Faces of Atrial Fibrillation and …the science of tipping

Outline

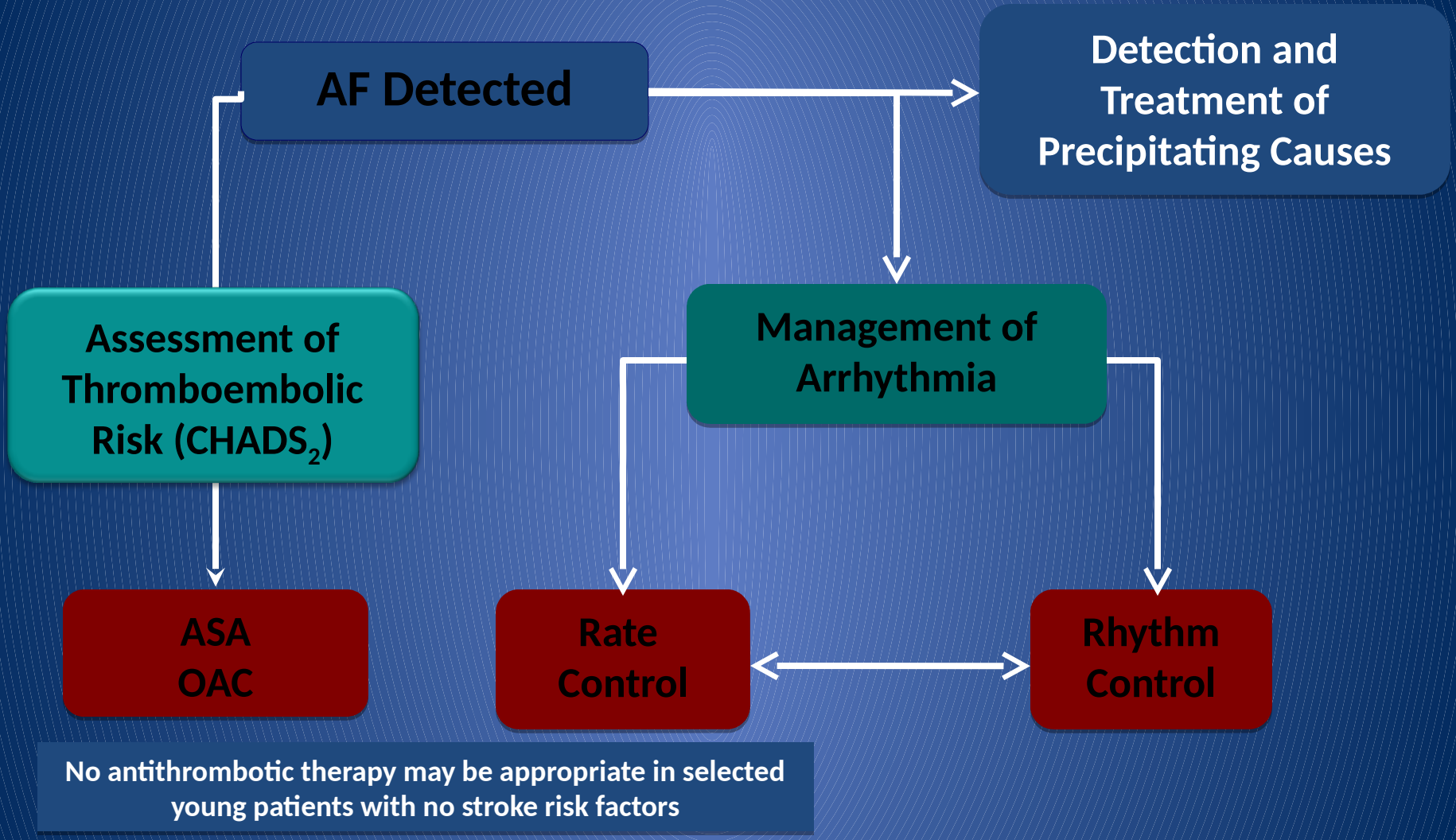
- ECG case-based discussion on the clinical course of atrial fibrillation
- Review of Canadian AF management guidelines
- Under recognized risk factor of atrial fibrillation

Objectives

- Understand the complexity of AF management in rate and rhythm control
- Role of ECG based tests in guidance of AF management
- Recognize risks of AF management
- Improve adherence to practice guideline

Tipping strategies

Overview of AF Management



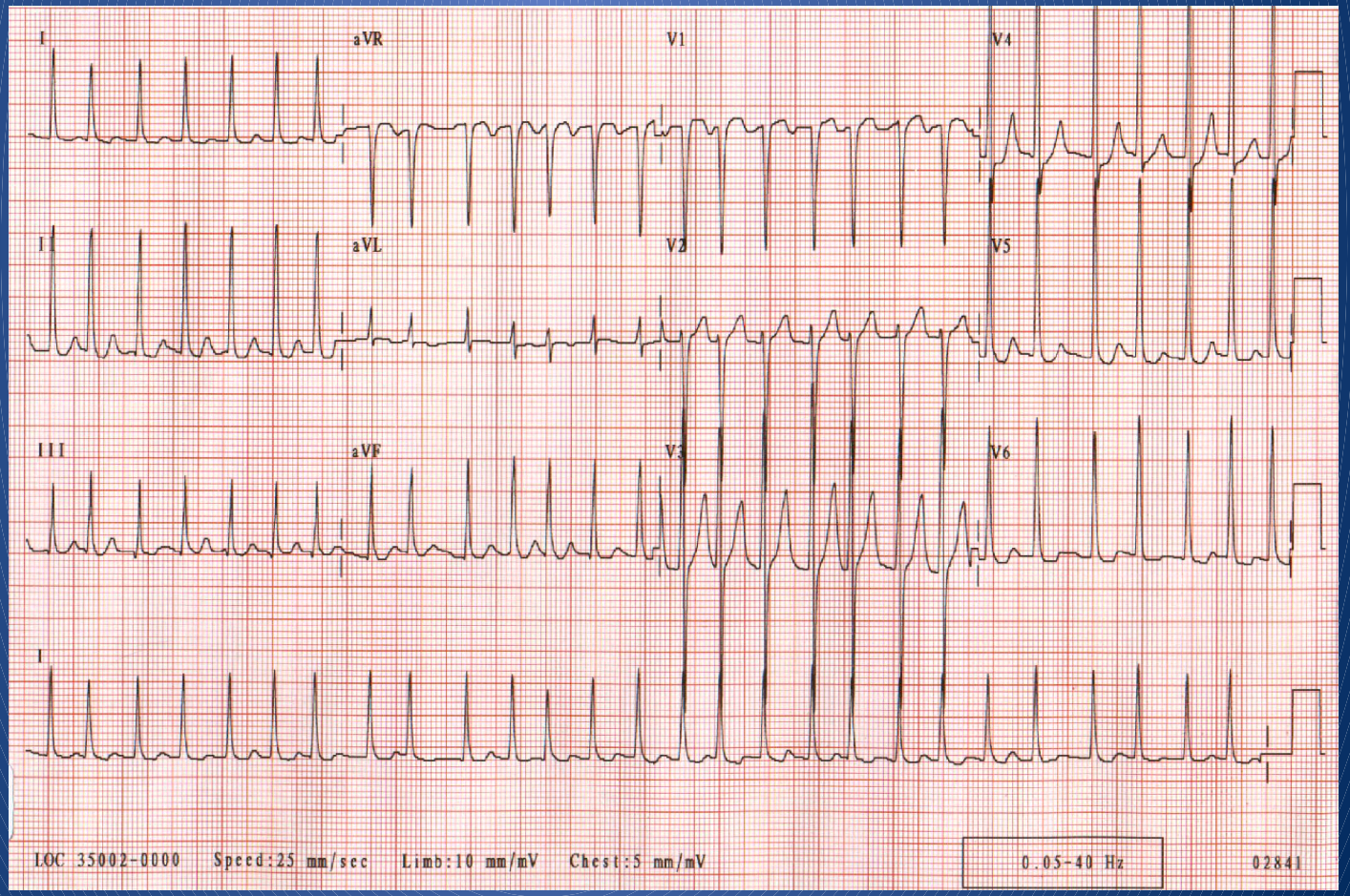
Skanes AC, Healey JS et al., *Can J Cardiol* 2012 Mar;28(2): 125-136

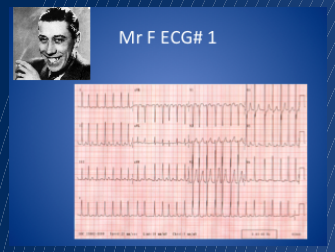
Goals of AF Arrhythmia Management

- Identify and treat underlying … heart disease and other predisposing conditions
- Relieve symptoms and improve functional quality of life
- Reduce morbidity/mortality associated with AF/AFL
  - Prevent tachycardia-induced cardiomyopathy
  - Reduce/prevent emergency room visits or hospitalizations secondary to AF/AFL
  - Prevent stroke or systemic thromboembolism

