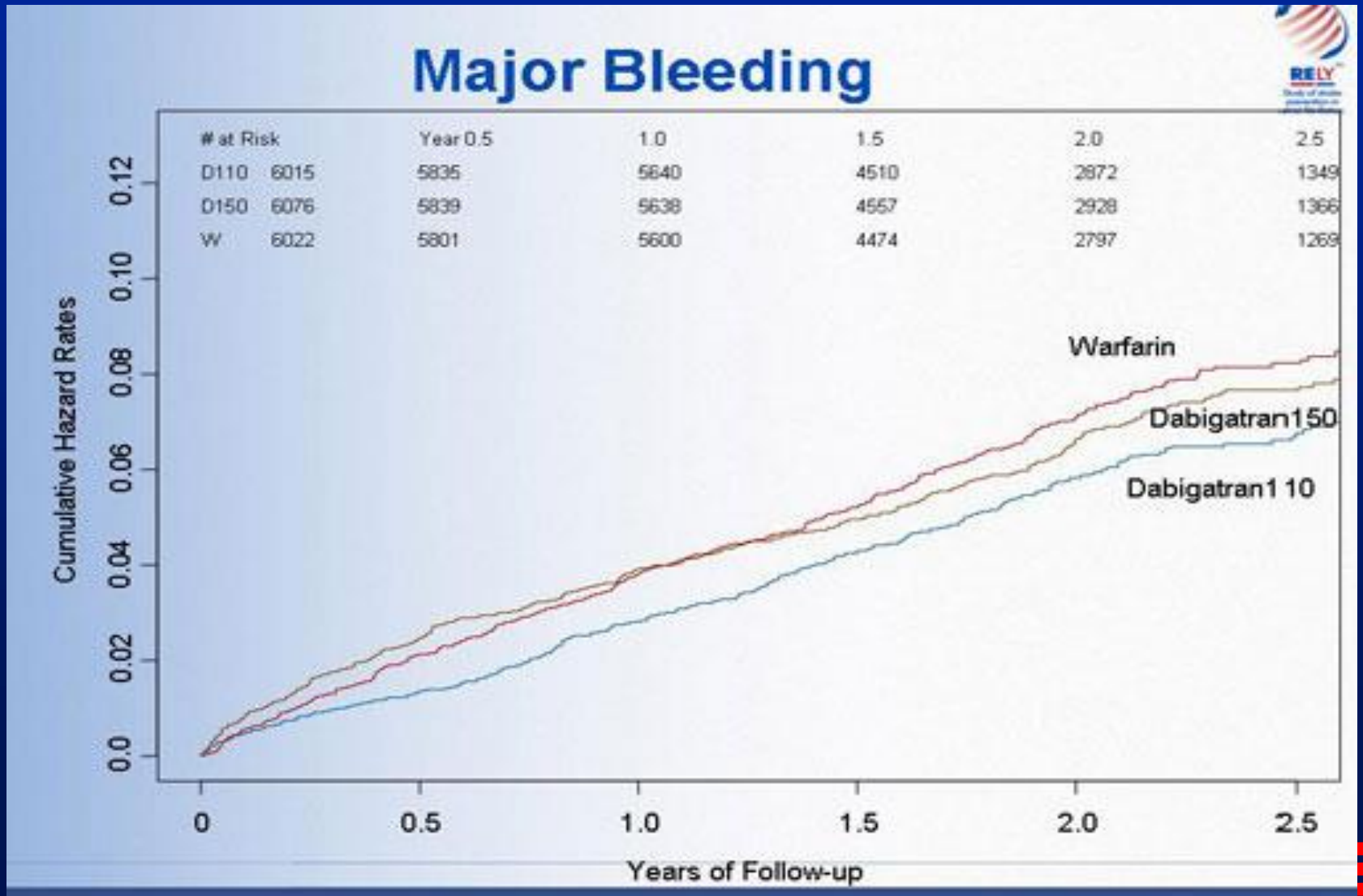
RELY



ΕΚΠΑ

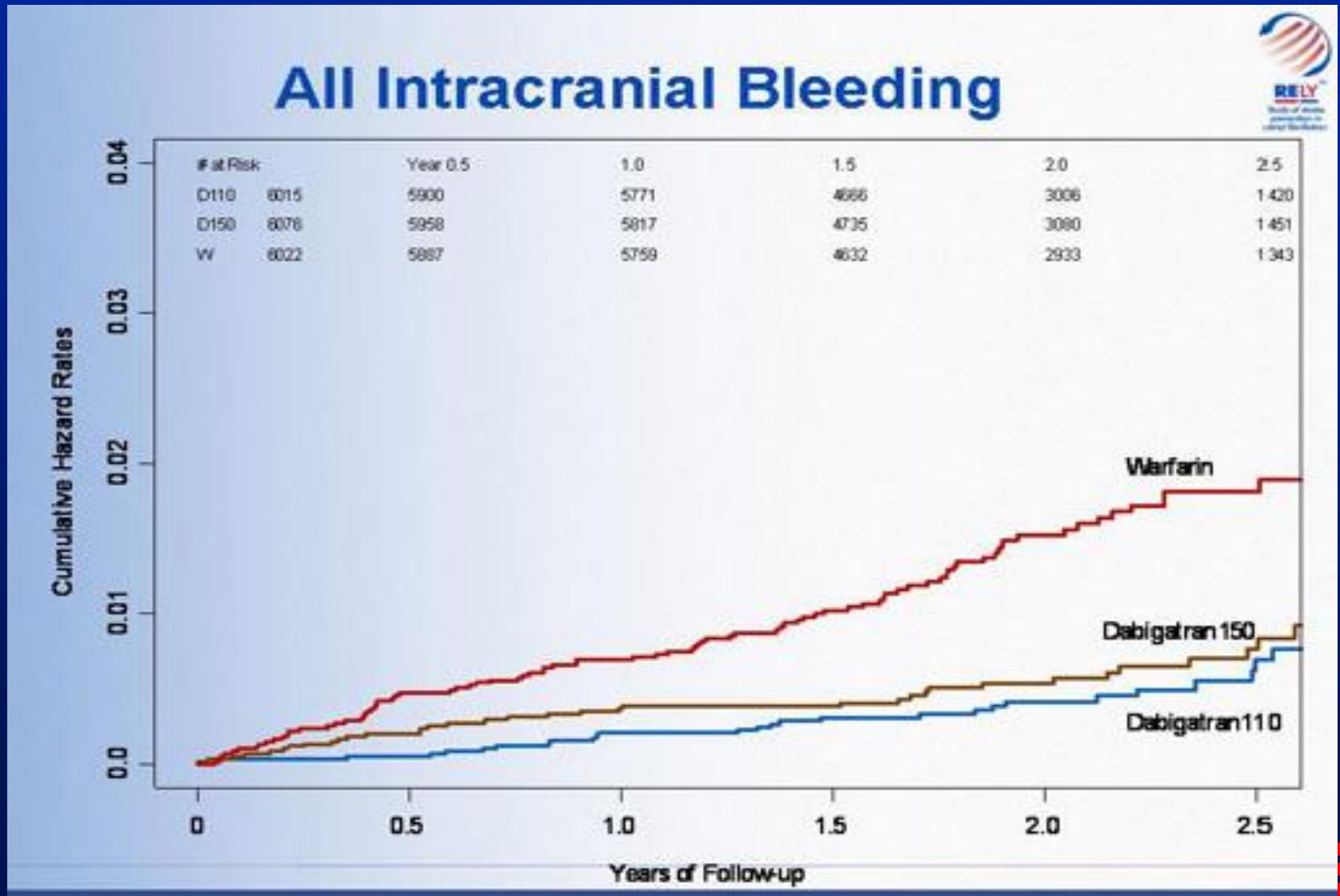
ASM

RELY

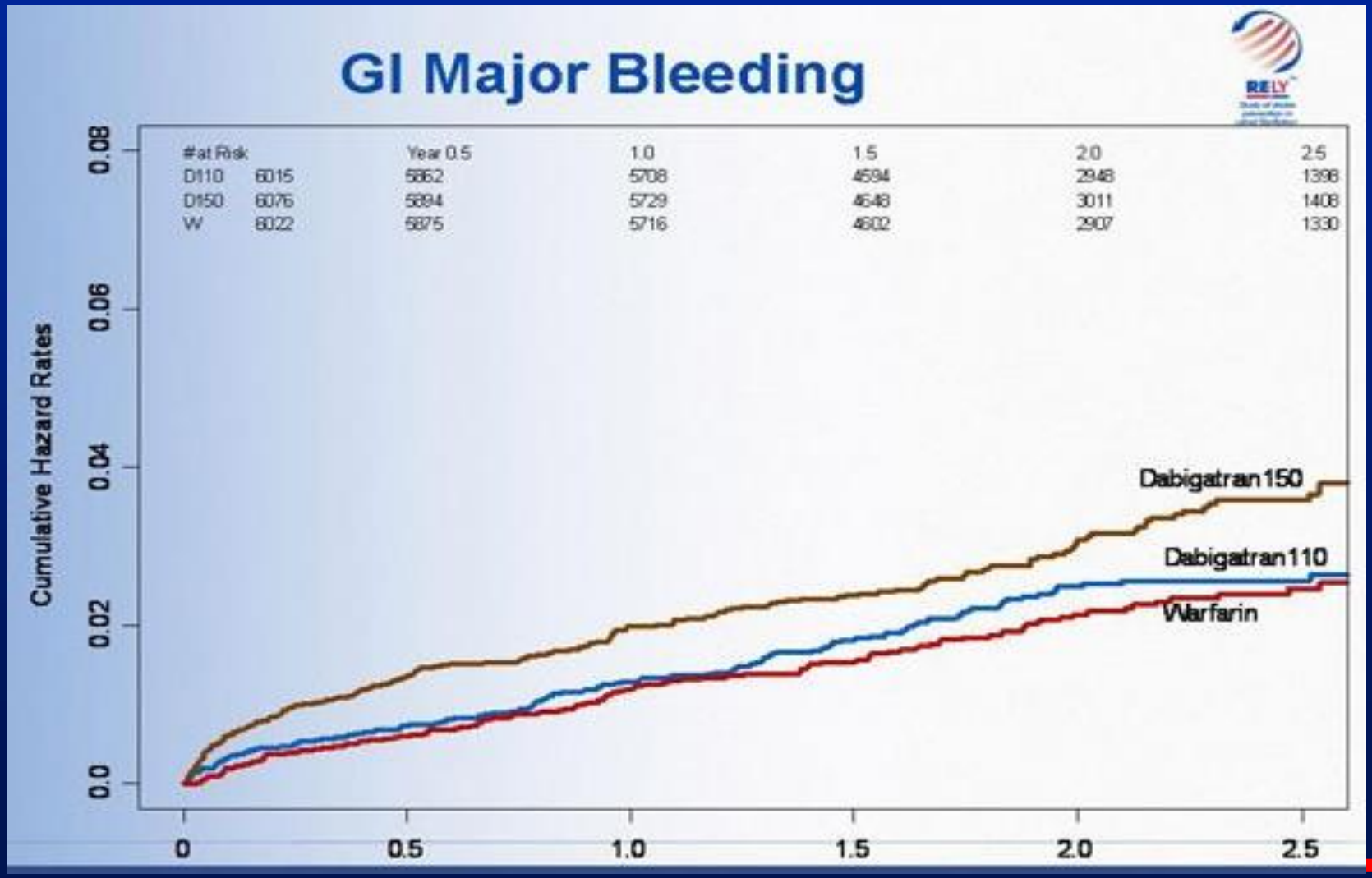


ΕΚΠΑ

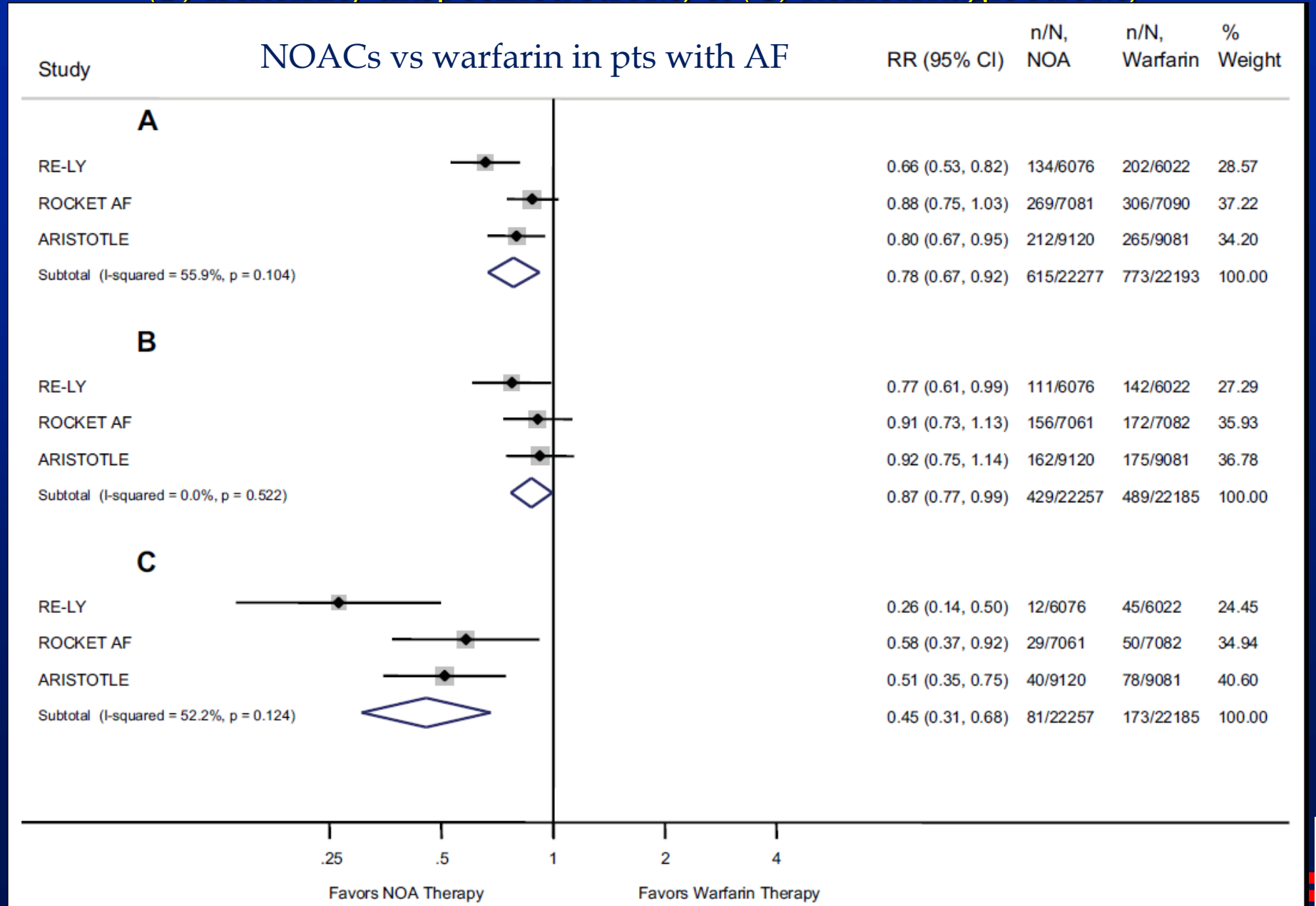
RELY


All Intracranial Bleeding
RELY
at Risk
D110 6015 5900 5771 4666 3006 1 420
D150 6076 5958 5817 4735 3080 1 451
W 6022 5887 5759 4632 2933 1 343
Year 0.5 1.0 1.5 2.0 2.5
Cumulative Hazard Rates
0.0
0.01
0.02
0.03
0.04
Warfarin
Dabigatran 150
Dabigatran 110
0
0.5
1.0
1.5
2.0
2.5
Years of Follow-up

RELY


GI Major Bleeding
#at Risk
D110 6015
D150 6076
W 6022
Year 0.5 1.0 1.5 2.0 2.5
5862 5708 4594 2948 1398
5894 5729 4648 3011 1408
5875 5716 4602 2907 1330
Cumulative Hazard Rates
0.0 0.02 0.04 0.06 0.08
0 0.5 1.0 1.5 2.0 2.5
Dabigatran 150
Dabigatran 110
Warfarin

NOACs: (A) all-cause stroke/systemic embolism, (B) ischemic/unspecified stroke, & (C) hemorrhagic stroke,



Anticoagulation - General

Recommendations for prevention of thromboembolism in non-valvular AF - general		
Recommendations	**Class**	**Level**
Antithrombotic therapy to prevent thromboembolism is recommended for all patients with AF, except in those patients (both male and female) who are at low risk (aged <65 years and lone AF), or with contraindications.	I	A
The choice of antithrombotic therapy should be based upon the absolute risks of stroke/thromboembolism and bleeding and the net clinical benefit for a given patient.	I	A
The CHA_2DS_2-VASc score is recommended as a means of assessing stroke risk in non-valvular AF.	I	A
Female patients who are aged <65 and have lone AF (but still have a CHA_2DS_2-VASc score of 1 by virtue of their gender) are low risk and no antithrombotic therapy should be considered.	IIa	B

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

Anticoagulation – General (Cont..)

Recommendations	Class	Level
In patients with a CHA_2DS_2-VASc score of 0 (i.e., aged <65 years with lone AF) who are at low risk, with none of the risk factors, no antithrombotic therapy is recommended.	I	B
