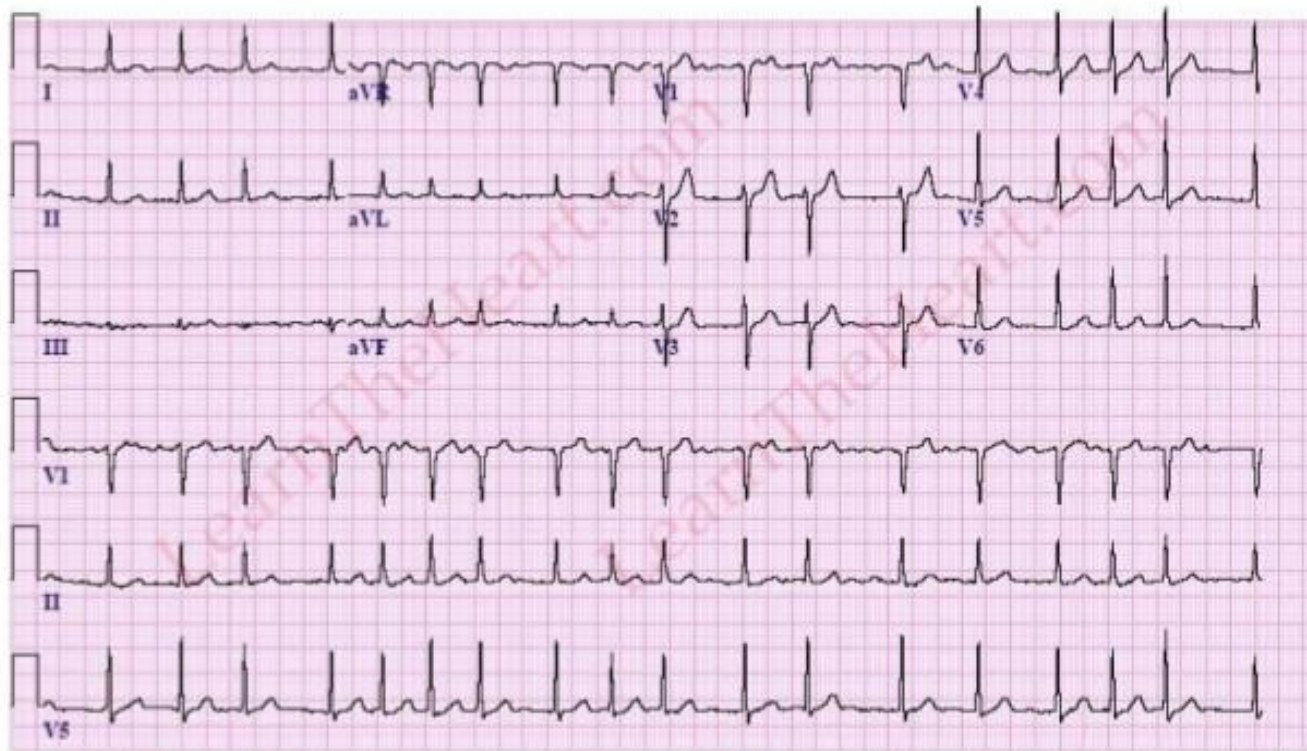


# ΚΟΛΠΙΚΗ ΜΑΡΜΑΡΥΓΗ ΦΑΡΜΑΚΕΥΤΙΚΗ ΗΛΕΚΤΡΙΚΗ ΑΝΑΤΑΞΗ

ΣΠΥΡΟΜΗΤΡΟΣ ΓΕΩΡΓΙΟΣ  
Καρδιολόγος, Ε/Α , Γ.Ν.Κατερίνης.  
F.E.S.C



25mm/s 10mm/mV 40Hz 005C 12SL 250 CID: 2

EID:607 EDT: 13:33 14-OCT-2003 ORDER:



- AF είναι η πιο κοινή μορφή αρρυθμίας και η συχνότητα εμφάνισης της αυξάνεται με γρήγορους ρυθμούς<sup>1</sup>
- AF υπολογίζεται ότι παρουσιάζεται στο 1% to 2% του γενικού πληθυσμού<sup>1</sup>
- Η συχνότητα εμφάνισης της AF αυξήθηκε 13% στις τελευταίες 2 δεκαετίες<sup>1</sup>
- Πάνω από 6 εκατομμύρια Ευρωπαίοι έχουν κάποια μορφή AF<sup>1</sup>

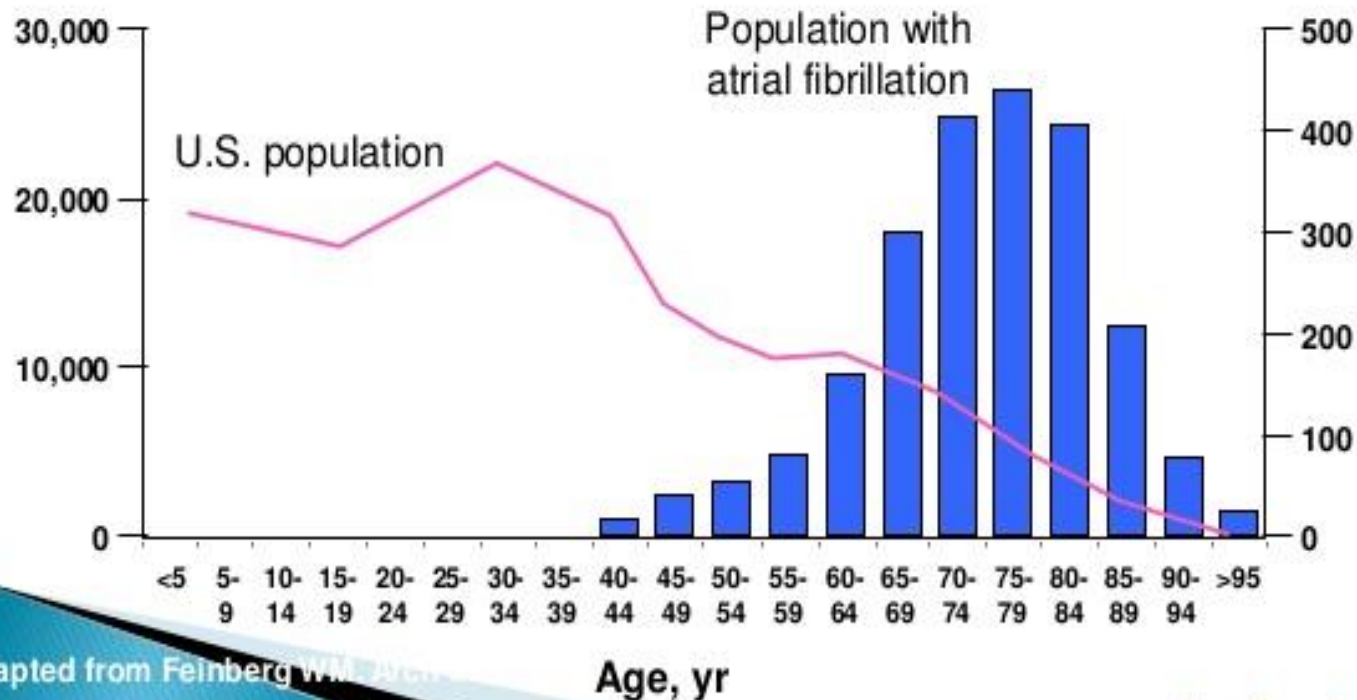
AF = atrial fibrillation.