Skanes AC, Healey JS et al., *Can J Cardiol* 2012 Mar;28(2): 125-136

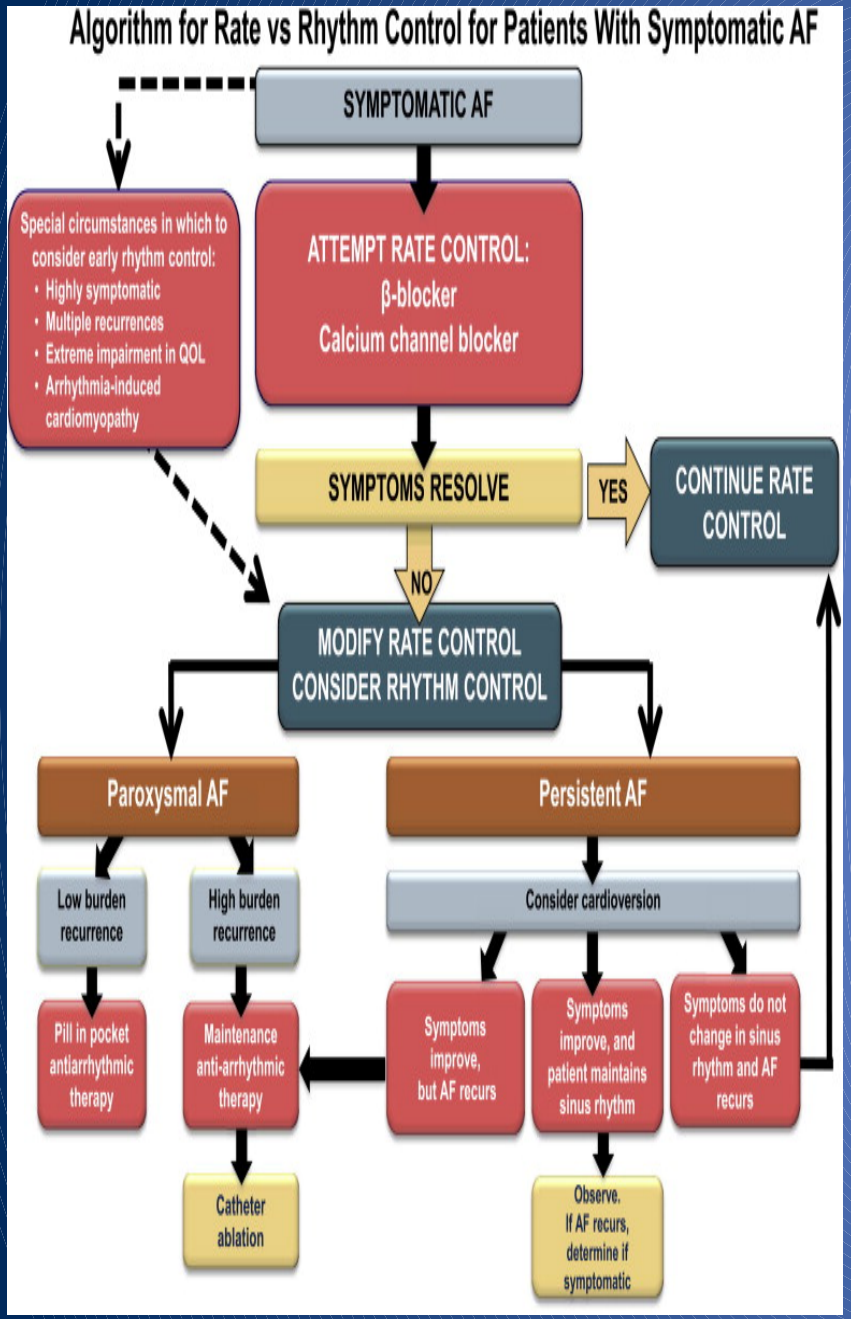
Mr F ECG# 1

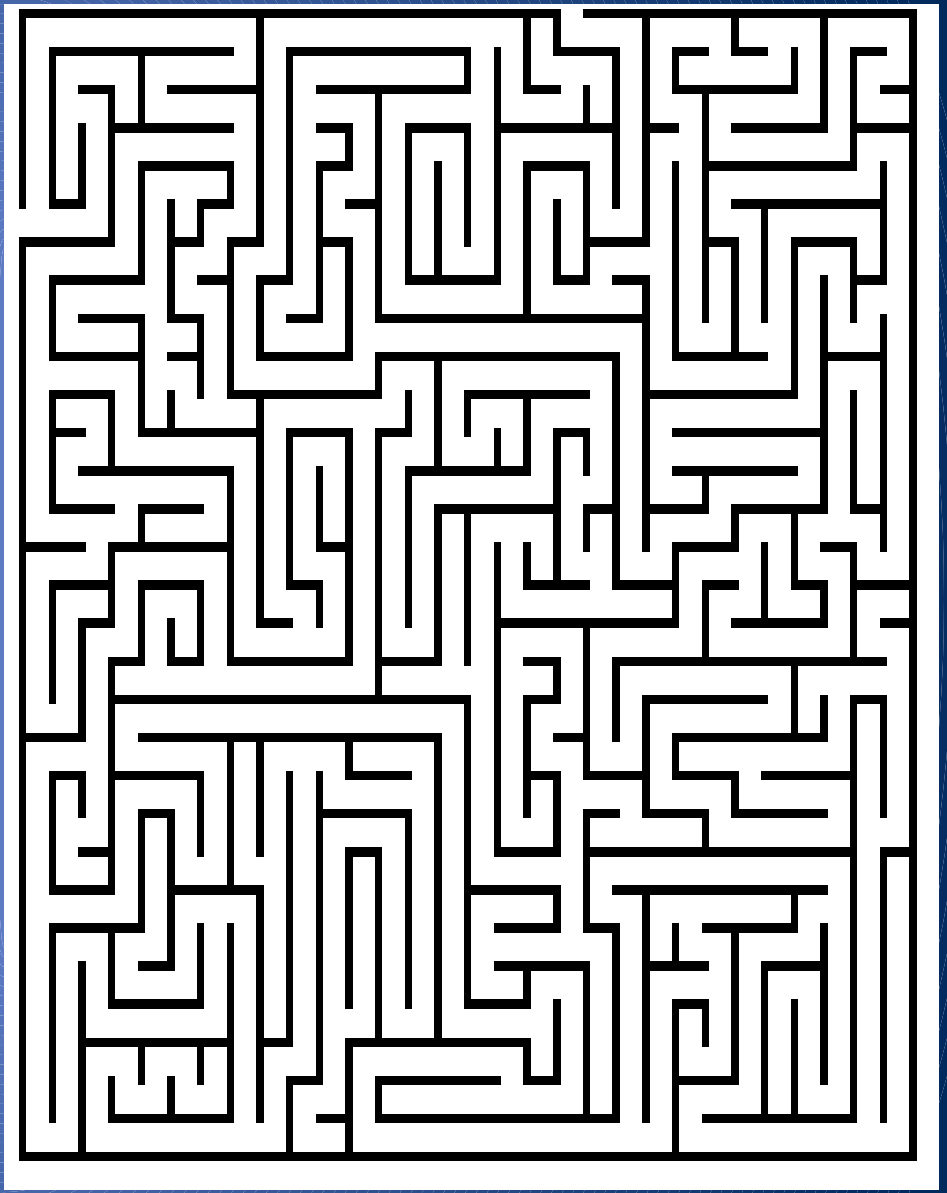

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
LOC 35002-0000
Speed:25 mm/sec
Limb:10 mm/mV
Chest:5 mm/mV
0.05-40 Hz
02841



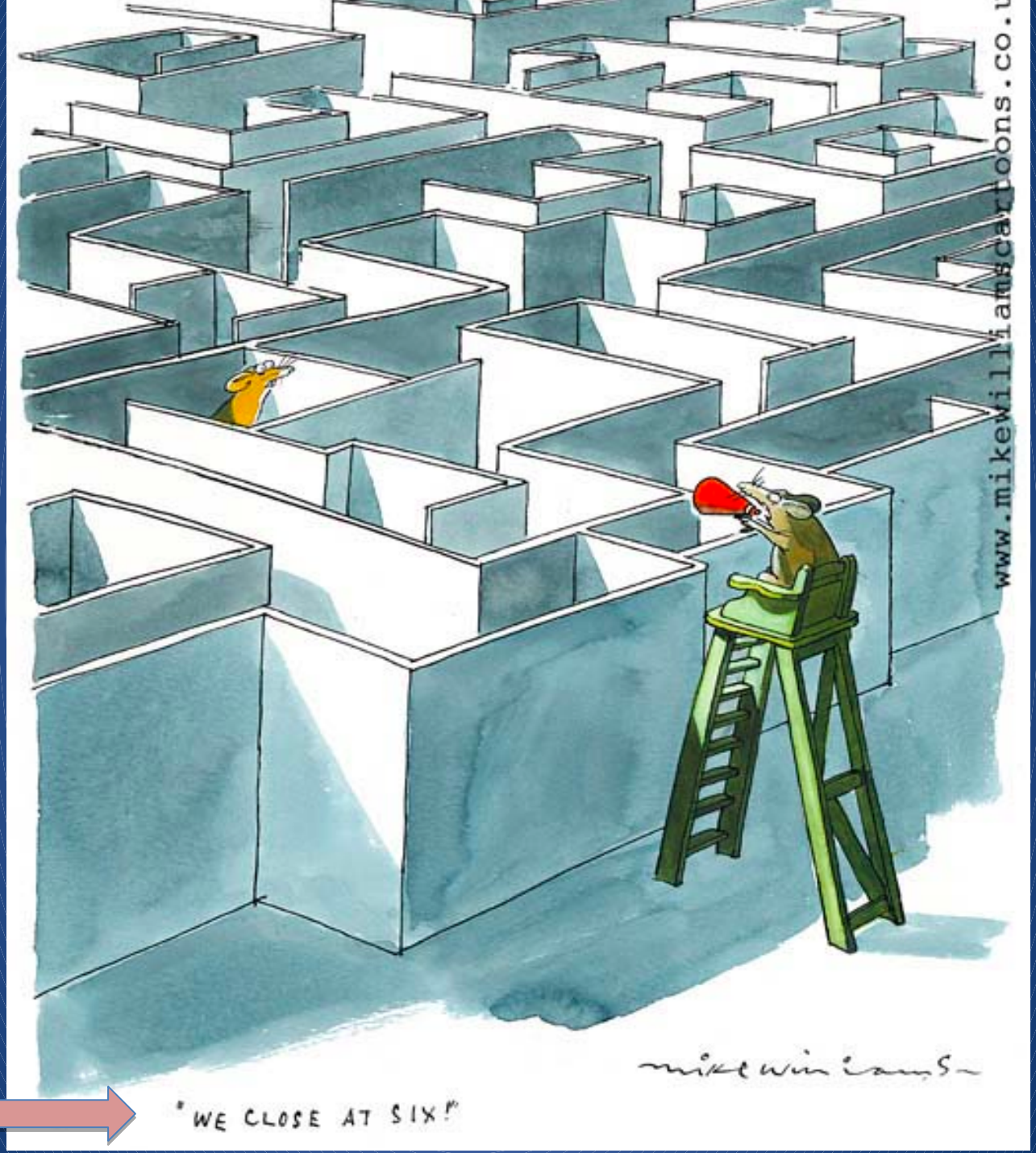
Q1

- A I will refer him to Dr Lashevsky
- B I will start anticoagulation and rate control
- C I will ask him to come back in two days and repeat ECG; perhaps it will be over





Canadian Journal of Cardiology 2014 30, 1114-1130DOI: (10.1016/j.cjca.2014.08.001)