In patients with a CHA_2DS_2-VASc score ≥2, OAC therapy with: • adjusted-dose VKA (INR 2–3); or • a direct thrombin inhibitor (dabigatran); or • an oral factor Xa inhibitor (e.g., rivaroxaban, apixaban)[d] …. is recommended, unless contraindicated.	I	A
In patients with a CHA_2DS_2-VASc score of 1, OAC therapy with: • adjusted-dose VKA (INR 2–3); or • a direct thrombin inhibitor (dabigatran); or • an oral factor Xa inhibitor (e.g., rivaroxaban, apixaban)[d] …. should be considered, based upon an assessment of the risk of bleeding complications and patient preferences.	IIa	A

[d] = pending EMA/FDA approval – prescribing information is awaited

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

Anticoagulation - General

Recommendations for prevention of thromboembolism in non-valvular AF - general		
Recommendations	**Class**	**Level**
When patients refuse the use of any OAC (whether VKAs or NOACs), antiplatelet therapy should be considered, using combination therapy with aspirin 75–100 mg plus clopidogrel 75 mg daily (where there is a low risk of bleeding) or – less effectively – aspirin 75–325 mg daily.	IIa	B

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

Anticoagulation - NOACs

Recommendations for prevention of thromboembolism in non-valvular AF - NOACs		
Recommendations	**Class**	**Level**
When adjusted-dose VKA (INR 2–3) cannot be used in a patient with AF where an OAC is recommended, due to difficulties in keeping within therapeutic anticoagulation, experiencing side effects of VKAs, or inability to attend or undertake INR monitoring, one of the NOACs, either: • a direct thrombin inhibitor (dabigatran); or • an oral factor Xa inhibitor (e.g., rivaroxaban, apixaban)[d] … is recommended	I	B
Where OAC is recommended, one of the NOACs, either: • a direct thrombin inhibitor (dabigatran); or • an oral factor Xa inhibitor (e.g., rivaroxaban, apixaban)[d] … should be considered rather than adjusted-dose VKA (INR 2–3) for most patients with non-valvular AF, based on their net clinical benefit.	IIa	A

[d]Apixaban (pending approval EMA and FDA approval): prescribing information is awaited.