1. The Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). *Eur Heart J.* 2010;31:2369–2429.

# Atrial Fibrillation Demographics by Age

U.S. population  
x 1000

Population with AF  
x 1000



Adapted from Feinberg WM, et al.

## Definitions of AF: A Simplified Scheme

| Term                               | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Paroxysmal AF</b>               | <ul style="list-style-type: none"><li>• AF that terminates spontaneously or with intervention within 7 d of onset.</li><li>• Episodes may recur with variable frequency.</li></ul>                                                                                                                                                                                                                                                                                                                                 |
| <b>Persistent AF</b>               | <ul style="list-style-type: none"><li>• Continuous AF that is sustained &gt;7 d.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Long-standing persistent AF</b> | <ul style="list-style-type: none"><li>• Continuous AF &gt;12 mo in duration.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Permanent AF</b>                | <ul style="list-style-type: none"><li>• The term “permanent AF” is used when the patient and clinician make a joint decision to stop further attempts to restore and/or maintain sinus rhythm.</li><li>• Acceptance of AF represents a therapeutic attitude on the part of the patient and clinician rather than an inherent pathophysiological attribute of AF.</li><li>• Acceptance of AF may change as symptoms, efficacy of therapeutic interventions, and patient and clinician preferences evolve.</li></ul> |
| <b>Nonvalvular AF</b>              | <ul style="list-style-type: none"><li>• AF in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair.</li></ul>                                                                                                                                                                                                                                                                                                                                               |

AF indicates atrial fibrillation.

# Classification of AF

| Terminology                            | Clinical features                                                        |                           |
|----------------------------------------|--------------------------------------------------------------------------|---------------------------|
| Initial event (first detected episode) | Symptomatic<br>Asymptomatic<br>Onset unknown                             | Rhythm/Rate               |
| Paroxysmal                             | Spontaneous termination<br><7 days and most often<br><48 hours           | Rhythm<br>Control         |
| Persistent                             | Not self-terminating<br>Lasting >7 days or prior<br>cardioversion        | Rhythm or<br>Rate control |
| Permanent ('accepted')                 | Not terminated<br>Terminated but relapsed<br>No<br>cardioversion attempt | Rate Control              |

# Cardioversion

- Cardioversion is performed as part of a rhythm-control treatment strategy
- There are two types of cardioversion: electrical (ECV) and pharmacological (PCV)
- Cardioversion of AF is associated with increased risk of stroke in the absence of antithrombotic therapy.

# Likelihood of Spontaneous Conversion of Atrial Fibrillation to Sinus Rhythm

- **356 pts with AF < 72 h**
- **Symptoms of < 24 h was only independent predictor of spontaneous conversion (OR: 1.8, p < 0.0001)**

| <b>AF duration</b> | <b>n</b>   | <b>Conversion</b> |
|--------------------|------------|-------------------|
| <b>&lt; 24 h</b>   | <b>292</b> | <b>73%</b>        |
| <b>24 - 72 h</b>   | <b>64</b>  | <b>45%</b>        |
| <b>Total</b>       | <b>356</b> | <b>68%</b>        |

# Prevention of Thromboembolism

- With AF or atrial flutter for  $\geq 48$  h, or unknown duration, anticoagulate with warfarin for at least 3 wk before and 4 wk after cardioversion (Class I)
- With AF or atrial flutter for  $>48$  h or unknown duration, requiring immediate cardioversion, anticoagulate as soon as possible and continue for at least 4 wk (Class I)
- With AF or atrial flutter  $<48$  h and high stroke risk, IV heparin or LMWH, or factor Xa or direct thrombin inhibitor, is recommended before or immediately after cardioversion, followed by long-term anticoagulation (Class I)
- With AF or atrial flutter  $<48$  h and low thromboembolic risk, IV heparin, LMWH, a new oral anticoagulant, or no antithrombotic may be considered for cardioversion (Class IIb)

For patients with AF or atrial flutter of 48 hours' duration or longer or when duration of AF is unknown, anticoagulation with dabigatran, rivaroxaban, or apixaban is reasonable for at least 3 weeks before and 4 weeks after cardioversion.

IIa

C

## PRACTICE GUIDELINE

**2014 AHA/ACC/HRS Guideline  
for the Management of Patients  
With Atrial Fibrillation:  
Executive Summary**

Circulation 2014;130:2071-2104.