"WE CLOSE AT SIX!"
www.mikewilliamscartoons.co.u

Factors Influencing Decision of Rate vs Rhythm Control

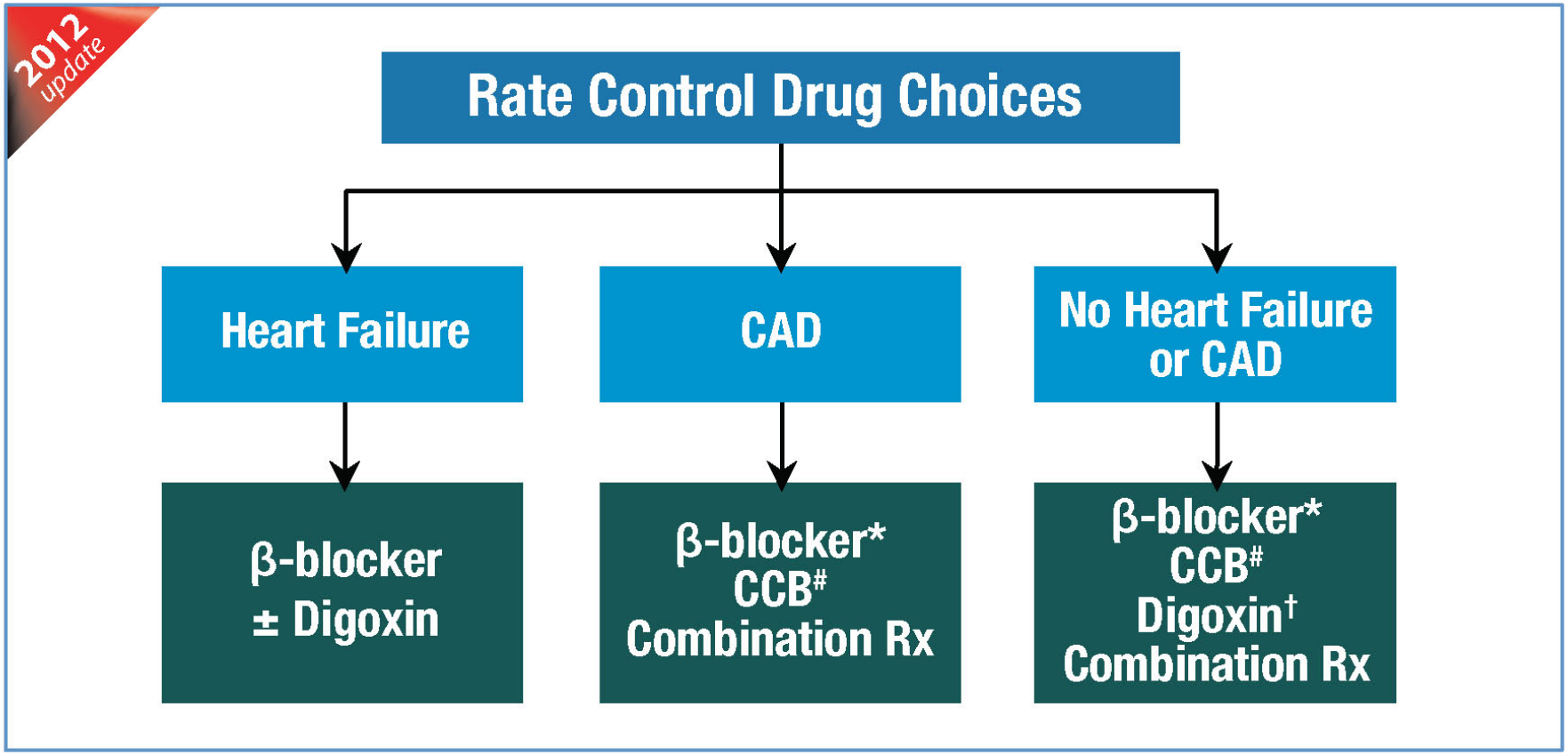
Favours Rate Control	Favours Rhythm Control
Persistent AF	Paroxysmal AF
Less Symptomatic	Newly Detected AF
> 65 years of age	More Symptomatic
Hypertension	< 65 years of age
No History of Congestive Heart Failure	No Hypertension
Previous Antiarrhythmic Drug Failure	Congestive Heart Failure clearly exacerbated by AF
	No Previous Antiarrhythmic Drug Failure

Skanes AC, Healey JS et al., *Can J Cardiol* 2012 Mar;28(2): 125-136

Table 8. Summary of Recommendations for Rate Control

Recommendations	COR
Control ventricular rate using a beta blocker or nondihydropyridine calcium channel antagonist for paroxysmal, persistent, or permanent AF	I
IV beta blockers or nondihydropyridine calcium channel blocker recommended to slow ventricular heart rate in the acute setting in patients without pre-excitation. In hemodynamically unstable patients, electrical cardioversion is indicated	I
For AF, assess heart rate control during exertion, adjusting pharmacological treatment as necessary	I
A heart rate control (resting heart rate <80 bpm) strategy is reasonable for symptomatic management of AF	IIa
IV amiodarone can be useful for rate control in critically ill patients without pre-excitation	IIa
AV nodal ablation with permanent ventricular pacing is reasonable when pharmacological management is inadequate and rhythm control is not achievable	IIa

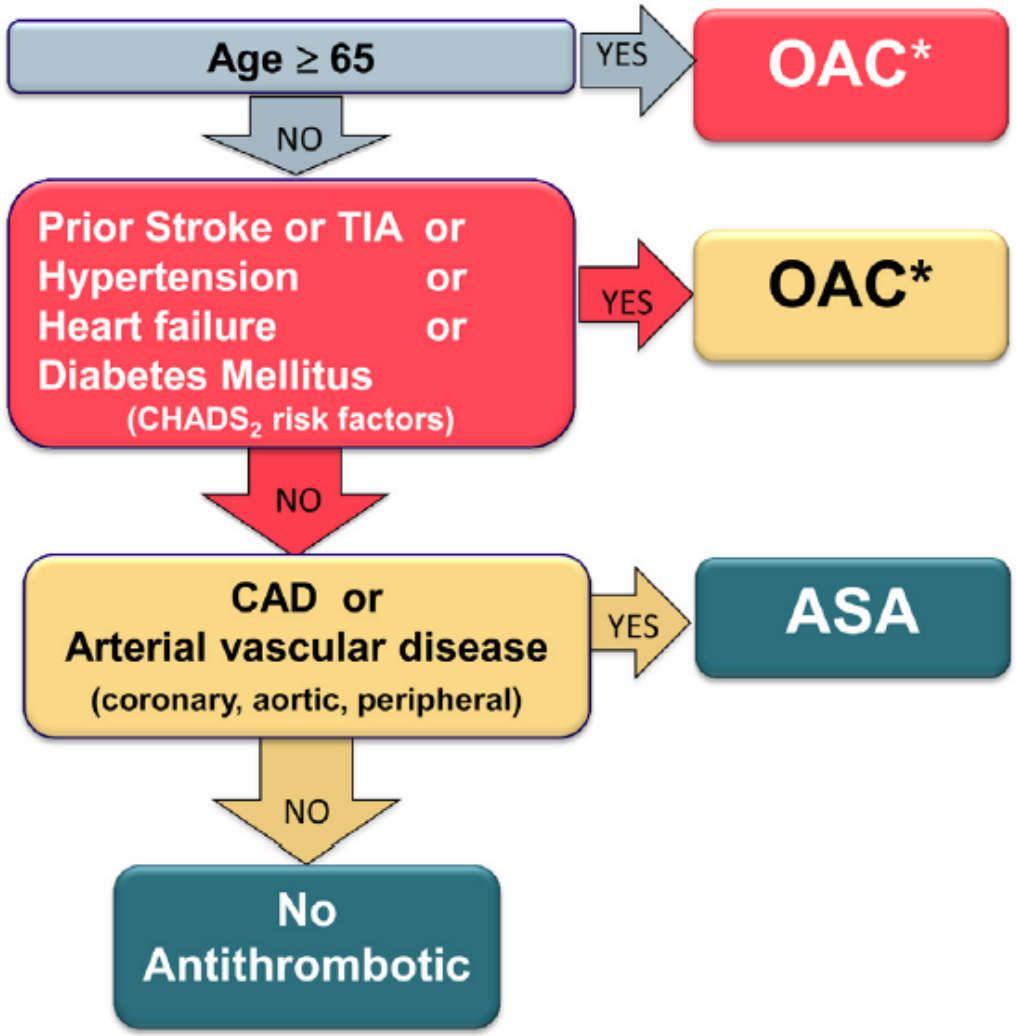
Overview of Rate Management



Drugs are listed in alphabetical order
*β-blockers preferred in CAD
Non-dihydropyridine calcium channel blockers (diltiazem, verapamil)
†Digoxin may be considered as monotherapy only in particularly sedentary individuals

Skanes AC, Healey JS et al., *Can J Cardiol* 2012 Mar;28(2): 125-136

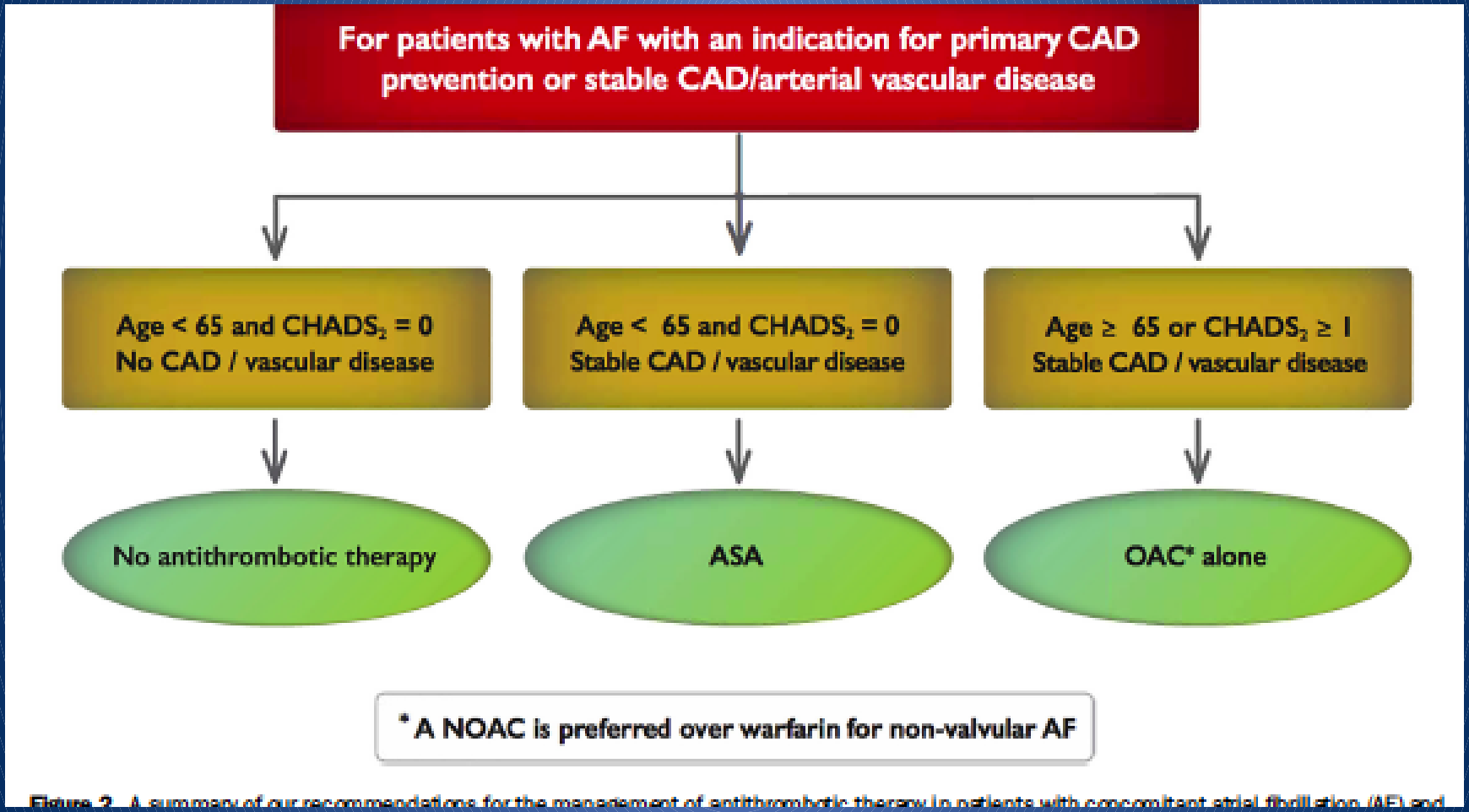
The "CCS Algorithm" for OAC Therapy in AF