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

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Recommendations	Class	Level
Where dabigatran is prescribed, a dose of 150 mg b.i.d. should be considered for most patients in preference to 110 mg b.i.d., with the latter dose recommended in: • elderly patients, age ≥ 80 • concomitant use of interacting drugs (e.g. verapamil) • high bleeding risk (HAS-BLED score ≥3) • moderate renal impairment (CrCl 30–49 mL/min).	IIa	B
Where rivaroxaban is being considered, a dose of 20 mg o.d. should be considered for most patients in preference to 15 mg o.d., with the latter dose recommended in: • high bleeding risk (HAS-BLED score ≥3) • moderate renal impairment (CrCl 30–49 mL/min).	IIa	C
Baseline and subsequent regular assessment of renal function (by CrCl) is recommended in patients following initiation of any NOAC, which should be done annually but more frequently in those with moderate renal impairment where CrCl should be assessed 2–3 times per year.	IIa	B
NOACs (dabigatran, rivaroxaban, and apixaban) are not recommended in patients with severe renal impairment (CrCl <30 mL/min).	III	A

European Heart Journal 2012;33:2719-2747 -
doi:10.1093/eurheartj/ehs253

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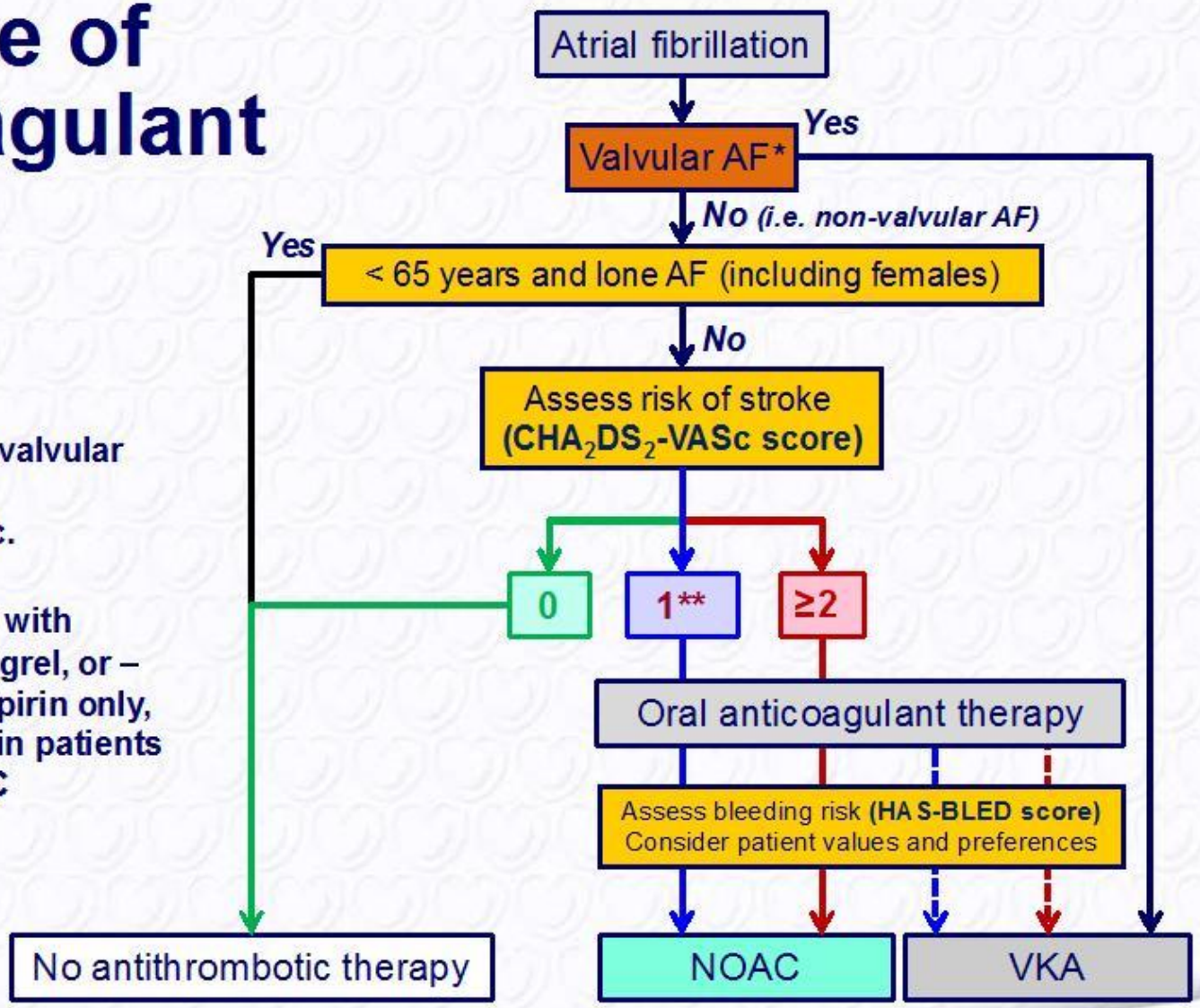
Anticoagulation – Peri-cardioversion

Recommendations for prevention of thromboembolism in non-valvular AF – peri-cardioversion		
Recommendations	**Class**	**Level**
For patients with AF of ≥48 h duration, or when the duration of AF is unknown, OAC therapy (e.g. VKA with INR 2-3 or dabigatran) is recommended for ≥3 weeks prior to and for ≥4 weeks after cardioversion, regardless of the method (electrical or oral/i.v. pharmacological).	I	B
In patients with risk factors for stroke or AF recurrence, OAC therapy, whether with dose-adjusted VKA (INR 2-3) or a NOAC, should be continued lifelong irrespective of the apparent maintenance of sinus rhythm following cardioversion.	I	B

www.escardio.org/guidelines

European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

Choice of Anti-coagulant



- Includes rheumatic valvular AF, hypertrophic cardiomyopathy, etc.

** Antiplatelet therapy with aspirin plus clopidogrel, or – less effectively – aspirin only, may be considered in patients who refuse any OAC

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European Heart Journal 2012;33:2719-2747 - doi:10.1093/eurheartj/ehs253

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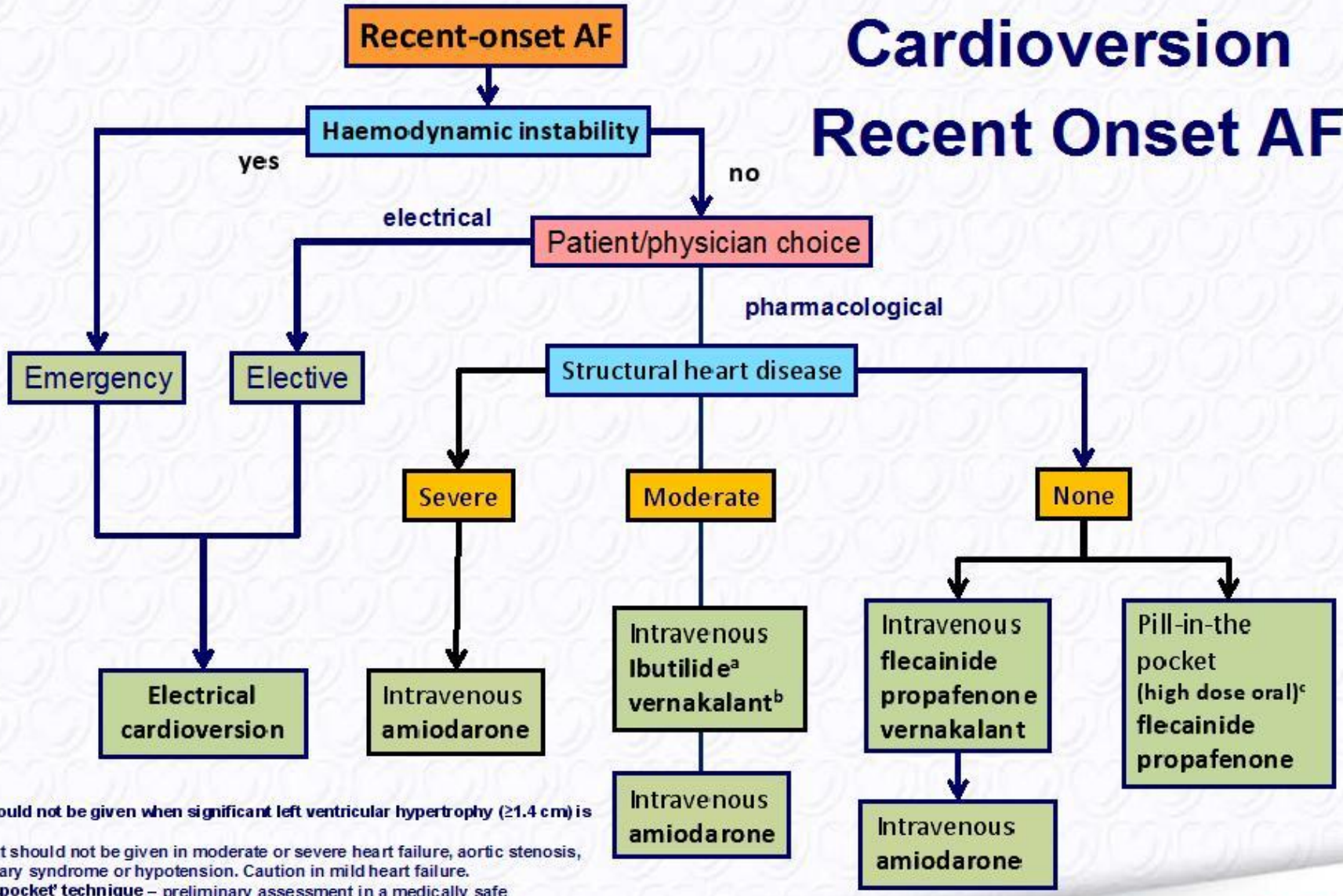
Cardioversion Recent Onset AF



[a]Ibutilide should not be given when significant left ventricular hypertrophy (≥1.4 cm) is present.
[b]Vernakalant should not be given in moderate or severe heart failure, aortic stenosis, acute coronary syndrome or hypotension. Caution in mild heart failure.
[c]'Pill-in-the-pocket' technique – preliminary assessment in a medically safe environment and then used by the patient in the ambulatory setting.