## Recommendations for anticoagulation pericardioversion

| Recommendations                                                                                                                                                                                                                                                                | Class <sup>a</sup> | Level <sup>b</sup> | Ref. <sup>c</sup> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|-------------------|
| For patients with AF of 48 h duration or longer, or when the duration of AF is unknown, OAC therapy (INR 2.0–3.0) is recommended for at least 3 weeks prior to and for 4 weeks after cardioversion, <u>regardless of the method (electrical or oral/i.v. pharmacological).</u> | I                  | B                  | 63                |
| For patients with AF requiring immediate/emergency cardioversion because of haemodynamic instability, heparin (i.v. UFH bolus followed by infusion, or weight-adjusted therapeutic dose LMWH) is recommended.                                                                  | I                  | C                  |                   |

## Anticoagulation – Peri-cardioversion<sup>63</sup>

| 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     | .54, 63 |
| 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     | 42      |

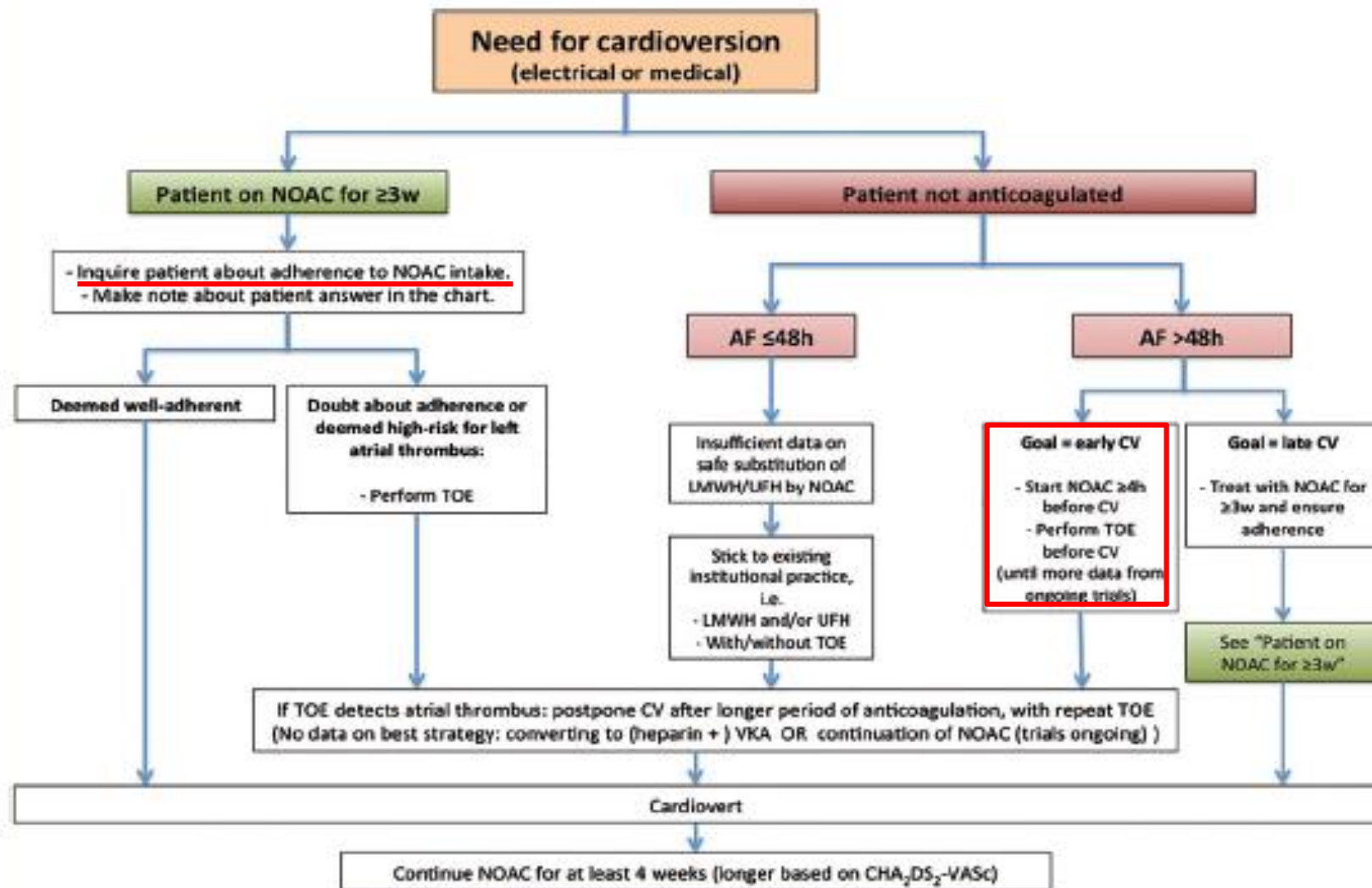
[www.escardio.org/guidelines](http://www.escardio.org/guidelines)