Consider and modify (if possible) all factors influencing risk of bleeding during OAC treatment (hypertension, antiplatelet drugs, NSAIDs, excessive alcohol, labile INRs) and specifically bleeding risks for NOACs (low eGFR, age ≥ 75, low body weight).†

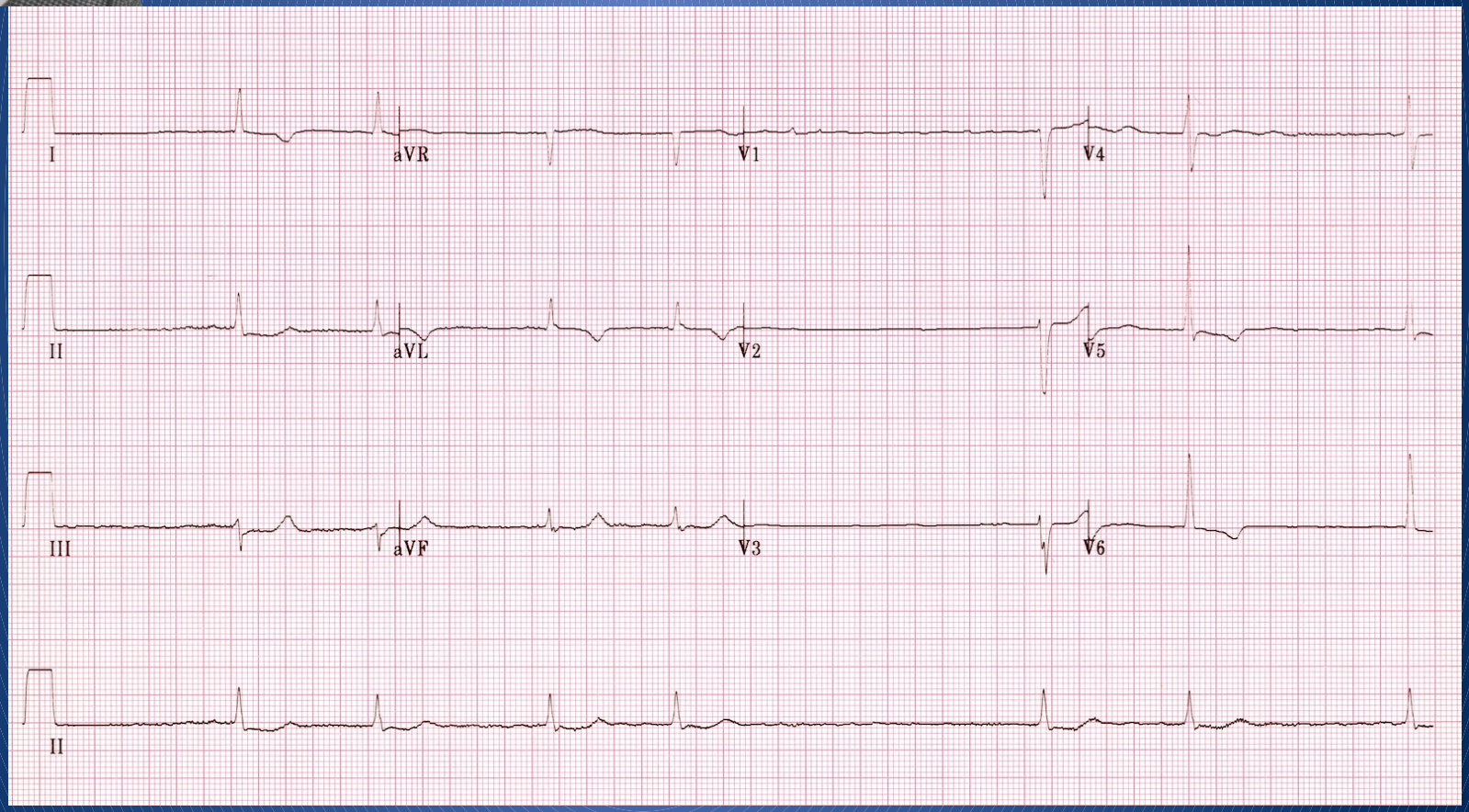
Nonvalvular AF refers to AF in the absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair

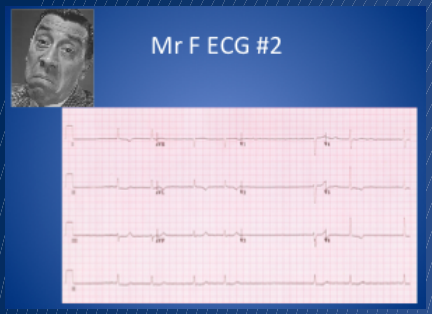
One more thing…



CCS 2016

Mr F ECG #2





Q2

- A. Stop rate control and call Dr Lashevsky
- B. Decrease the dose of rate control agent
- C. Decrease the dose of rate control agent and assess quality of rate control

Sunnybrook
HEALTH SCIENCES CENTRE

Table 8. Summary of Recommendations for Rate Control

Recommendations	COR	LOE	References
Control ventricular rate using a beta blocker or nondihydropyridine calcium channel antagonist for paroxysmal, persistent, or permanent AF	I	B	(93-95)
IV beta blockers or nondihydropyridine calcium channel blocker recommended to slow ventricular heart rate in the acute setting in patients without pre-excitation. In hemodynamically unstable patients, electrical cardioversion is indicated	I	B	(96-99)
For AF, assess heart rate control during exertion, adjusting pharmacological treatment as necessary	I		N/A
A heart rate control (resting heart rate <80 bpm) strategy is reasonable for symptomatic management of AF	IIa	B	(95, 100)
IV amiodarone can be useful for rate control in critically ill patients without pre-excitation	IIa	B	(101-103)
AV nodal ablation with permanent ventricular pacing is reasonable when pharmacological management is inadequate and rhythm control is not achievable	IIa	B	(104-106)

Table 2 Pharmacological classification of commonly used β-adrenergic antagonists (β-blockers)

β-blocker	ISA	Lipid solubility	Peripheral vasodilation	i.v.	Average daily oral dose
I. Non-selective ($\beta_1 + \beta_2$) adrenergic antagonists					
Carteolol	+	Low			2.5—20 mg once/twice daily
Nadolol	0	Low			40—320 mg once daily
Penbutolol	+	Moderate			20—80 mg once/twice daily
Pindolol	++	High			10—40 mg twice daily
Propranolol	0	High		+	40—180 mg twice daily
Sotalol	0	Low		+	
Timolol	0	High			5—40 mg twice daily
II. Selective β_1-adrenergic antagonists					
Acebutolol	+	Moderate			200—800 mg once/twice daily
Atenolol	0	Low		+	25—100 mg once daily
Betaxolol	0	Moderate			5—20 mg once daily
Bisoprolol	0	Moderate			2.5—10 mg once daily
Celiprolol	+	Moderate	+		200—600 mg once daily
Esmolol	0	Low		+	Only i.v.
Metoprolol	0	High		+	50—100 mg once/twice daily
Nevibolol	0		+		2.5—5 mg once daily
III. α_1- and β-adrenergic antagonists					
Bucindolol	+	Moderate	+		25—100 mg twice daily
Carvedilol*	0	Moderate	+		3.125—50 mg twice daily
Labetalol	+	Low	+		200—800 mg twice daily

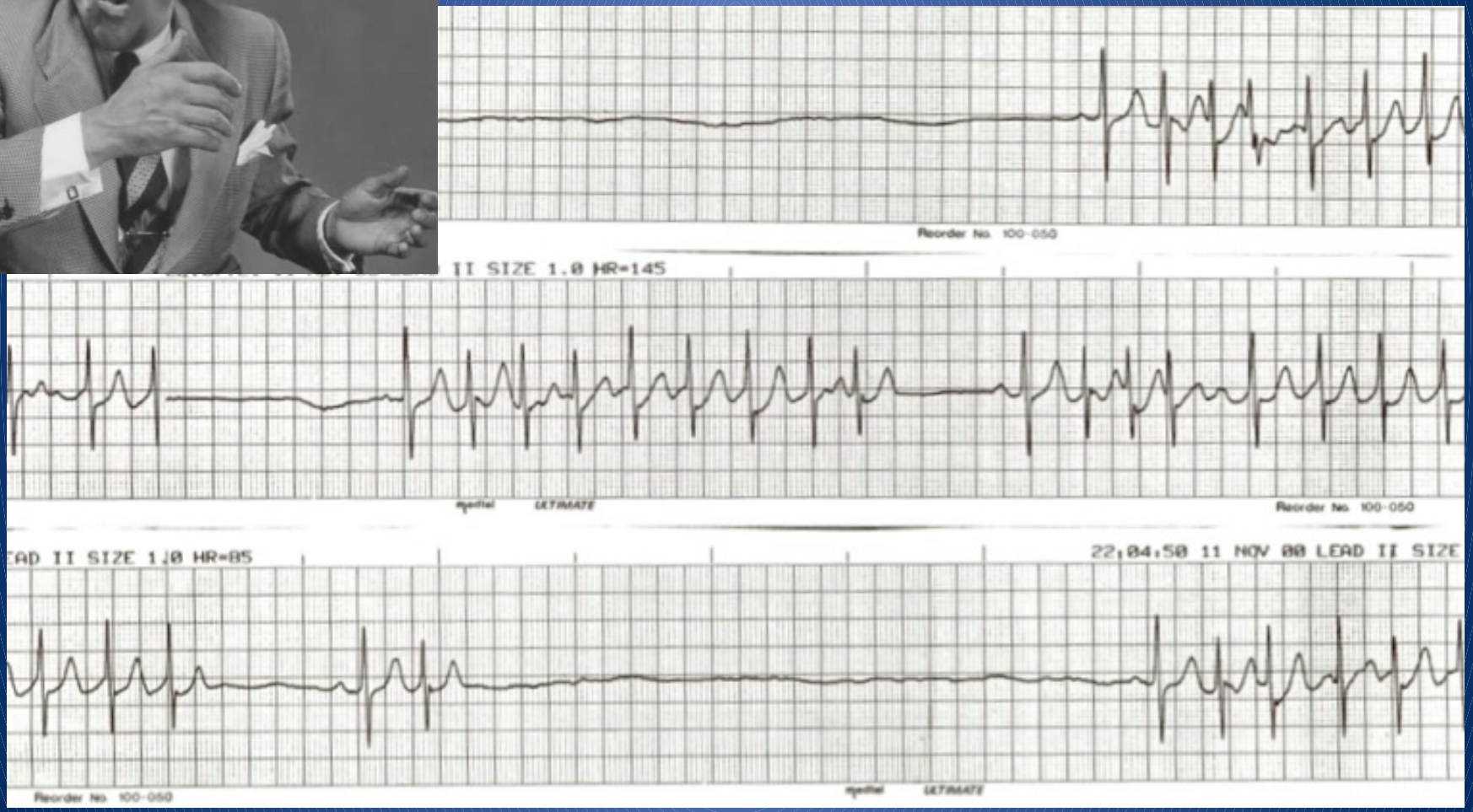
ISA: Intrinsic Sympathomimetic Activity; i.v.: Intravenous administration possible; AMI: Acute Myocardial Infarction; CHF: Chronic Heart Failure. Included only β-blockers with demonstrated efficacy on clinical outcomes and supporting the guidelines recommendations.