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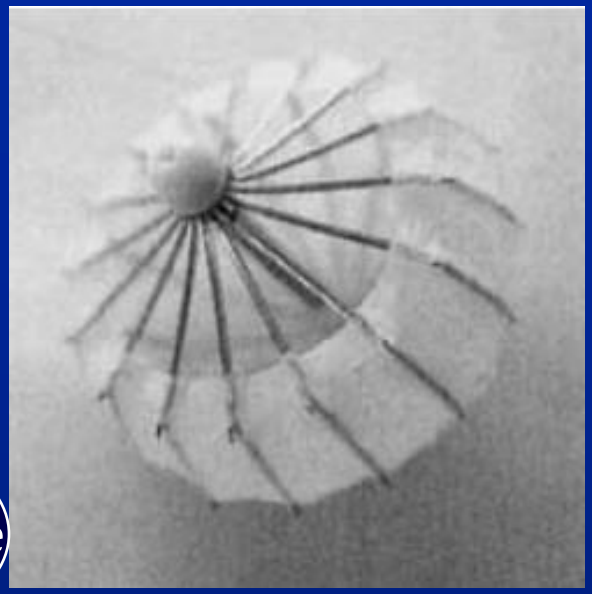
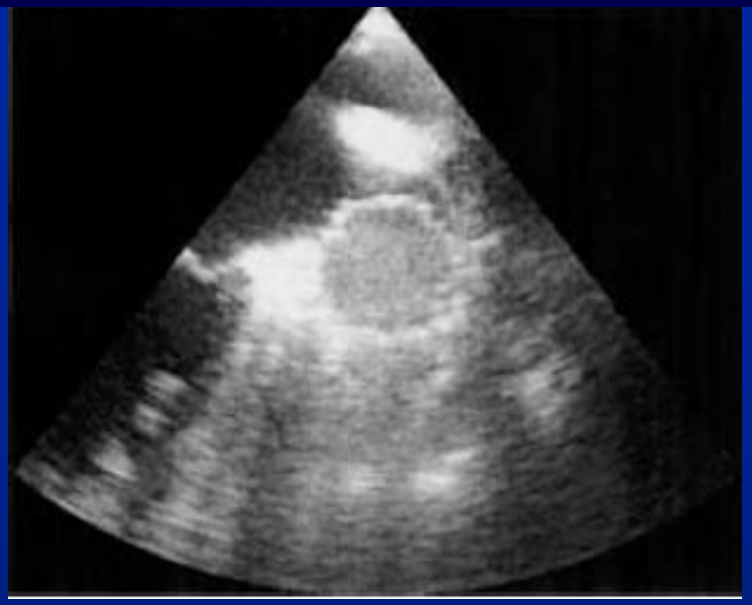
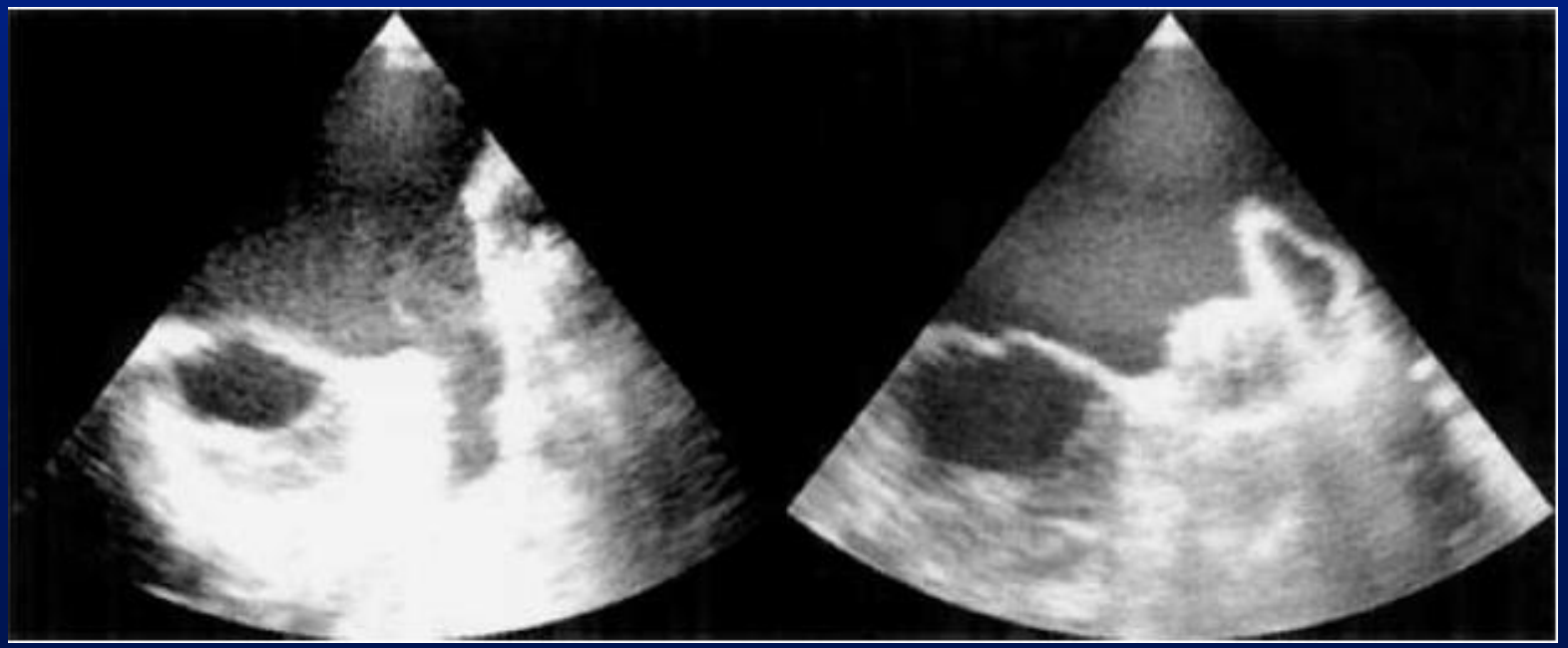
Mechanical Occlusion of the Left Atrial Appendage

ASM

PLAATO device



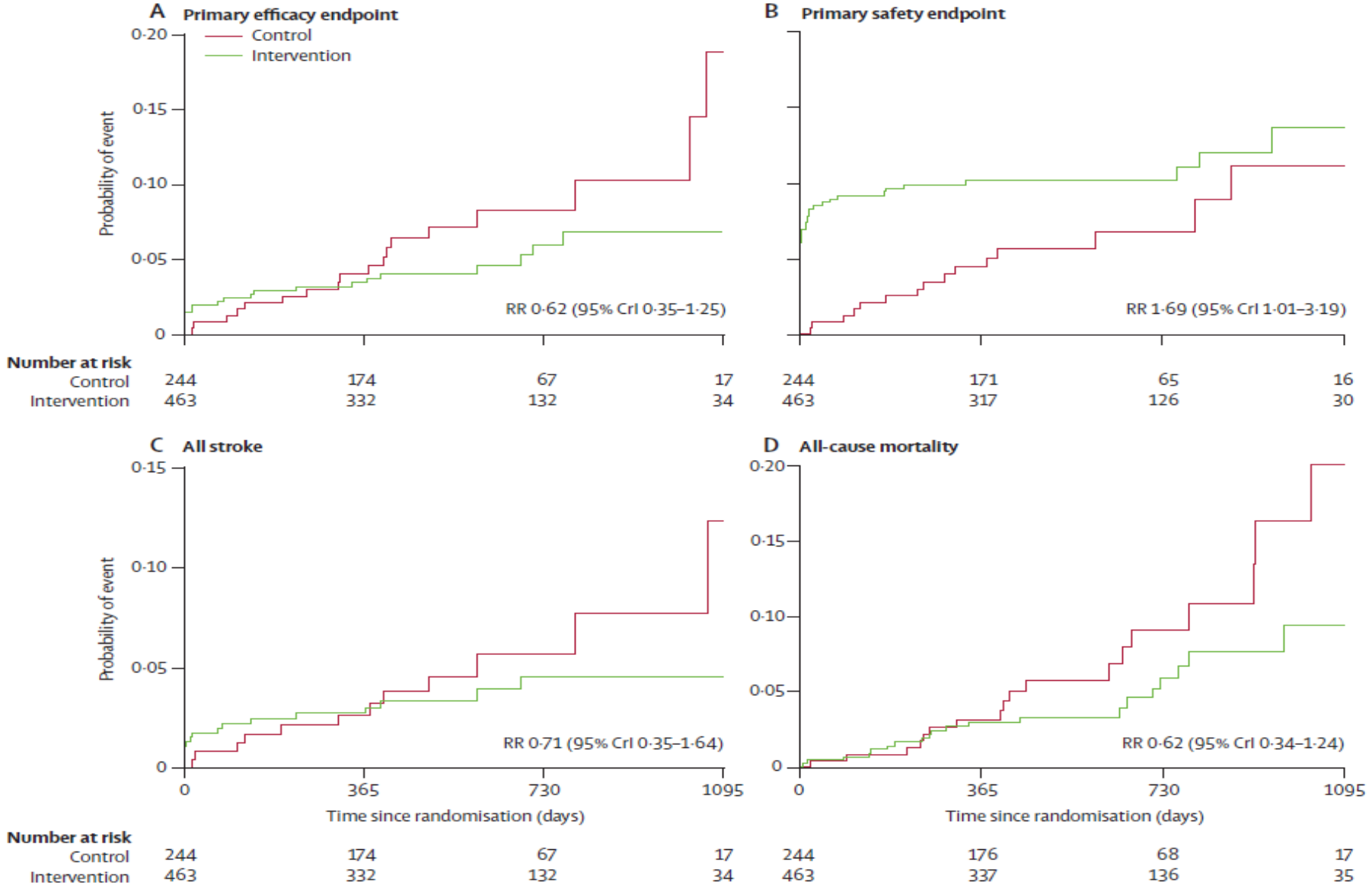




ΕΚΠΑ

PROTECT AF
Watchman

	Intervention group (n=463)	Control group (n=244)
Characteristics		
Age (years)	71·7(8·8;46·0–95·0)	72·7(9·2;41·0–95·0)
Male	326 (70·4%)	171 (70·1%)



LAA Closure/Occlusion/Excision

Recommendations for LAA closure/occlusion/excision		
Recommendations	**Class**	**Level**
Interventional, percutaneous LAA closure may be considered in patients with a high stroke risk and contraindications for long-term oral anticoagulation.	IIb	B
Surgical excision of the LAA may be considered in patients undergoing open heart surgery.	IIb	C