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



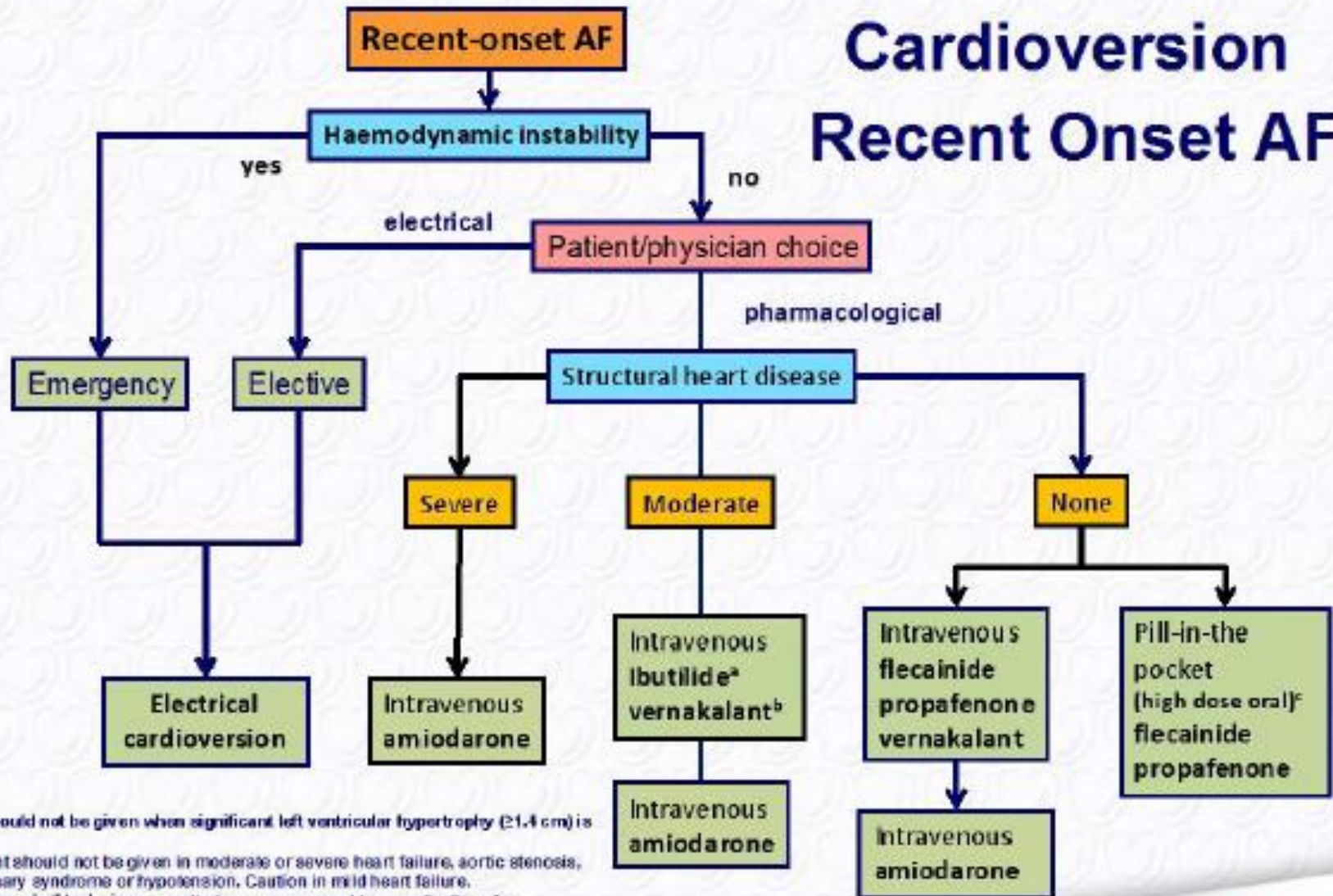
63

|                                                                                                                                                                                                                                                    |     |   |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---|--|
| for 4 weeks or lifelong (if risk factors are present).                                                                                                                                                                                             | IIa | C |  |
| If thrombus remains on repeat TOE, an alternative strategy (e.g. rate control) may be considered.                                                                                                                                                  | IIb | C |  |
| For patients with AF duration that is clearly <48 h and no thrombo-embolic risk factors, i.v. heparin or weight-adjusted therapeutic dose LMWH may be considered peri-cardioversion, without the need for post-cardioversion oral anticoagulation. | IIb | C |  |



**Figure 8** Cardioversion work-flow in AF patients treated with NOAC, depending on the duration of the arrhythmia and prior anti coagulation.

# Cardioversion Recent Onset AF



<sup>a</sup>Ibutilide should not be given when significant left ventricular hypertrophy ( $\geq 1.4$  cm) is present.

<sup>b</sup>Vernakalant should not be given in moderate or severe heart failure, aortic stenosis, acute coronary syndrome or hypotension. Caution in mild heart failure.

<sup>c</sup>'Pill-in-the-pocket' technique – preliminary assessment in a medically safe environment and then used by the patient in the ambulatory setting.

# Vaughan Williams classification

| Class     | Drugs                                                                                                                              |
|-----------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Ia</b> | <ul style="list-style-type: none"> <li>. <u>Quinidine</u></li> <li>. <u>Procainamide</u></li> <li>. <u>Disopyramide</u></li> </ul> |
| <b>Ib</b> | <ul style="list-style-type: none"> <li>. <u>Lidocaine</u></li> <li>. <u>Phenytoin</u></li> <li>. <u>Mexiletine</u></li> </ul>      |
| <b>Ic</b> | <ul style="list-style-type: none"> <li>. <u>Flecainide</u></li> <li>. <u>Propafenone</u></li> <li>. <u>Moricizine</u></li> </ul>   |
| <b>II</b> | <ul style="list-style-type: none"> <li>. <u><math>\beta</math>-blockers</u></li> </ul>                                             |

| Class      | Drugs                                                                                                                                                    |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>III</b> | <ul style="list-style-type: none"> <li>. <u>Amiodarone</u></li> <li>. <u>Sotalol</u></li> <li>. <u>Ibutilide</u></li> <li>. <u>Dofetilide</u></li> </ul> |
| <b>IV</b>  | <ul style="list-style-type: none"> <li>. <u>Verapamil</u></li> <li>. <u>Diltiazem</u></li> </ul>                                                         |
| <b>V</b>   | <ul style="list-style-type: none"> <li>. <u>Adenosine</u></li> <li>. <u>Digoxin</u></li> </ul>                                                           |

# Pharmacological Cardioversion

## Recommendations for pharmacological cardioversion of recent-onset AF

| Recommendations                                                                                                                                                                                                                                                                                                                              | Class | Level |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|
| When pharmacological cardioversion is preferred and there is no or minimal structural heart disease, intravenous flecainide, propafenone, ibutilide, or vernakalant are recommended.                                                                                                                                                         | I     | A     |
| In patients with AF $\leq 7$ days and moderate structural heart disease [but without hypotension $< 100$ mm Hg, NYHA class III or IV heart failure, recent [ $< 30$ days] ACS, or severe aortic stenosis] intravenous vernakalant may be considered. Vernakalant should be used with caution in patients with NYHA class I–II heart failure. | IIb   | B     |
| Intravenous vernakalant may be considered for cardioversion of postoperative AF $\leq 3$ days in patients after cardiac surgery.                                                                                                                                                                                                             | IIb   | B     |