* In some studies there was lack of evidence for peripheral α_1-adrenoceptor blockade during long-term treatment of heart failure with carvedilol.[229]

Monitoring

- Stress test*
- Holter during regular daily activity

Mr F ECG #3


II SIZE 1.0 HR=145
Reorder No. 100-050
LEAD II SIZE 1.0 HR=85
22:04:50 11 NOV 00 LEAD II SIZE
Reorder No. 100-050

Conversion Pause

- In both rhythm and rate control
- Manifests as syncope or pre-syncope
- Most of the time requires pacemaker
- Ablation is the solution for a few
- Medical treatment modification
- If suspected best way of action is ER
- ?Recent Rx changes

Digoxin

Digoxin can be considered …to achieve rate control in …AF and symptoms caused by rapid ventricular rates whose response to b-blockers and/or calcium channel blockers is inadequate, or in whom … they are contraindicated or not tolerated

Digoxin is considered a 2nd-line agent because although some published cohort, retrospective, and subgroup studies show no harm, there are others that suggest possible harm.

CCS 2016

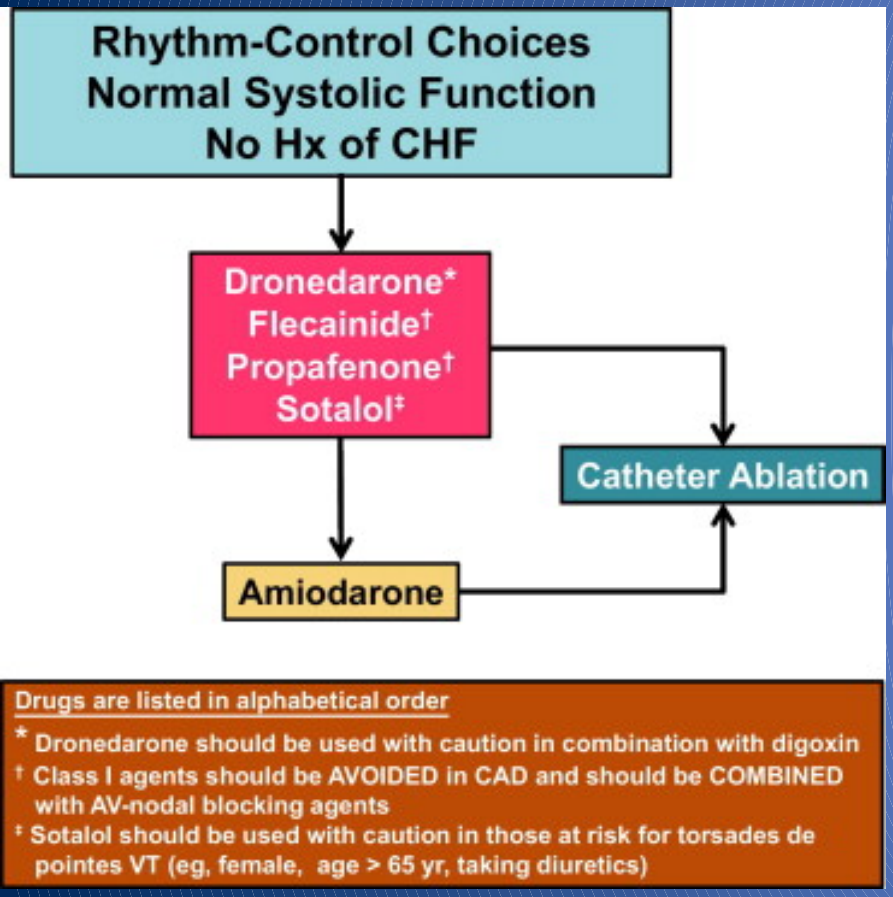
Rhythm control?

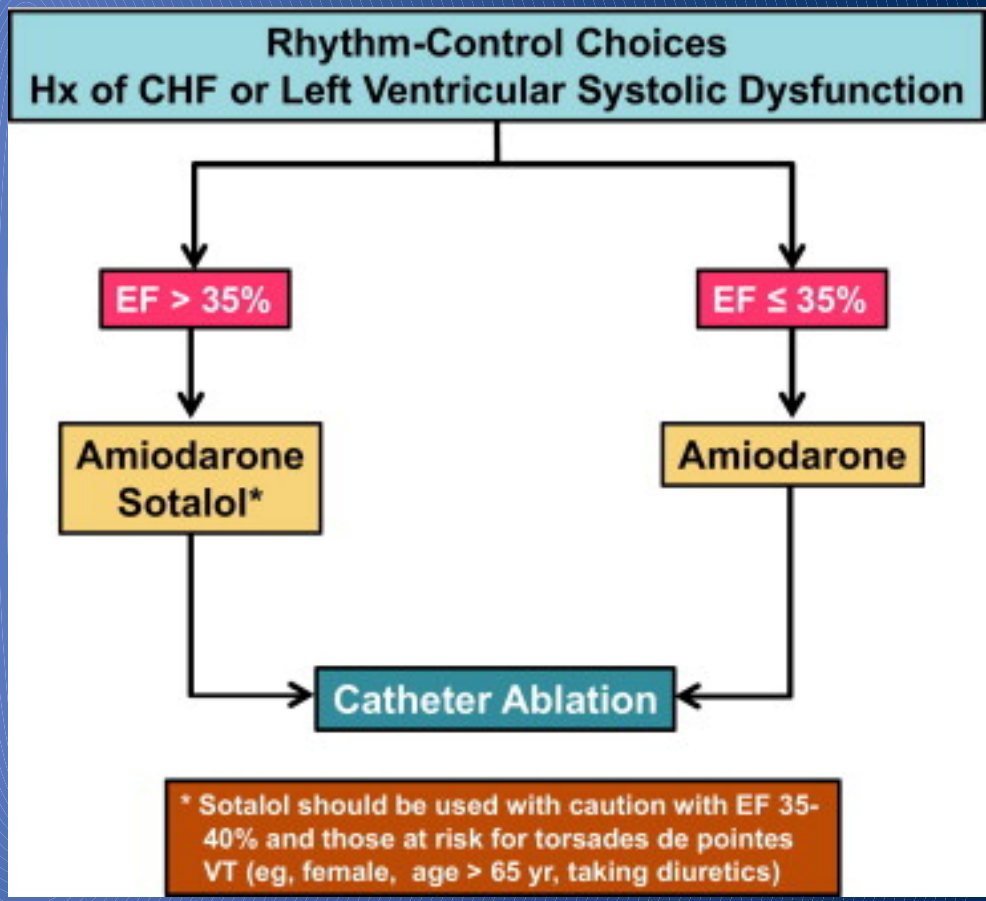
- Antiarrhythmic meds
- Ablation
- Corrective behavioral and other approaches

Antiarrhythmic therapy in rhythm control of AF

- CCS 2014,2016 are almost silent

Figure 4

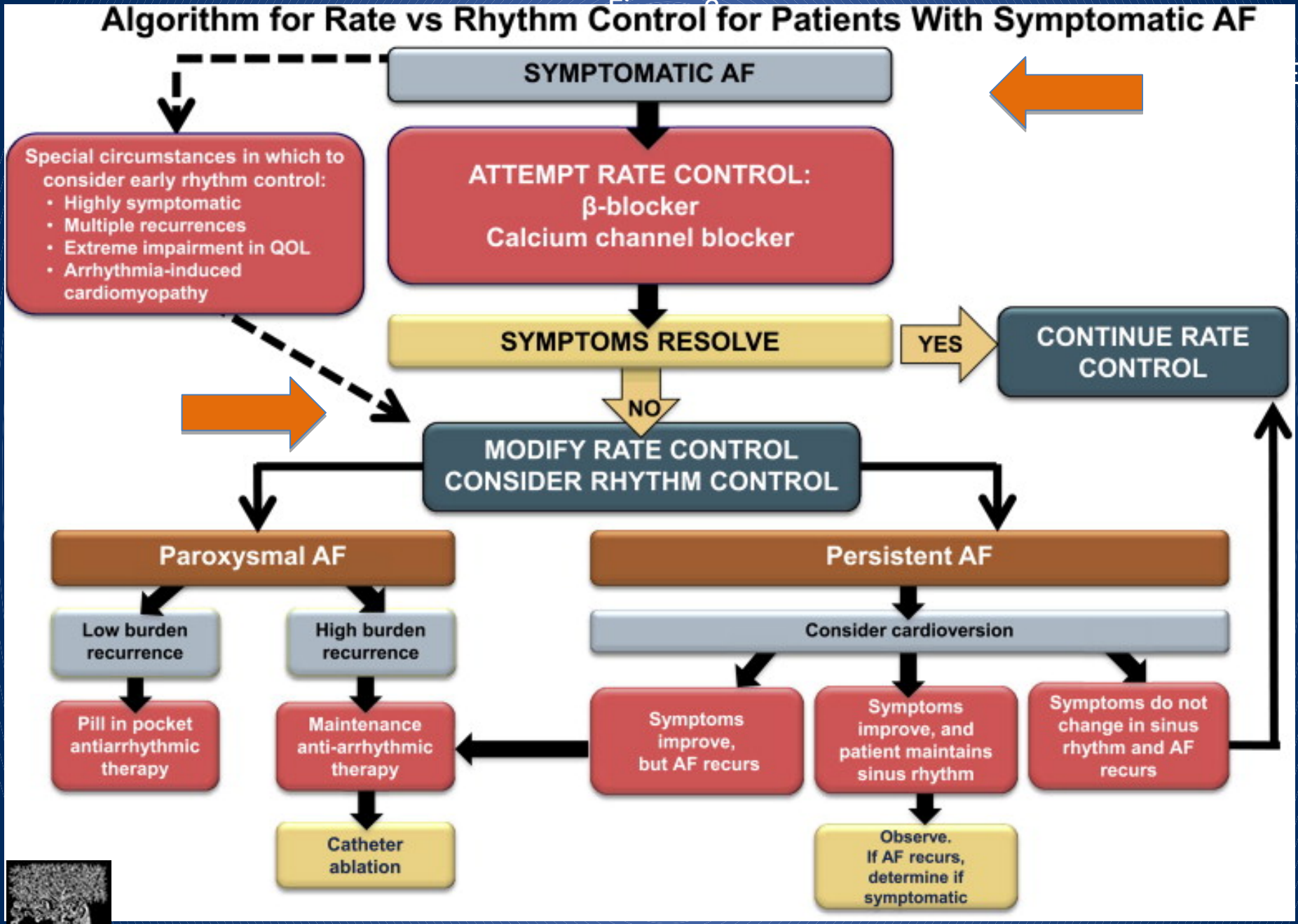




Canadian Journal of Cardiology 2012 28, 125-136DOI: (10.1016/j.cjca.2012.01.021)

Who is comfortable to prescribe propafenone, flecainide or amiodarone???