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Left Atrial Ablation

Recommendations for left atrial ablation		
Recommendations	**Class**	**Level**
Catheter ablation of symptomatic paroxysmal AF is recommended in patients who have symptomatic recurrences of AF on antiarrhythmic drug therapy (amiodarone, dronedarone, flecainide, propafenone, sotalol) and who prefer further rhythm control therapy, when performed by an electrophysiologist who has received appropriate training and is performing the procedure in an experienced centre.	I	A
Catheter ablation of AF should be considered as first-line therapy in selected patients with symptomatic, paroxysmal AF as an alternative to antiarrhythmic drug therapy, considering patient choice, benefit, and risk.	IIa	B

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Left Atrial Ablation

Recommendations	Class	Level
Catheter ablation of AF should target isolation of the pulmonary veins.	IIa	A
When catheter ablation of AF is planned, continuation of oral anticoagulation with a VKA should be considered during the procedure, maintaining an INR close to 2.0.	IIa	B
When AF recurs within the first 6 weeks after catheter ablation, a watch-and-wait rhythm control therapy should be considered.	IIa	B

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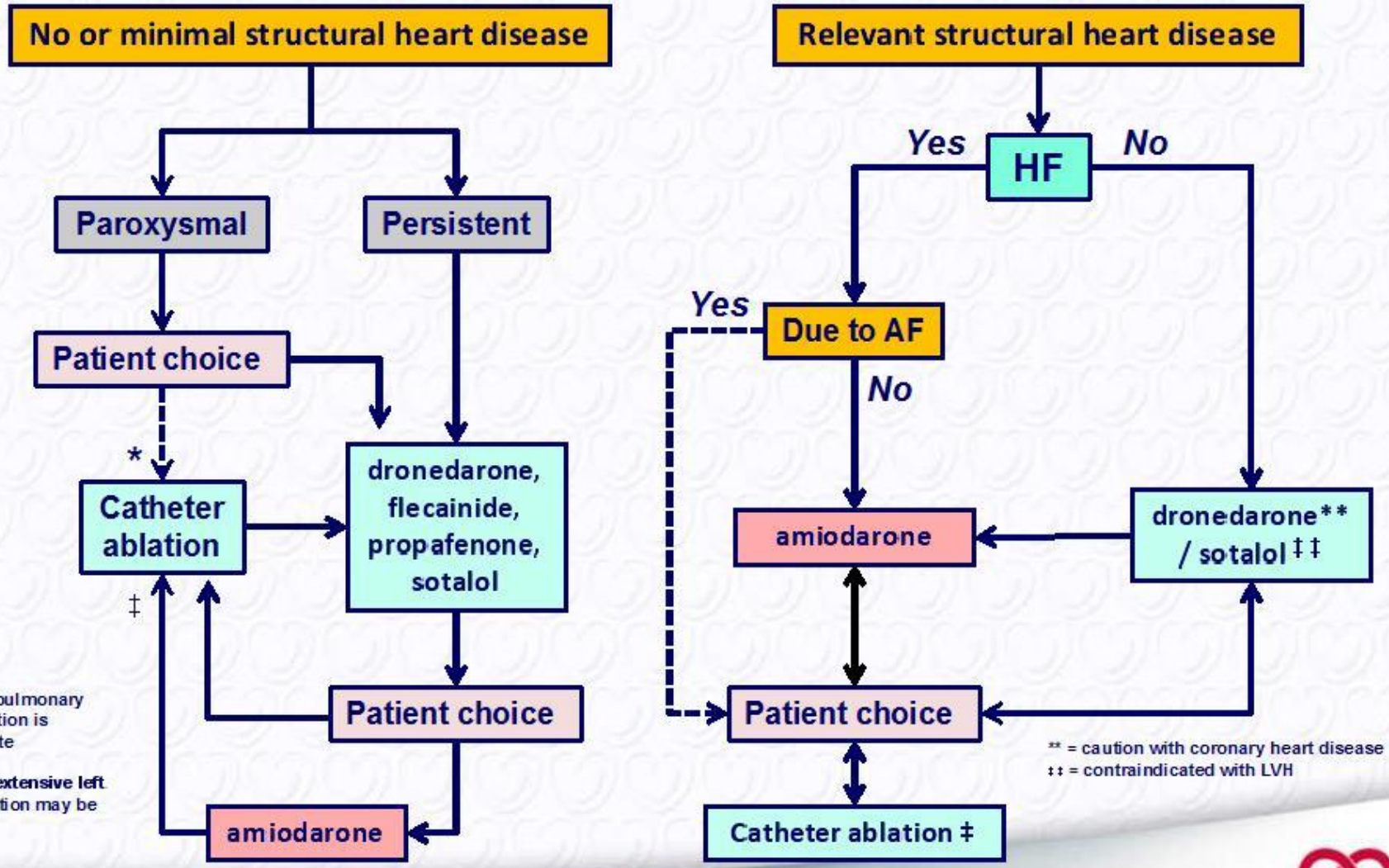
Left Atrial Ablation (and AAD)



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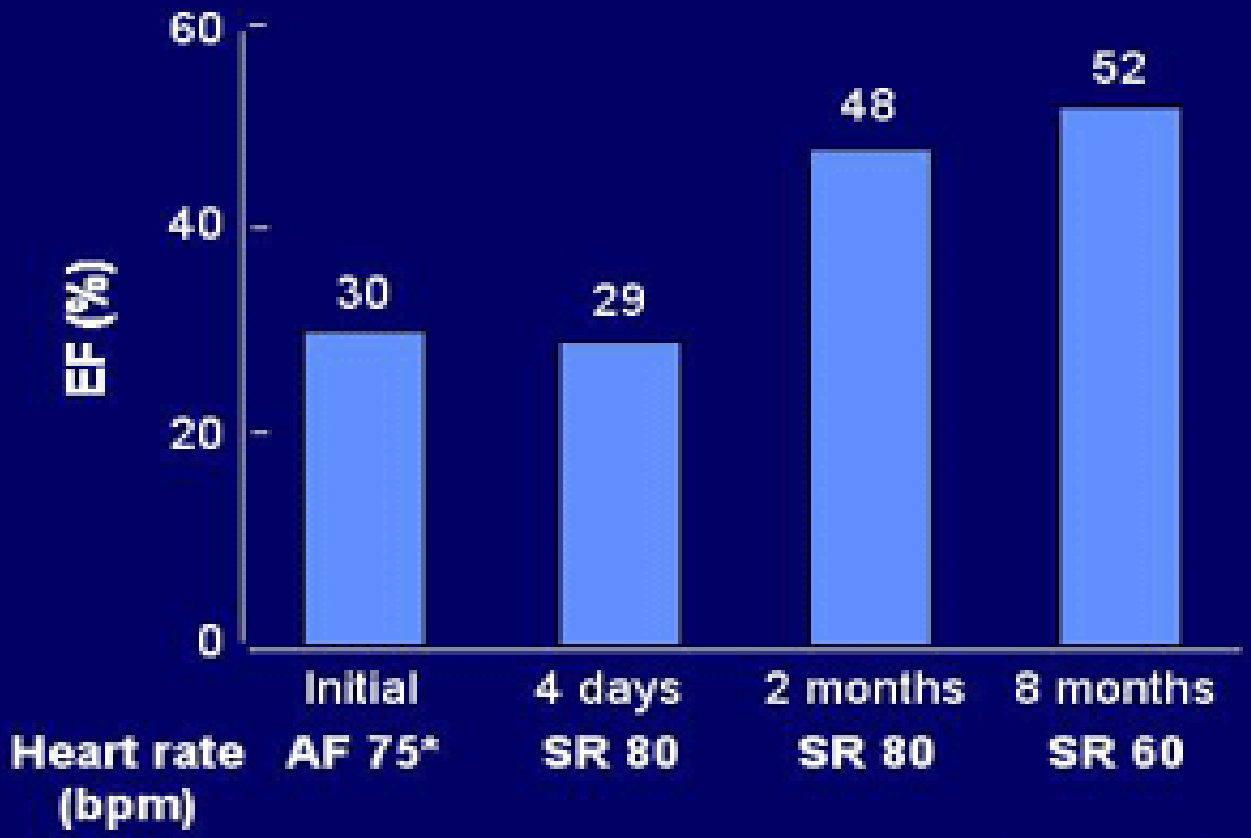
Case Study



Improved EF of 36-year-old male who presented with AF (HR 140 bpm) 1 week prior to initial echo

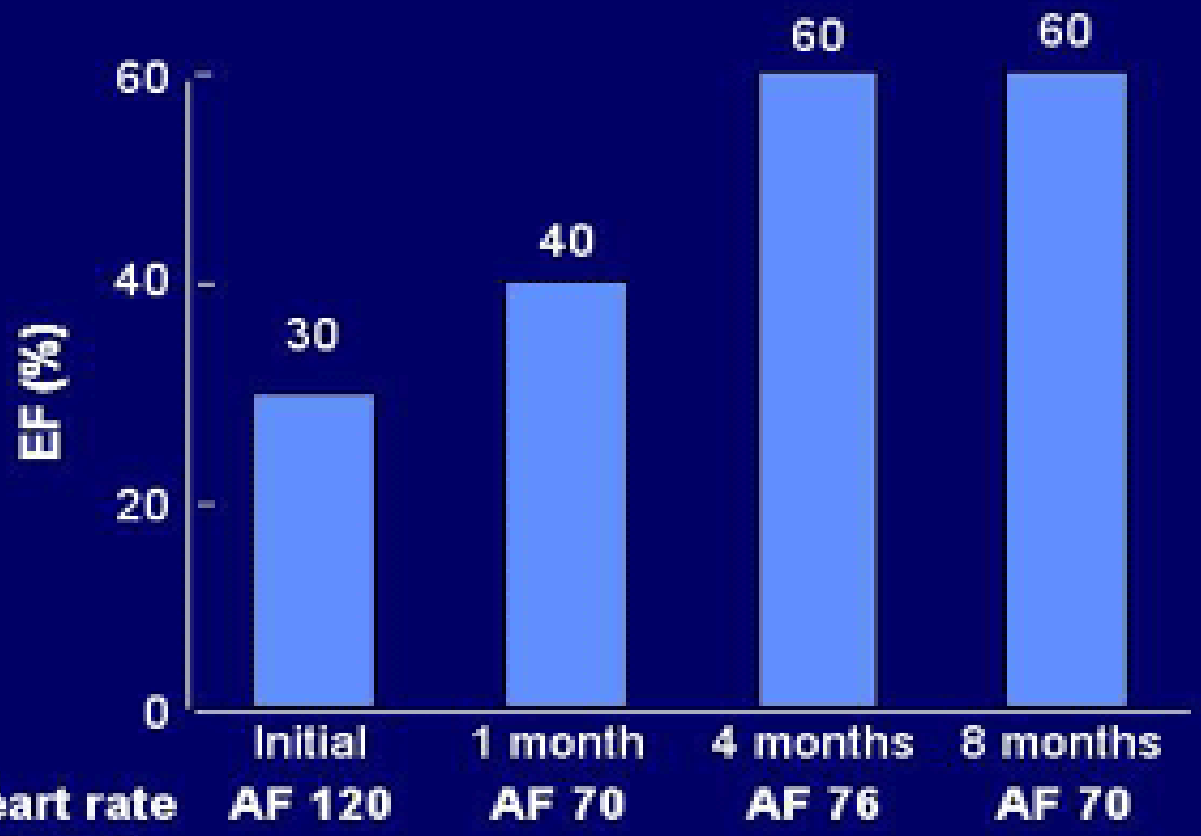
* Heart rate 140 one week earlier

Primary Rx: DC cardioversion

Other Rx: digoxin and quinidine

Grogan M. Am J Cardiol. 1992;69:1570-1573.