# Pharmacological cardioversion



- Flecainide, dofetilide, propafenone, and IV ibutilide are useful for cardioversion of AF or atrial flutter, provided contraindications to the selected drug are absent (Class I)
- Amiodarone is reasonable for pharmacological cardioversion of AF (Class IIa)
- Propafenone or flecainide (“pill-in-the-pocket”) to terminate AF out of hospital is reasonable once observed to be safe in a monitored setting (Class IIa)

## PRACTICE GUIDELINE



**2014 AHA/ACC/HRS Guideline  
for the Management of Patients  
With Atrial Fibrillation:  
Executive Summary**

**Circulation** 2014;130:2071-2104.

**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,<br>or<br>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,<br>or<br>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. <sup>68–70†</sup>                                                                                                                                                                                   |

# FLECAINIDE

- Approximately **half of the responding patients** convert within 3 h of the oral dose or within 1 h of the initial infusion time.
- The single loading **oral dose** of flecainide (200-300mg) has a conversion rate of 50–60% at 3 h and 75–85% at 6–8 h.
- **Very effective** antiarrhythmic drug for the pharmacologic conversion of a patient with AF of short (<24 hours) duration, rarely effective for termination of atrial flutter or persistent AF.
- Intravenous flecainide (2 mg/kg over 10 min) acutely reverts recent onset AF in 67 to 92% of patients within six hours and is **more effective** than procainamide, sotalol, propafenone, and amiodarone

ESH 2010

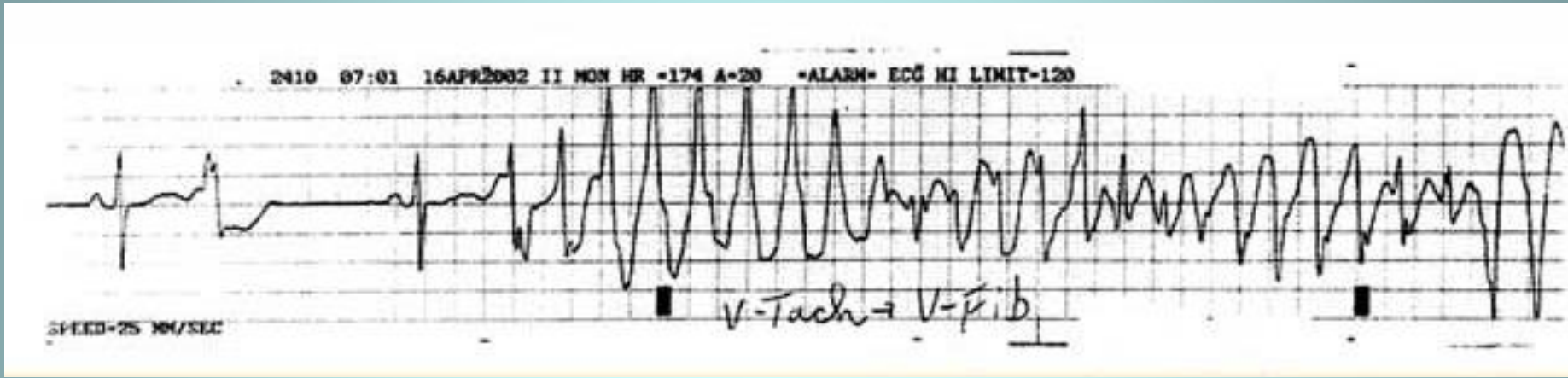
*Aliot et al. Europace (2011) 13, 161-173*

# PROPAFENONE

- Significantly more effective in paroxysmal as opposed to persistent AF
- Not suggest using propafenone in patients with structural heart disease, particularly those with left ventricular systolic dysfunction and those with coronary artery disease
- Within a few hours, expected conversion rates was 41-91% after i.v., time 30 min-2h.
- Oral propafenone can be given as a large dose of 450 to 600 mg, conversion 2-6h.

# IBOUTILIDE

- Available only as an intravenous preparation (1 mg over 10 minutes and potentially repeated once after 20 minutes)
- Prolong repolarization and the QT interval
- In patients with structural heart disease (but without heart failure).
- The acute AF conversion rate is 28 to 51 %
- Arrhythmia conversion occurred within a mean of 27 to 33 minutes after the start of the infusion
- Do not use ibutilide in combination with other antiarrhythmic medications