Algorithm for Rate vs Rhythm Control for Patients With Symptomatic AF

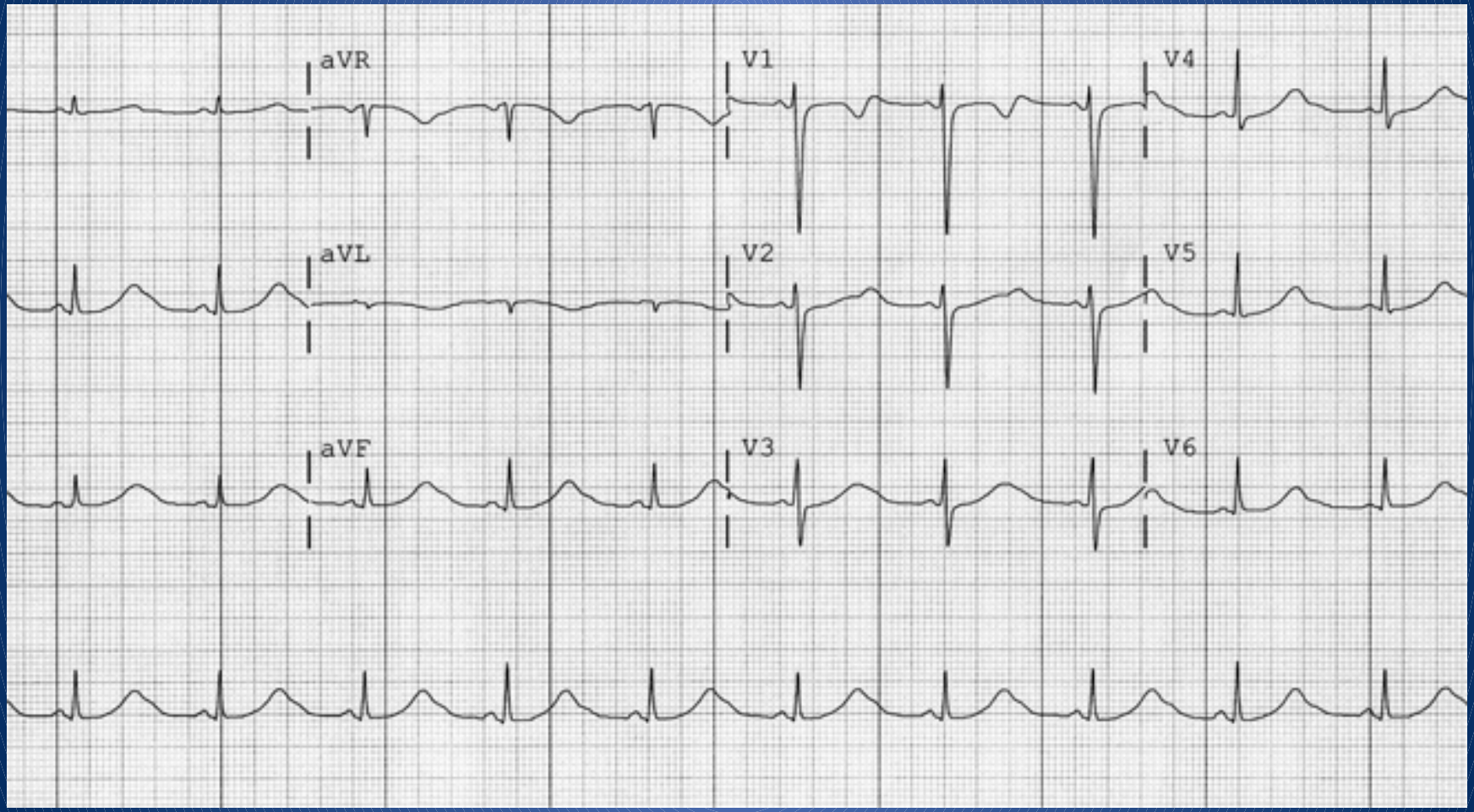


Canadian Journal of Cardiology 2014 30, 1114-1130DOI: (10.1016/j.cjca.2014.08.001)

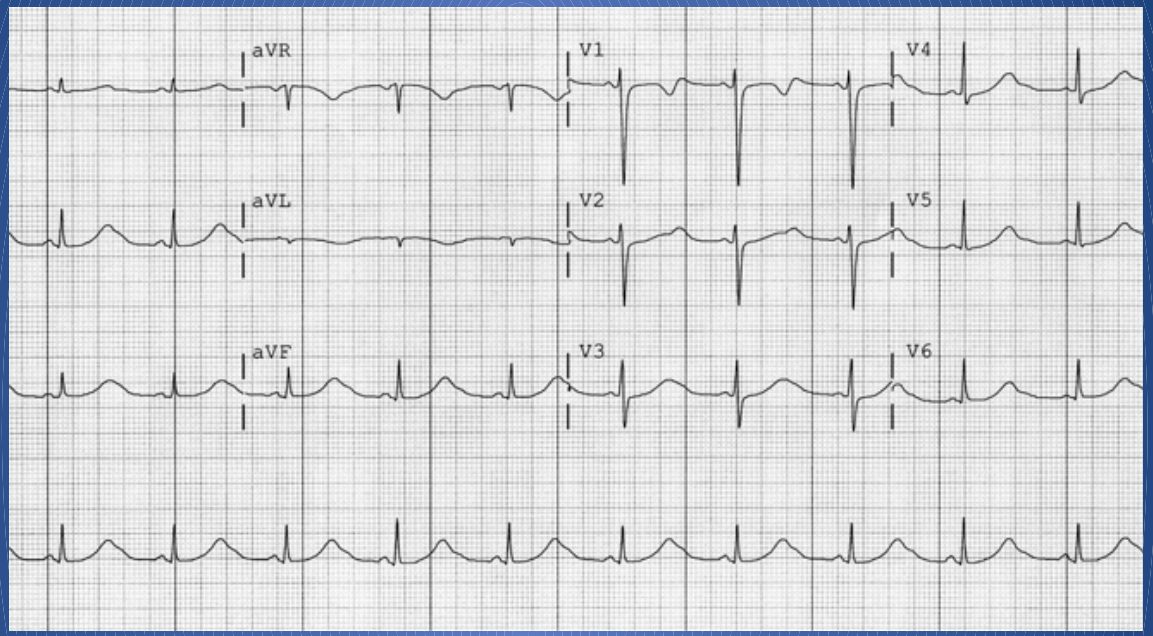
Ms A

- 62 yo women, long standing HTN, DM
- A Fib known for 10 years
- Extremely rare episodes on medical treatment (HCTZ, Atacand, Sotalol); occasional brief dizziness
- Annual elective ECG

Ms A ECG



Ms A



a. No arrhythmia, good to go
b. I need to review strategy
c. I need to send her to ER

Long QTc

- Acquired LQT may be result of antiarrhythmic meds, combination of antiarrhythmics with other meds, renal failure, hypokalemia, hypomagnesemia etc
- Patients on Sotalol should have renal function monitored, should be warned of potential interaction with other meds, have electrolytes monitored

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Bisoprolol	0	Moderate			2.5—10 mg once daily
Celiprolol	+	Moderate	+		200—600 mg once daily
Esmolol	0	Low		+	Only i.v.
Metoprolol	0	High		+	50—100 mg once/twice daily
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Other ECG signs of antiarrhythmic therapy toxicity

- QRS duration for **propafenone, flecainide**
- Bradycardia for **flecainide**
- Uncontrolled flutter/fibrillation for **propafenone**

What else was wrong with Ms A?

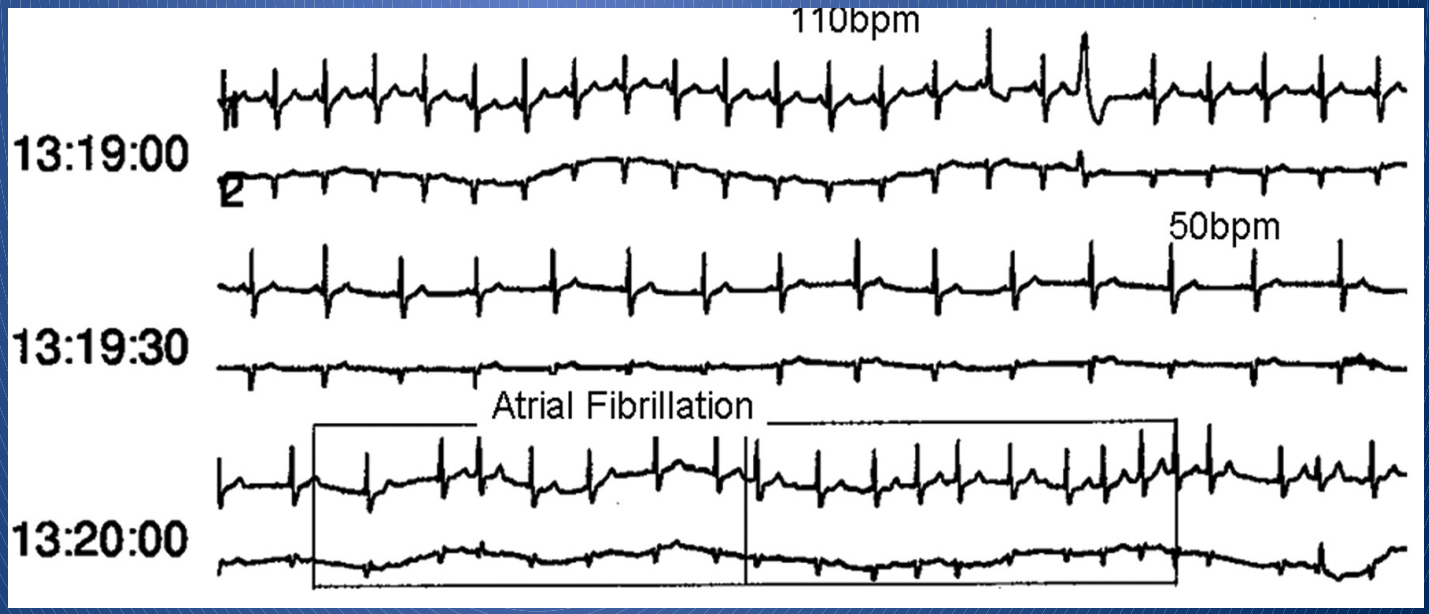
62 yo women, long standing HTN, DM

A Fib known for 10 years

Extremely rare episodes on medical treatment (HCTZ, Atacand, Sotalol); occasional brief dizziness

Annual elective ECG

Mr F ECG 6



Risk Factors for AF

Clinical Risk Factors	References
Increasing age	(35)
Hypertension	(35)
Diabetes mellitus	(35)
MI	(35)
VHD	(35)
HF	(35, 36)
Obesity	(37-39)
Obstructive sleep apnea	(39)
Cardiothoracic surgery	(40)
Smoking	(41)
Exercise	(42-44)
Alcohol use	(45-47)
Hyperthyroidism	(48-50)
Increased pulse pressure	(51)
European ancestry	(52)
Family history	(53)
Genetic variants	(54-57)