Case Study

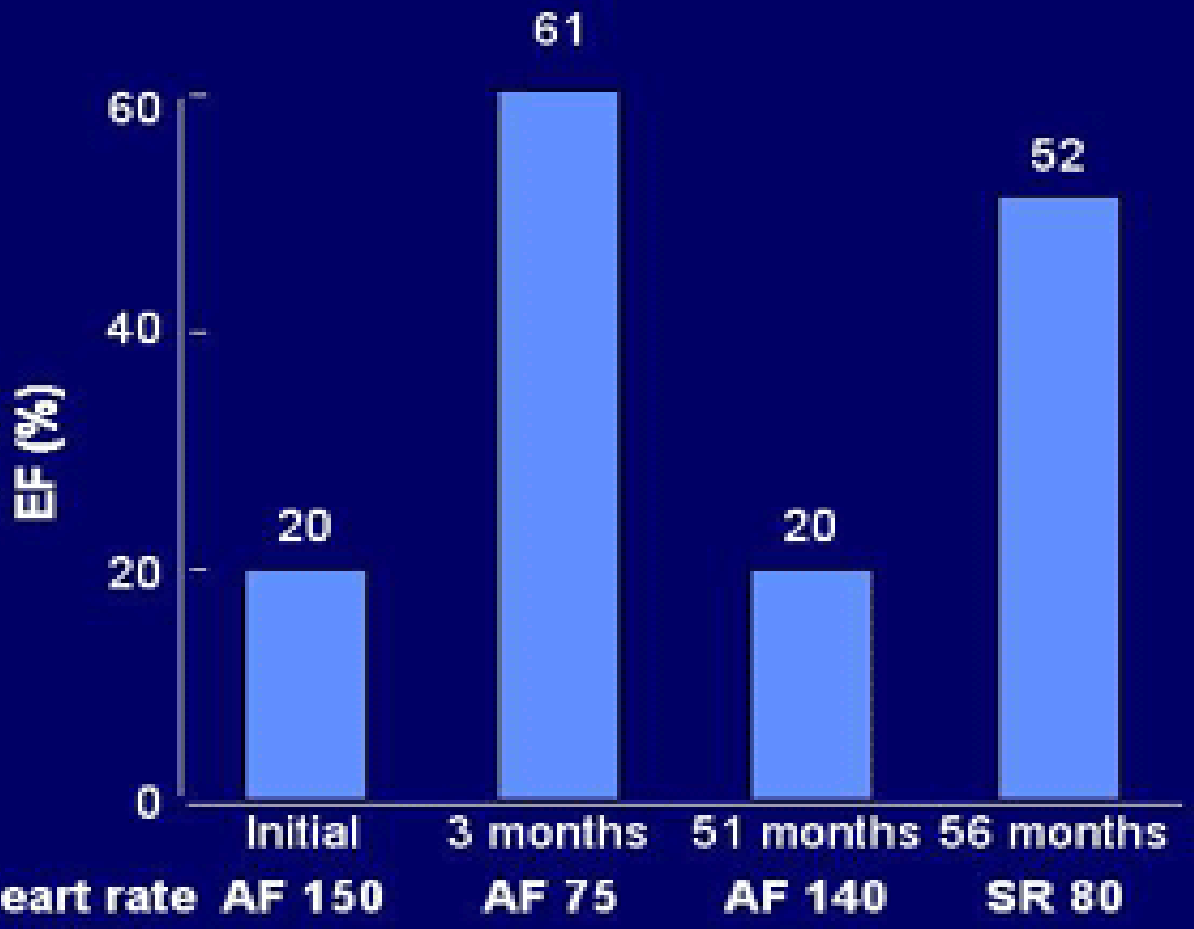


Improved EF in 80-year-old female with chronic AF but with improved rate control

Primary Rx: digoxin and propranolol

Grogan M. Am J Cardiol. 1992;69:1570-1573.

Case Study



Markedly improved EF in 55-year-old female with both rate control & NSR, with reversion to AF (HR 140 bpm) and subsequent decrease in EF

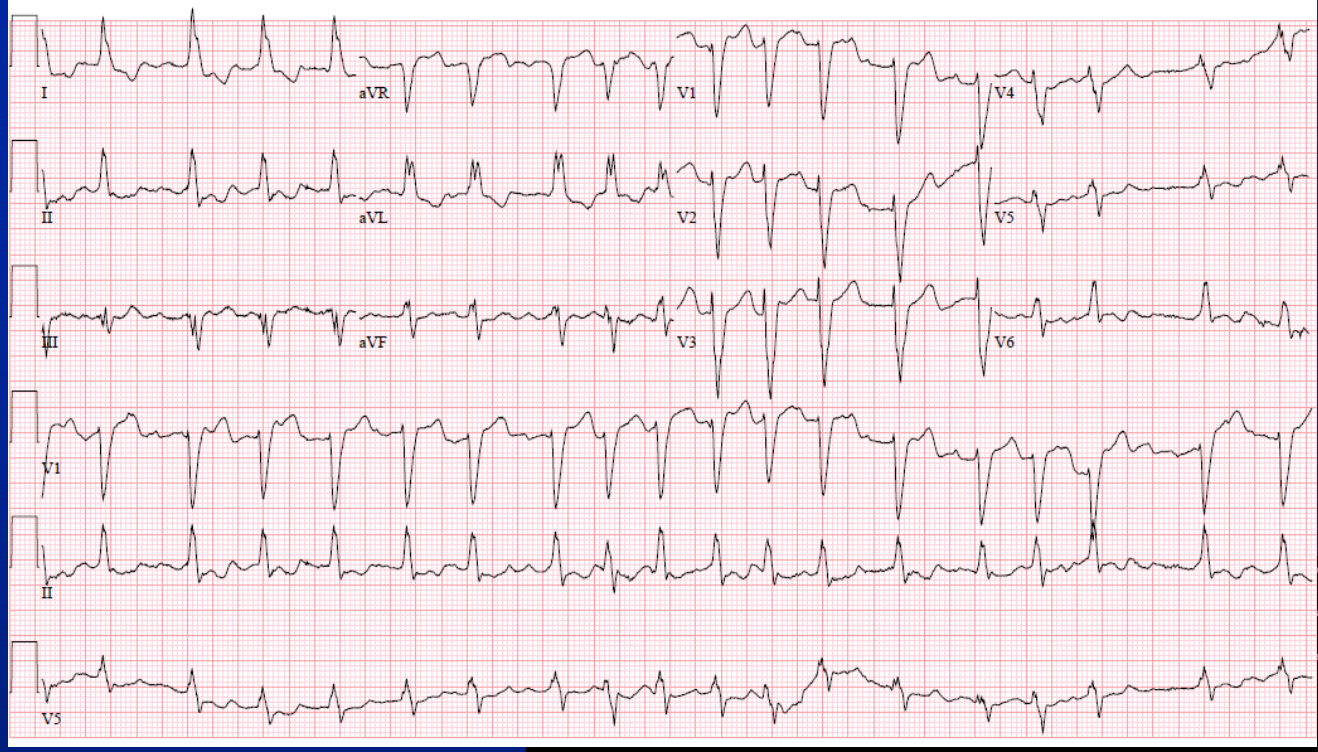
Primary Rx: amiodarone

Other Rx: digoxin and lisinopril

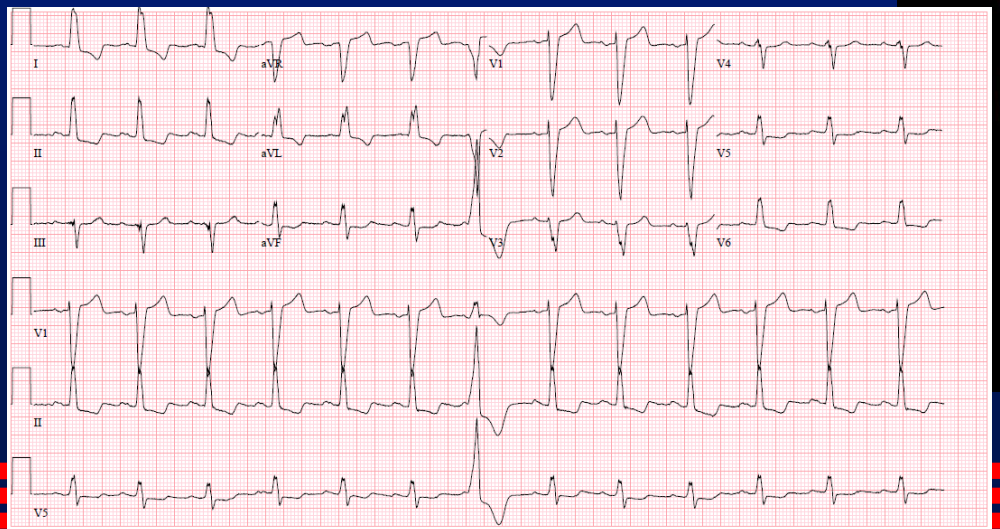
Grogan M. Am J Cardiol. 1992;69:1570-1573.