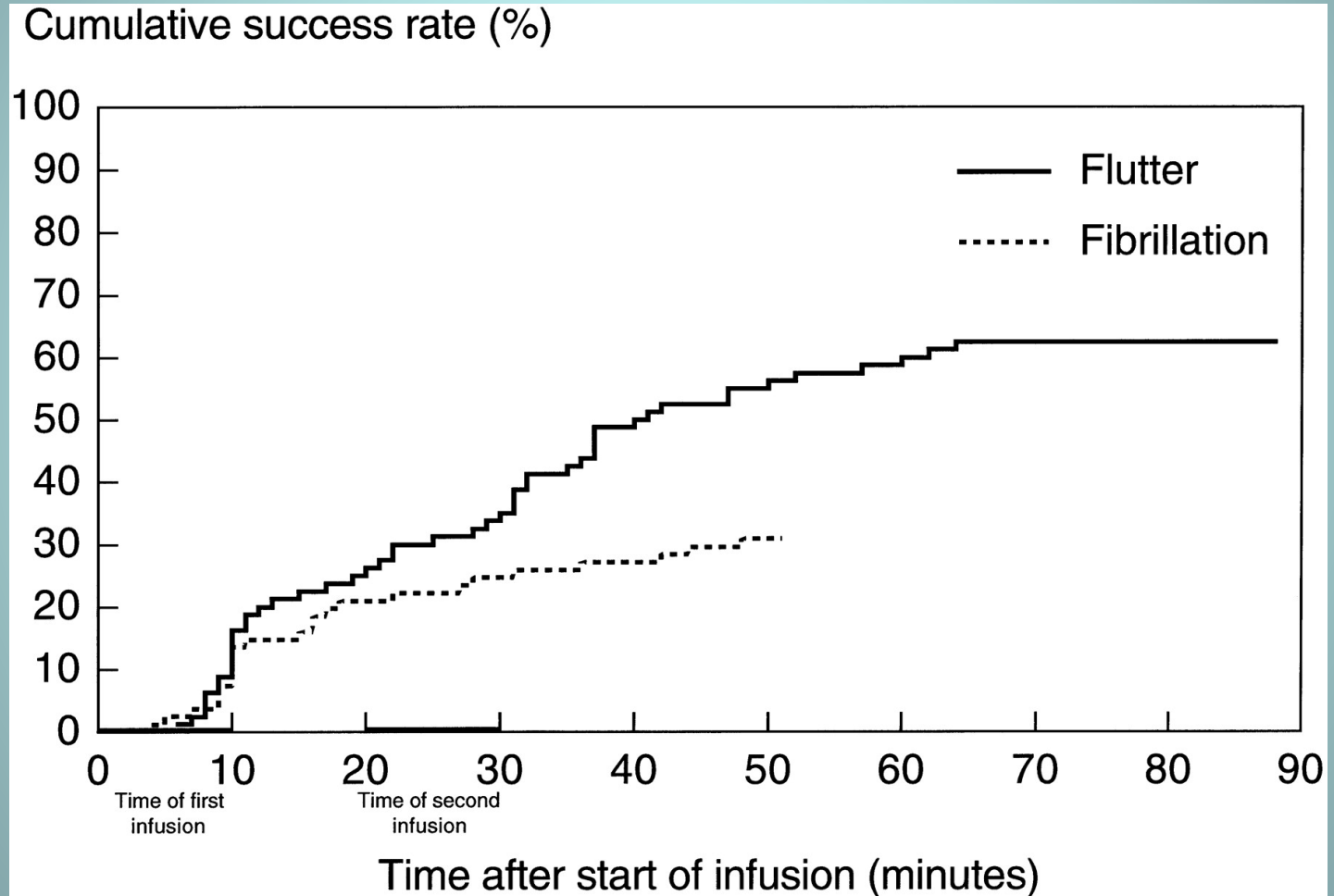


In four large series, the rate of torsade de pointes ranged between 3.6 and 8.3 percent

continuous electrocardiogram monitoring for at least four hours after the infusion or until the QTc interval has returned to baseline

# Cardioversion of atrial flutter and fibrillation after ibutilide infusion

(67 y/o, 15 days duration, half with prior episode)



# DOFETILIDE

- Primarily been studied for the medical conversion of persistent AF
- Its principle use is to help maintain sinus rhythm, rather than to be used for cardioversion.
- Successfully in patients with structural heart disease
- Rarely used solely for the purpose of cardioversion, prior to anticipated DC cardioversion
- SAFIRE-D study, 500 µg twice daily , incidence of torsade was 1.2 percent

# AMIODARONE

- Cardioversion with either intravenous or oral amiodarone ***is not particularly effective*** and occurs several hours later than with flecainide, propafenone, ibutilide, and vernakalant
- Intravenous amiodarone may be more effective in converting AF after it has been given for hours and days
- Oral amiodarone requires long-term loading and is effective in converting about 25% of patients with persistent AF to sinus rhythm after six weeks of loading
- Have value before cardioversion in patients who will receive the drug long term for maintenance and may be considered as adjunctive therapy to increase the likelihood of successful cardioversion in patients who are known to be refractory to electrical cardioversion or in those in whom there is a concern about early relapse

## 1. Φάρμακα *χωρίς* καμία δράση !

Digoxin

Καμία δράση

Verapamil

Καμία δράση

Sotalol

One study: placebo versus 2 dosages of sotalol: conversion rates 14%, 11%, 13% (ns).

$\beta$ -blockers

metoprolol, atenolol, carvedilol, bisoprolol, propranolol, timolol and esmolol: no effect/no reports

Ajmaline

Έλλειψη στοιχείων

## 2. Φάρμακα *με αποδεδειγμένη* δράση ?

DAAF trial group: (1997) Eur Heart J, 18, 649-54.  
Jordaens L, et al: (1997) Eur Heart J, 18, 643-8.  
Blancani L, et al: (1998) Am J Cardiol, 82, 584-8.  
Suttrop MJ, et al: (1989) Am J Cardiol, 63, 693-6.  
Platta EV, et al: (1989) Am J Cardiol, 63, 925-9.  
Sotalol Multicenter Study Grp 1995: Am Heart J, 129, 739-48.  
Rehnqvist N: (1981) Ann Clin Res, 13 Suppl 30, 68-72.

# Flecainide is highly effective in the acute cardioversion of AF

## Meta-analysis of acute conversion of AF studies

|                   | Conversion rate | No. of studies |
|-------------------|-----------------|----------------|
| Quinidine         | 11-86%          | (n=6)          |
| Procainamide      | 63%             | (n=1)          |
| Disopyramide      | 23%             | (n=1)          |
| <b>Flecainide</b> | <b>52-95%</b>   | <b>(n=8)</b>   |
| Propafenone       | 6-91%           | (n=15)         |
| Amiodarone        | 25-92%          | (n=6)          |
| Sotalol           | 8-52%           | (n=3)          |
| Ibutilide         | 10-49%          | (n=3)          |
| Control treatment | 0-76%           | (n=25)         |

- Αντιαρρυθμικός παράγοντας που δρα εκλεκτικά στους κόλπους για να παρατείνει την κολπική ανερεθιστότητα και να επιβραδύνει την αγωγιμότητα των ώσεων με συχνο-εξαρτώμενο τρόπο
- Η εκλεκτική δράση στους κόλπους αποδείχτηκε σε προ-κλινικές μελέτες όπου υπήρξε:
  - Αποκλεισμός των συγκεκριμένων  $I_{Kur}$  and  $I_{KAch}$  ρευμάτων καλίου στους κόλπους
  - Χρόνο και Ηλεκτρο – εξαρτώμενος αποκλεισμός ρευμάτων Νατρίου επικεντρώνει την δράση του φαρμάκου στις υψηλές καρδιακές συχνότητες
- Πολλαπλός αποκλεισμός καναλιών  $K^+$  and  $Na^+$  σε όλες τις φάσεις του δυναμικού δράσης των κόλπων
- Αποκλεισμός των όψιμων ρευμάτων νατρίου  $I_{Na}$
- Κατά την κολπική μαρμαρυγή, ο αποκλεισμός των διαύλων νατρίου που εξαρτάται από τη συχνότητα και την τάση εστιάζει περαιτέρω τη δράση του φαρμάκου προς τον ταχέως ενεργοποιούμενο και μερικώς εκπολωμένο κολπικό ιστό από ότι προς την φυσιολογικώς πολωμένη κοιλία που χτυπά σε χαμηλότερους καρδιακούς ρυθμούς.
  - Μείωση της επαναπόλωσης των κοιλιών που προκαλείται από τον αποκλεισμό ρευμάτων καλίου στις κοιλίες
  - Οι εστιασμένες επιδράσεις στους κόλπους συνδυασμένες με αποκλεισμό όψιμων ρευμάτων νατρίου αποδεικνύει το χαμηλό προ-αρρυθμικό φορτίο της Βερνακαλάντης