2014 AHA/ACC/HRS Atrial Fibrillation Guideline

Lone atrial fibrillation in athlete

- 300 top Finnish orienteers vs 495 controls
- Mean age 47 vs 49 years
- Subjects with risk factors for AF were excluded
- 10 year follow up
- Lone AF developed **5.8 times more frequent** in athletes than in the control group
- Mean age at 1st episode of AF was 52 years with an average of 36 years of training

Karjalainen J et al. BMJ 1998; 310: 1784-85

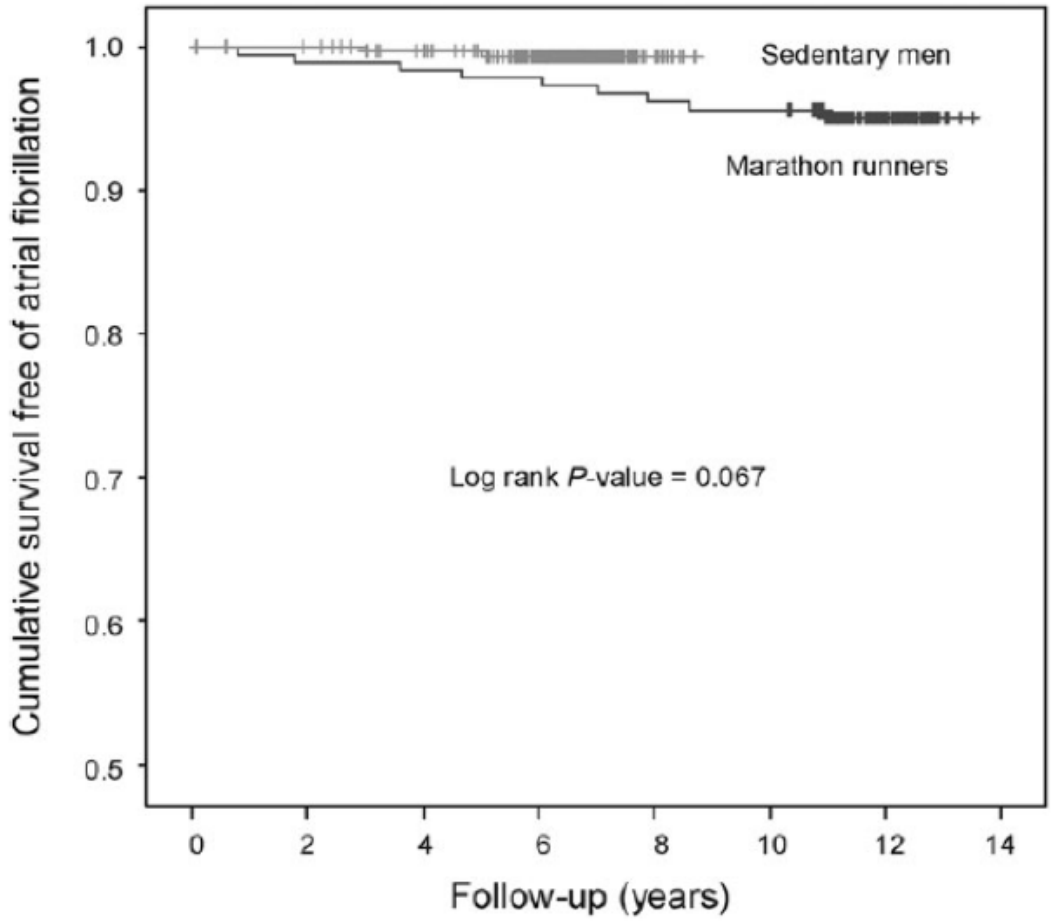


Figure 2 The Kaplan–Meier survival curves for cumulated survival free of lone atrial fibrillation in sedentary men and marathon runners.

Annual incidence rate:
Marathon runners: 0.43/100
Control subjects: 0.11/100

Molina L et al. *Europace* 2008; 10: 618-23

Lifetime physical activity and development of lone atrial fibrillation

Table 5 Adjusted odds ratios and 95% confidence intervals of lone atrial fibrillation for cumulated moderate and heavy physical activity, height, and left atrial anteroposterior diameter

	Odds ratio (95% confidence interval)	*P*-value
Cumulated moderate and heavy physical activity		
0–2077 h	1	
2078–9318 h	5.60 (1.59–19.75)	0.0075
≥9319 h	15.11 (3.75–60.83)	0.0001

Mont L. el al *Europace* 2008; 10: 15-20

Hallmark of exercise related AF/AT?

- Hx of intense and frequent exercise
- Vagal sinus brady in rest
- Association with exercise (sometimes delayed)
- History, Diary and Holter are the keys!

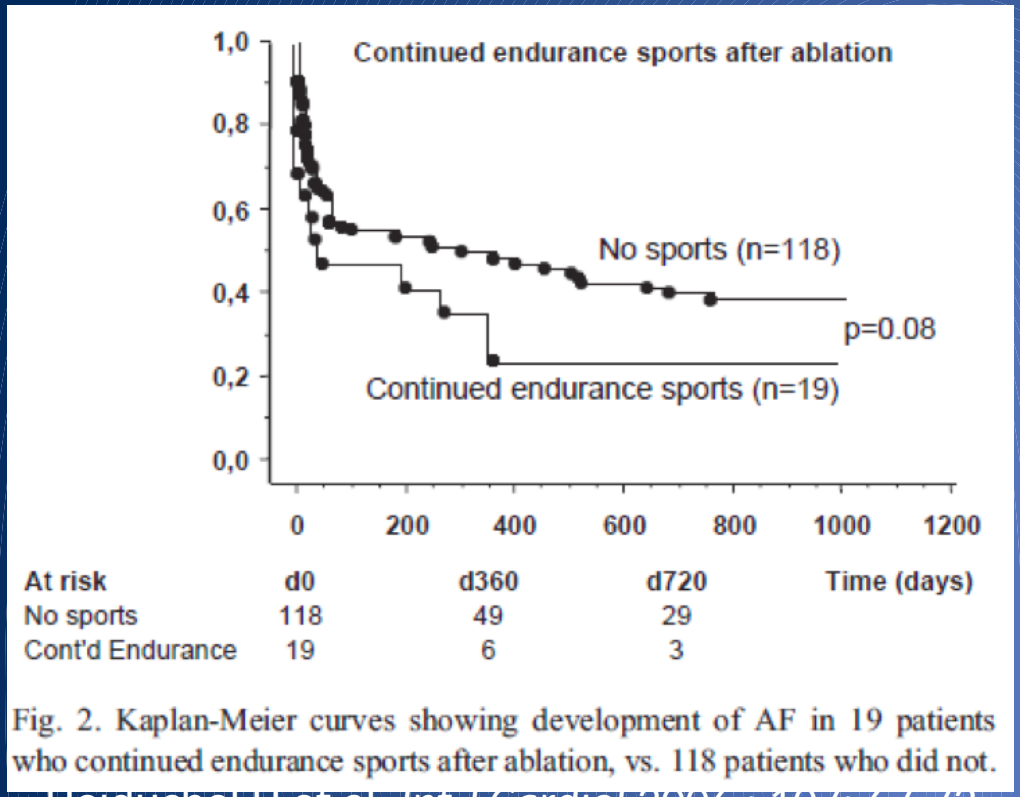
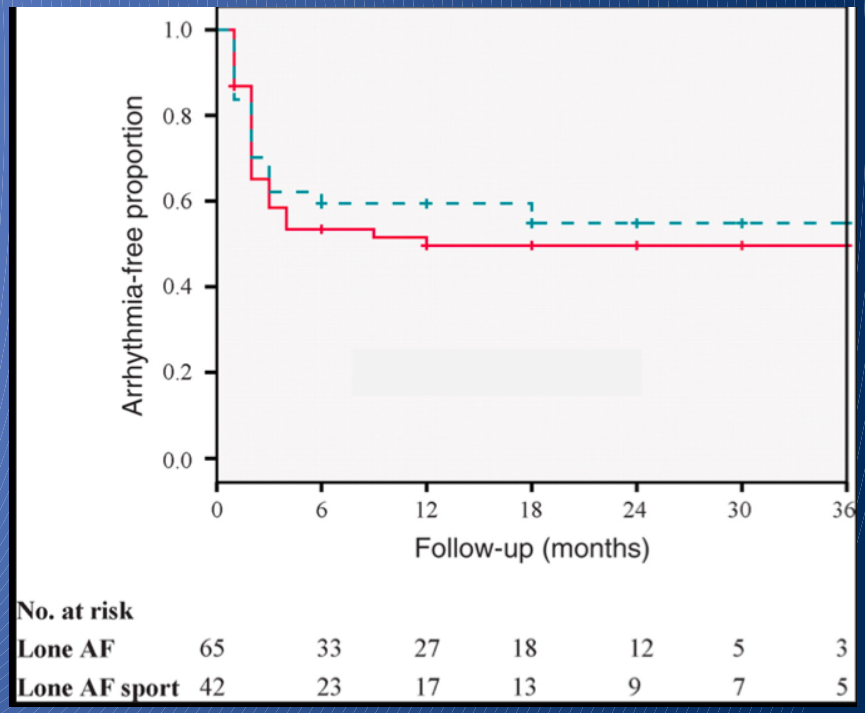
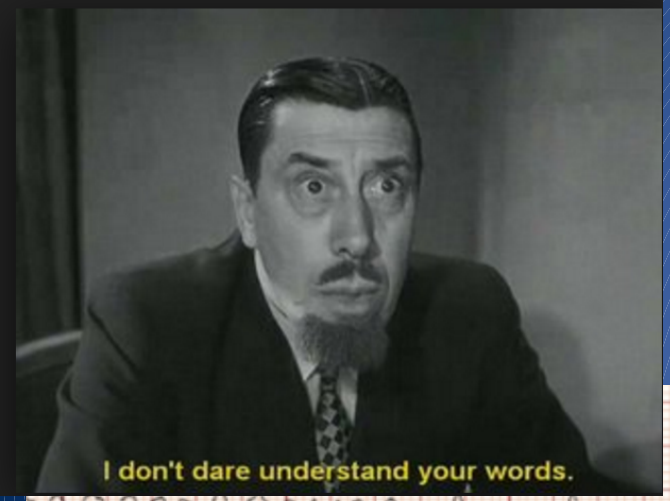


Fig. 2. Kaplan-Meier curves showing development of AF in 19 patients who continued endurance sports after ablation, vs. 118 patients who did not.