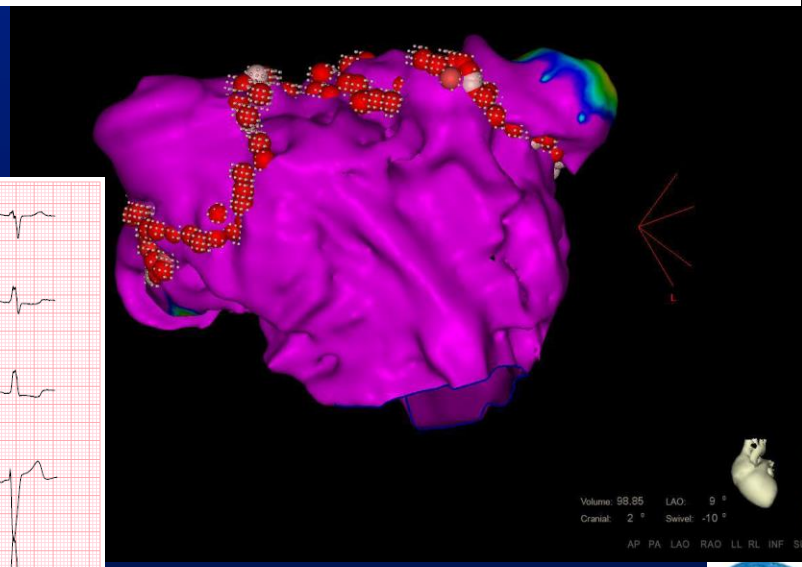
Case Study

- 62 year old female, LBBB
- 2012:presented c 3 w of "bronchitis"
- AF with RVR / • Echo: EF 15%
- 4 kg diuresis / • Cardioverted



- Maintained in SR on sotalol
- Repeat echo: EF 60%
- But: increasing breakthrough AF on sotalol
- Presented for ablation / •In AF for 4 days
- TEE: EF 40%





- AF->AT->SR
- 1 year: no AF
- Off AADs
- EF 60%

ASM

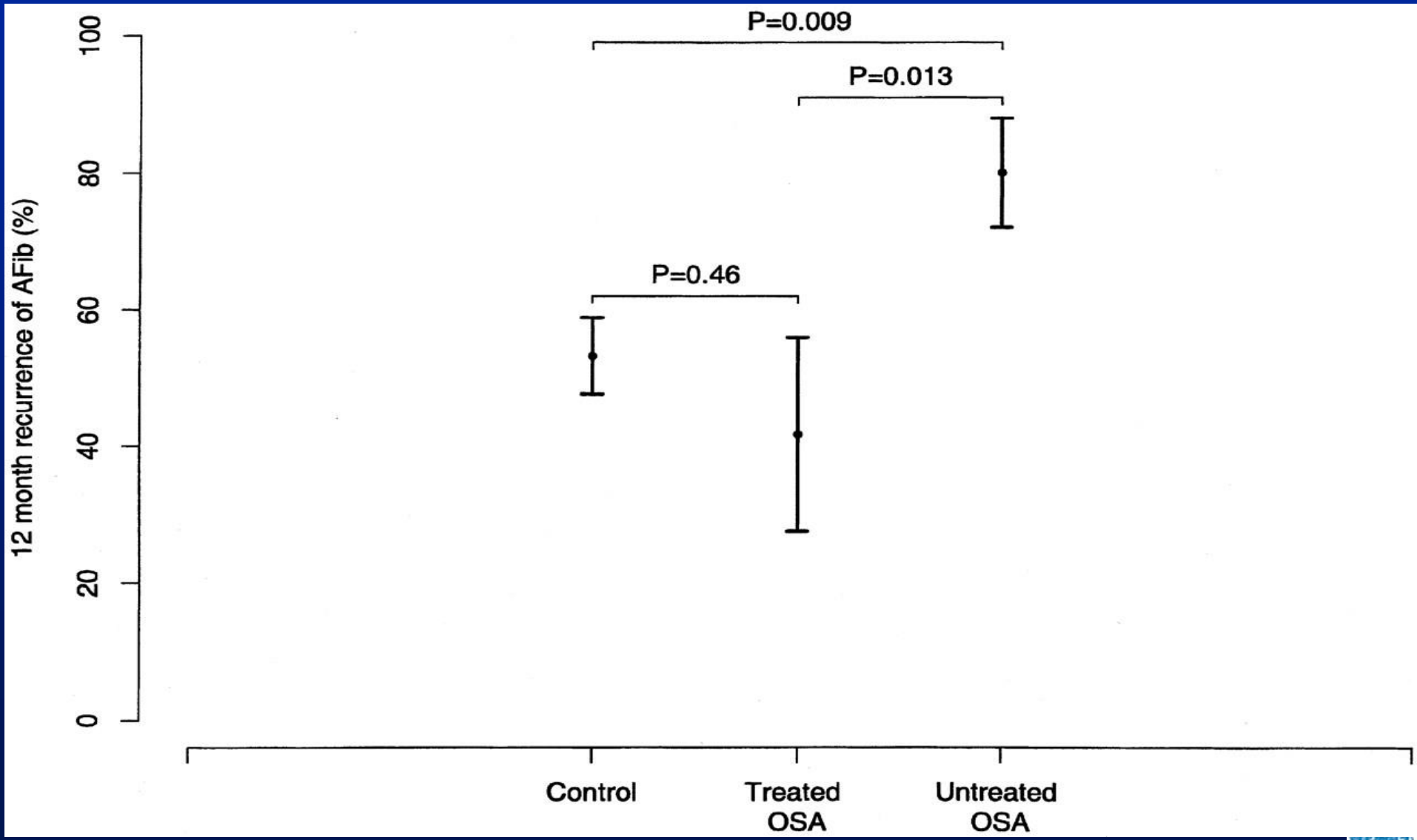
AF & Statins

Young-Xu Y, Blatt CM, Bedell S, et al. Statins reduce the incidence of atrial fibrillation in patients with coronary artery disease (abstr). *J Am Coll Cardiol* 2003;41:301A.

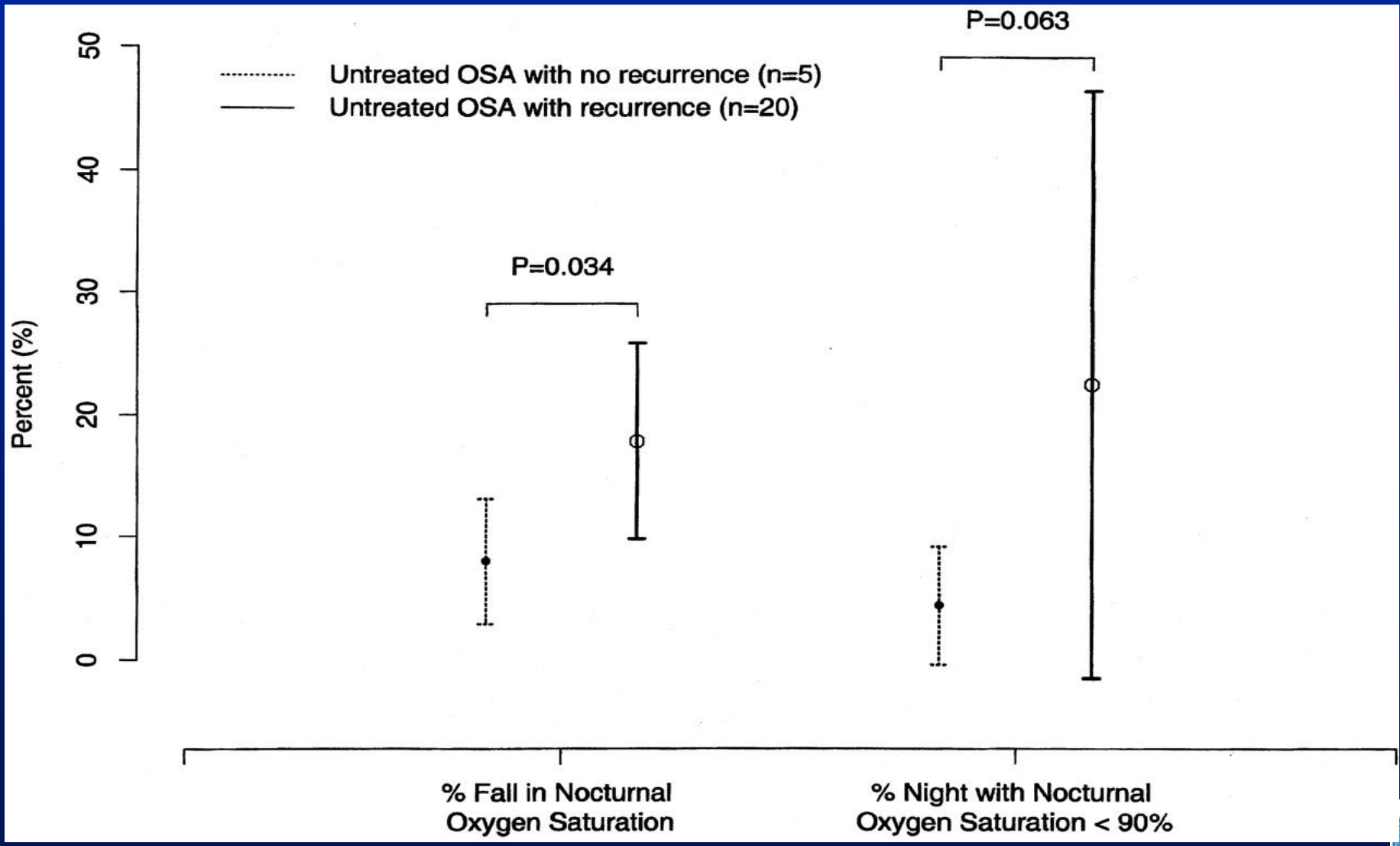
Tveit A, Grundtvig M, MD, Gundersen T, et al. Analysis of *Pravastatin* to Prevent Recurrence of Atrial Fibrillation After Electrical Cardioversion.
Am J Cardiol 2004;93:780–782