# Σύνοψη κλινικών μελετών (φάσης 3)



ACT I and ACT III: Ταχεία ανάταξη ΚΜ με Vernakalant<sup>a</sup>



Αποτελτα: Συνολικά στοιχεία από ACT I and ACT III<sup>1</sup>



|                              |   |
|------------------------------|---|
| ACT I Pivotal <sup>1</sup>   | A |
| ACT III Pivotal <sup>2</sup> | A |
| ACT II Pivotal <sup>3</sup>  | A |
| ACT IV <sup>4</sup>          | A |
| ACT V                        | A |
| AVRO Pivotal <sup>5</sup>    | A |

■ Μέσος χρόνος ανάταξης: **10 λεπτά** από την έναρξη της 1<sup>ης</sup> δόσης

■ Στο **97%** των αποκρινόμενων στην vernakalant, ο σταθερός φλεβοκομβικός ρυθμός διατηρήθηκε για τουλάχιστον **24 ώρες**

patients  
placebo/Control

115

1 (AFL: N=9)

1 (AFL: N=4)

NA

68

5 (amiodarone)

1. EU Summary of Product Characteristics, BRINAVESS, MSD, 2010.

AF = atrial fibrillation

1. Roy D et al. *Circulation*. 2008;117:1518–1525; 2. Pratt CM et al. *Am J Cardiol*. 2010;106:1277–1283; 3. Kowey PR et al. *Circ Arrhythmia Electrophysiol*. 2009;2:652–659; 4. Stiell IG et al. *Am Heart J*. 2010;159:1095–1101; 5. Camm AJ et al. *J Am Coll Cardiol*. 2011;57:313–321.

# Vernakalant: Incidence of Hypotension and Ventricular Arrhythmia During the First 2 Hours<sup>1</sup>



|                                | Placebo (%) | Vernakalant (%) |
|--------------------------------|-------------|-----------------|
| <b>Hypotension</b>             |             |                 |
| All patients                   | 5.1         | 7.6             |
| Patients with CHF              | 4.7         | 16.1            |
| -Serious/discontinuation       | 0           | 2.9             |
| Patients without CHF           | 5.2         | 5.7             |
| <b>Ventricular arrhythmia</b>  |             |                 |
| Patients with CHF <sup>a</sup> | 1.6         | 7.3             |
| Patients without CHF           | 3.6         | 3.2             |


CHF = congestive heart failure

<sup>a</sup>These arrhythmias typically presented as asymptomatic, monomorphic, non-sustained (average 3-4 beats) ventricular tachycardia.

# VERNAKALANT

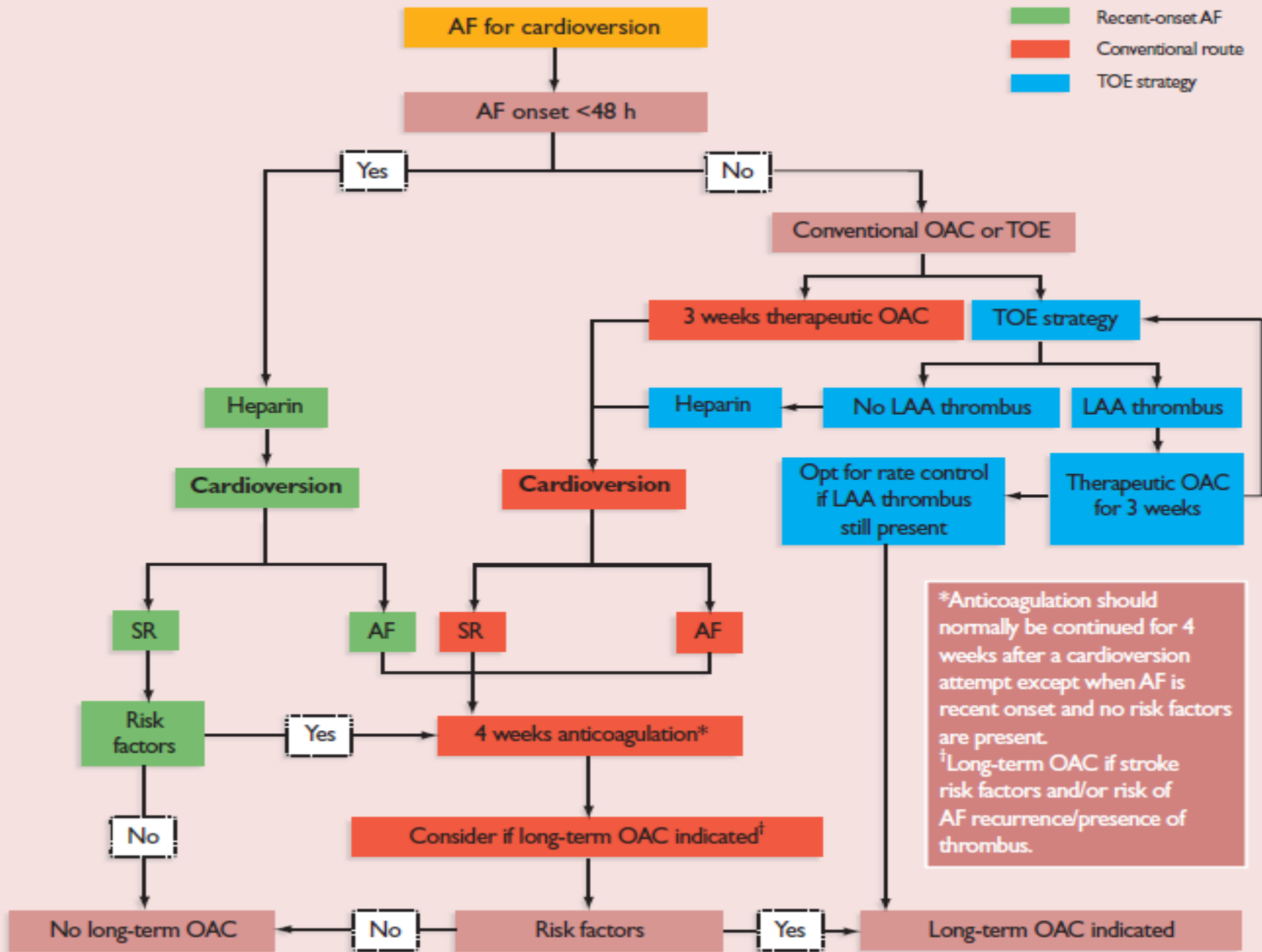
## Αντενδείξεις

### Υπερευαίσθησία στη δραστική ουσία

- Ασθενείς με σοβαρή στένωση της αορτής, ασθενείς με συστολική αρτηριακή πίεση < 100 mm Hg και ασθενείς με καρδιακή ανεπάρκεια κατηγορίας NYHA III και NYHA IV.
- Ασθενείς με παρατεταμένο διάστημα QT στην αρχική κατάσταση (μη διορθωμένο > 440 msec), ή σοβαρή βραδυκαρδία, δυσλειτουργία του φλεβόκομβου ή δεύτερου βαθμού και τρίτου βαθμού καρδιακό αποκλεισμό με απουσία βηματοδότη.
- Χρήση ενδοφλέβιων αντιαρρυθμικών που ελέγχουν το ρυθμό (κατηγορία I και κατηγορία III) εντός 4 ωρών πριν, καθώς και τις πρώτες 4 ώρες μετά, τη χορήγηση του 
- Οξύ στεφανιαίο σύνδρομο (που περιλαμβάνει έμφραγμα του μυοκαρδίου) εντός των τελευταίων 30 ημερών.

## Recommendations for direct current cardioversion

| Recommendations                                                                                                                                                                                                           | Class <sup>a</sup> | Level <sup>b</sup> | Ref. <sup>c</sup> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------------|-------------------|
| Immediate DCC is recommended when a rapid ventricular rate does not respond promptly to pharmacological measures in patients with AF and ongoing myocardial ischaemia, symptomatic hypotension, angina, or heart failure. | I                  | C                  |                   |
| Immediate DCC is recommended for patients with AF involving pre-excitation when rapid tachycardia or haemodynamic instability is present.                                                                                 | I                  | B                  | 82                |
| Elective DCC should be considered in order to initiate a long-term rhythm control management strategy for patients with AF.                                                                                               | IIa                | B                  | 46, 78, 83        |
| Pre-treatment with amiodarone, flecainide, propafenone, ibutilide, or sotalol should be considered to enhance success of DCC and prevent recurrent AF.                                                                    | IIa                | B                  | 79–81             |
| Repeated DCC may be considered in highly symptomatic patients refractory to other therapy.                                                                                                                                | IIb                | C                  |                   |
| Pre-treatment with $\beta$ -blockers, diltiazem or verapamil may be considered for rate control, although the efficacy of these agents in enhancing success of DCC or preventing early recurrence of AF is uncertain.     | IIb                | C                  |                   |
| DCC is contraindicated in patients with digitalis toxicity.                                                                                                                                                               | III                | C                  |                   |



# D.C.CARDIOVERSION

- The overall immediate success rate of DC cardioversion is greater than 90 %
- Commonly performed procedure with a high success rate and a low complication rate when performed by experienced clinicians.
- Synchronized DC cardioversion Biphasic shock should be performed while the patient is under the influence of procedural sedation
- Anteroposterior placement of electrodes more effective than anteriolateral.
- Arrhythmic complications — Bradyarrhythmias are occasionally seen after DC cardioversion; ventricular tachyarrhythmias are rare.
- 1-2% risk of thrombo-embolism

# RECURRENCE after DCC

- Immediate, within the first few minutes
- Early, during the first five days
- Late.
- Age
- AF duration before DCC
- Number of previous recurrences
- LA size, LA function
- Presence of Coronary disease, pulmonary, mitral disease
- Atrial ectopic beats

The recurrence rate of AF is high, particularly without maintenance antiarrhythmic therapy

DC cardioversion may be repeated if AF recurs acutely in patients who have not been pretreated with antiarrhythmic therapy

The combination of an atrioventricular (AV) nodal blocker plus intravenous loading with **amiodarone, ibutilide**, oral flecainide, sotalol, or propafenone may restore SR pharmacologically

Less than 14 % of patients remain in SR for a prolonged period after a third cardioversion

# Advantages and Disadvantages

## Electrical

- More effective (90%)
- Quick
- One procedure with TEE
- Cardioversion itself safe

## Pharmacological

Works well for recent onset

Avoid sedation

Screen for a proarrhythmic response

AF may convert to atrial flutter, permit rapid one-to-one AV conduction, class IA, IC

# CONCLUSIONS I

- Direct current cardioversion is the primary conversion strategy
- Pretreatment with amiodarone, flecainide, propafenone, ibutilide, or sotalol should be considered to enhance success and prevent recurrent AF

# CONCLUSIONS II

When pharmacologic therapy is preferred to electrical cardioversion

- For those without structural heart disease: intravenous flecainide or propafenone or vernakalant or ibutilide

A single, high oral dose of flecainide or propafenone may be considered

- For those with structural heart disease, intravenous amiodarone is preferred



ΕΥΧΑΡΙΣΤΩ ΓΙΑ ΤΗΝ ΠΡΟΣΟΧΗ ΣΑΣ