ΕΚΠΑ

Sleep Apnea & AF



Sleep Apnea & AF



Post-operative AF

- Incidence: 10-65%
- Meta-analysis of 24 trials (1991): 26.7%
- (HTx <) CABG (→40%) < valve surg (→ 60%) < CABG + valve
- highest: p-op days 2-3
- ↑ 30-day and 6-month mortality
- ↑ morbidity (e.g. p-op CVA), ↑ hosp stay
- ↑ cost (~10 000 $/pt)

Post-operative AF: Prophylaxis

- **Pre-op β-blockers**, meta-analysis on 24 trials / pts with EF≥30%) [no bronchospasm, type 1 DM, AVB/SSS
- demonstrated that therapy with a b-adrenergic blocker decreased the incidence of post-CABG AF by 77% (blunting of the effects of high sympathetic tone that occurs after cardiac surgery, as evidenced by ↑levels of RA norepinephrine
- *Digoxin & verapamil* do not ↓ the incidence of postop AF, although use of these agents does control VR
- In studies c >200 pts total, IV diltiazem ↓ incidence of postop AF by >2/3 compared with IV nitroglycerin
- Among AADs: amiodarone

Post-operative AF: Prophylaxis

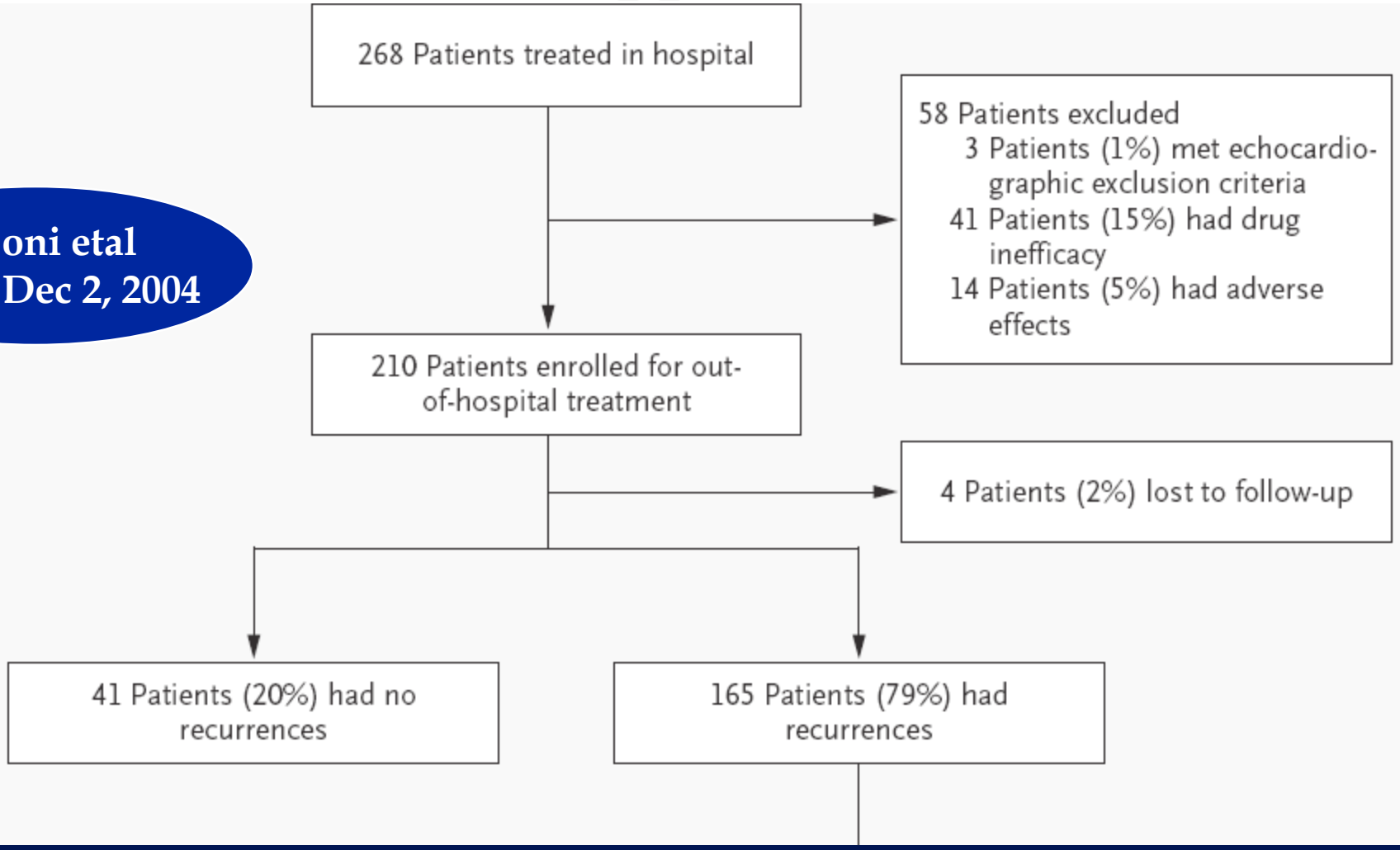
- Prophylactic Amiodarone: shown to decrease the incidence of post-CABG AF in several but not all studies
- Amiodarone (600 mg/d x 7 d) before surgery & 200 mg/d postop until hospital D/C ↓ post- CABG AFib by 45%
- Likewise, IV amiodarone postoperatively appears to decrease the incidence of postoperative AF by 26% to 76%
- In general, these trials excluded pts with a low resting HR (<50 bpm), 2nd or 3rd-degree AV block, or class III or IV CHF
- Sotalol ↓ postop AF c/w placebo or half-dose b-blockade; but, data on sotalol c/w full-dose β-blocker less conclusive
- Not effective/evaluated: Q/D/Proc/F/Prop
- Prophylactic Mg++ ↓ post-op AF
- Post-op atrial pacing: ↓AF up to 63% & hospital stay by >20%

Post-operative AF: Treatment

- Spontaneous conversion:15%-30% of pts convert within 2 h and 25%-80% within 24 h when either dig alone or no AAD
- 2 strategies for persist. or recurrent AF: rate & rhythm control
- For hemodynamically unstable or highly Sxic pts or those c a contraindication to anticoag, rhythm control is preferred. For pts in whom restoration of SR is less important: rate control
- Rate control:β-b (1st), verapamil /diltiazem, dig(at rest), amio
- ↓ risk for proarrhythmia by carefully monitoring electrolytes
- Rhythm control: Amio/IA or IC, but IC be avoided post-CABG
- IV class III AAD(sotalol, amio[40-90%], ibutilide[44%-78%AFl) & dofetilide): efficacy similar to class IA & IC for acute conversion of post-CABG AF
- External cardioversion/ Anticoagulation!(N.B:bld risk c heparin)

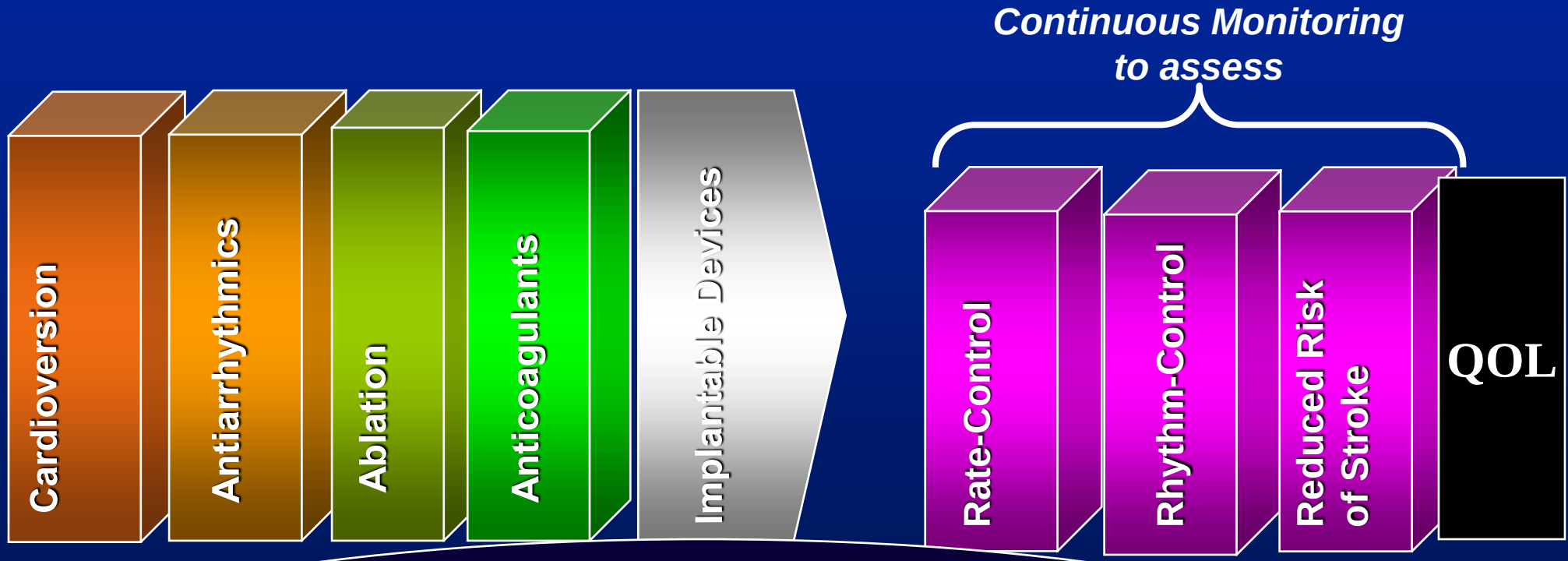
Outpatient Treatment of Recent-Onset Atrial Fibrillation with the "Pill-in-the-Pocket" Approach

Alboni etal
NEJM, Dec 2, 2004



Κολπική Μαρμαρυγή: Υβριδική Θεραπεία

Combinations of CV, drug, ablation, device-based & other therapies that work adjunctively to provide optimal medical care



Rhythm vs Rate Control:

these studies would not have happened if an AAD(s) with >90% efficacy & an acceptable AE profile had been available!