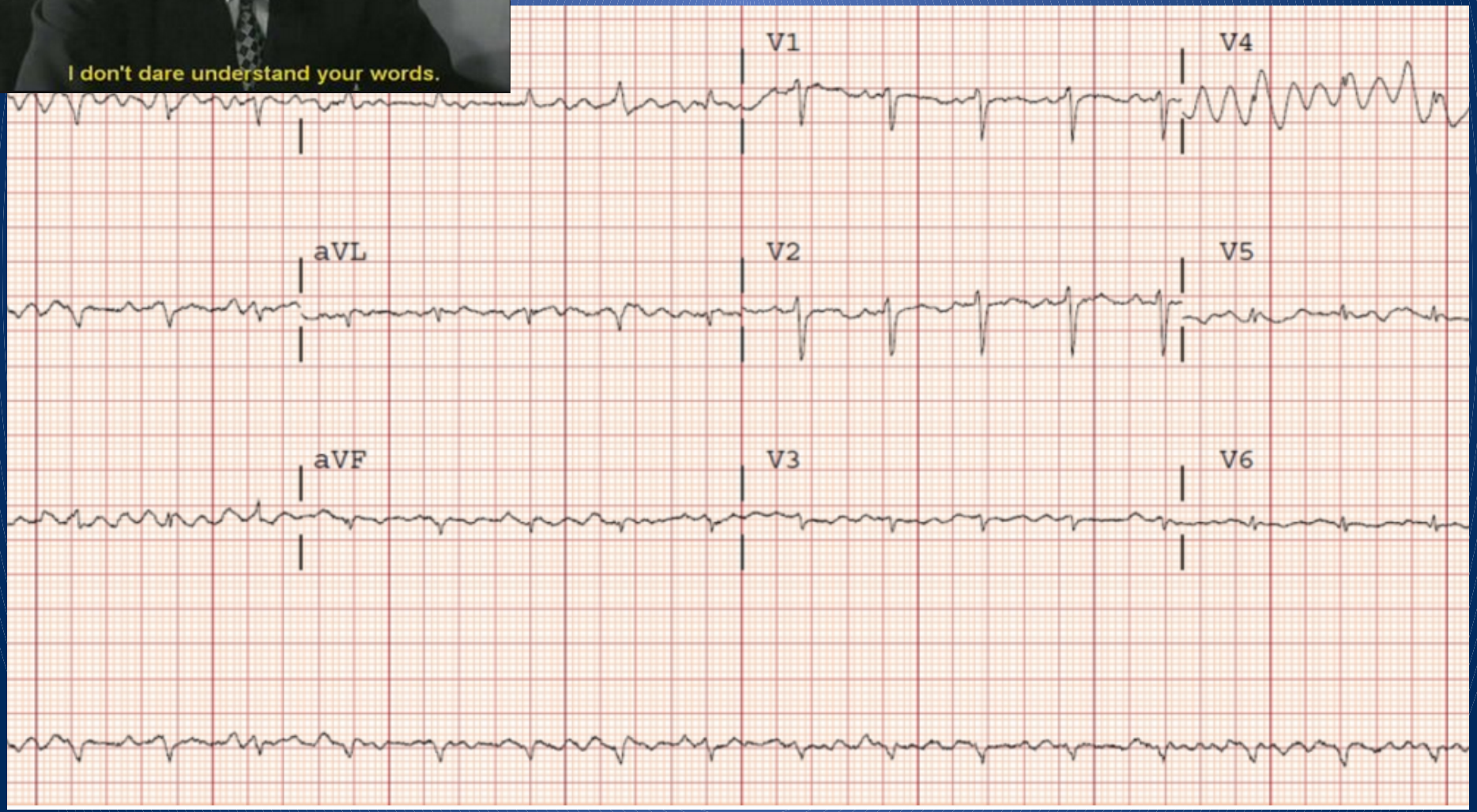
Heiduchel H et al. *Int J Cardiol* 2006 ; 107: 67-72



Calvo N et al. *Europace* 2010;12:30-36

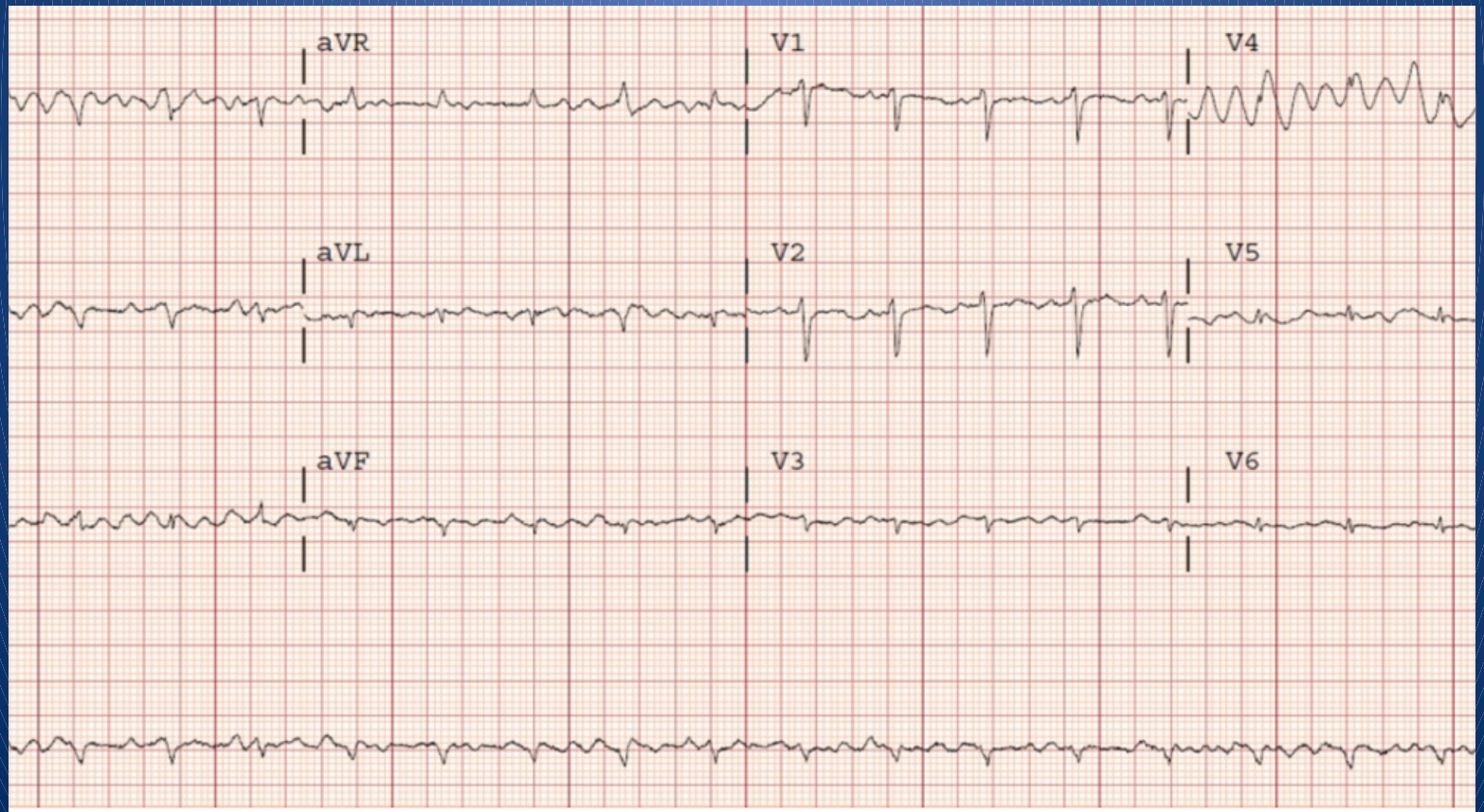


Mr F Case 8

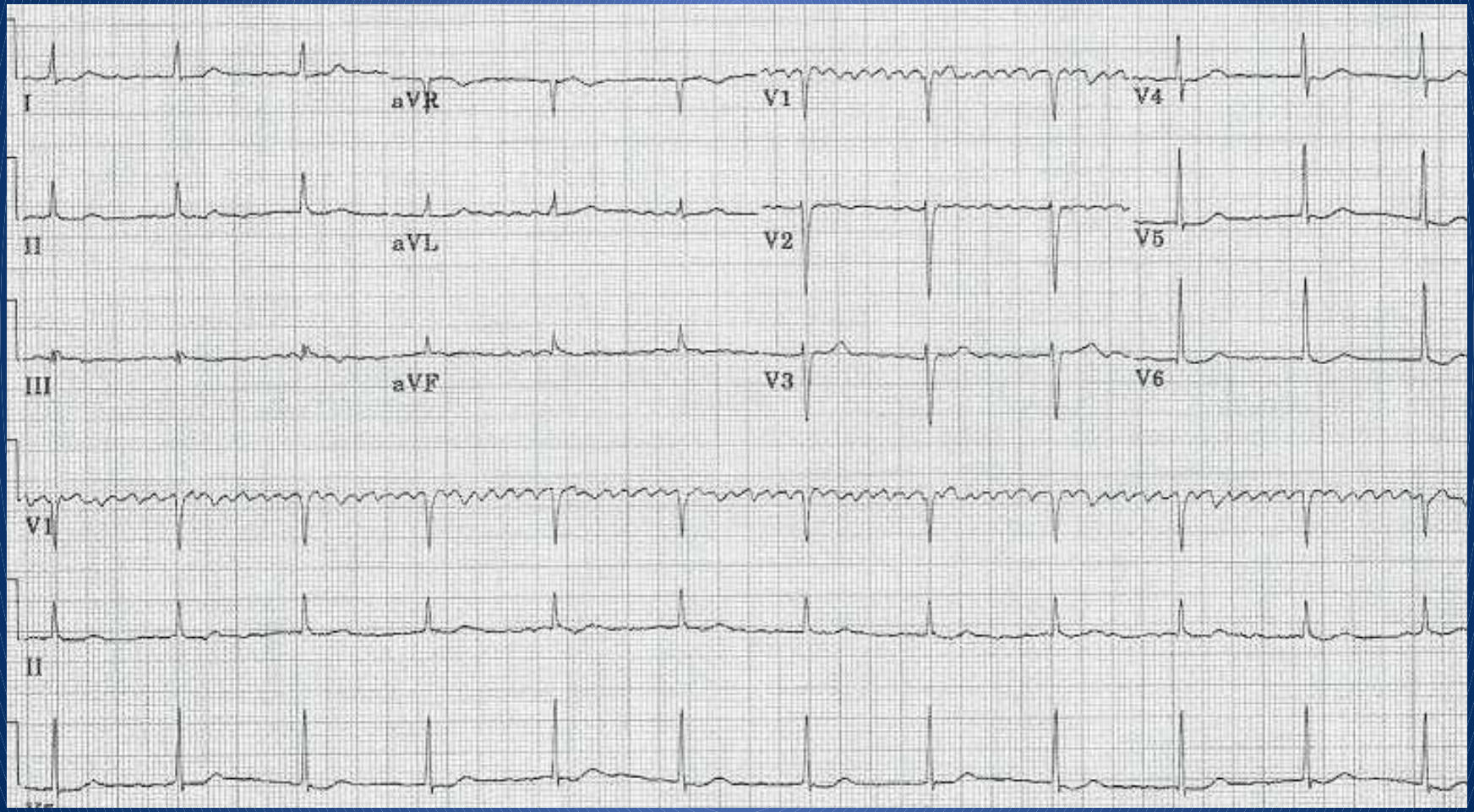


What do you think?

- A. It is asymptomatic atrial fibrillation
- B. It is coarse flutter



Is it atrial fibrillation?



AF hallmarks

- Absence of P waves across all leads available
- Atrial fibrillatory activity (V1, III)
- Irregularly irregular QRS (in absence of AV block)
- Usually fast

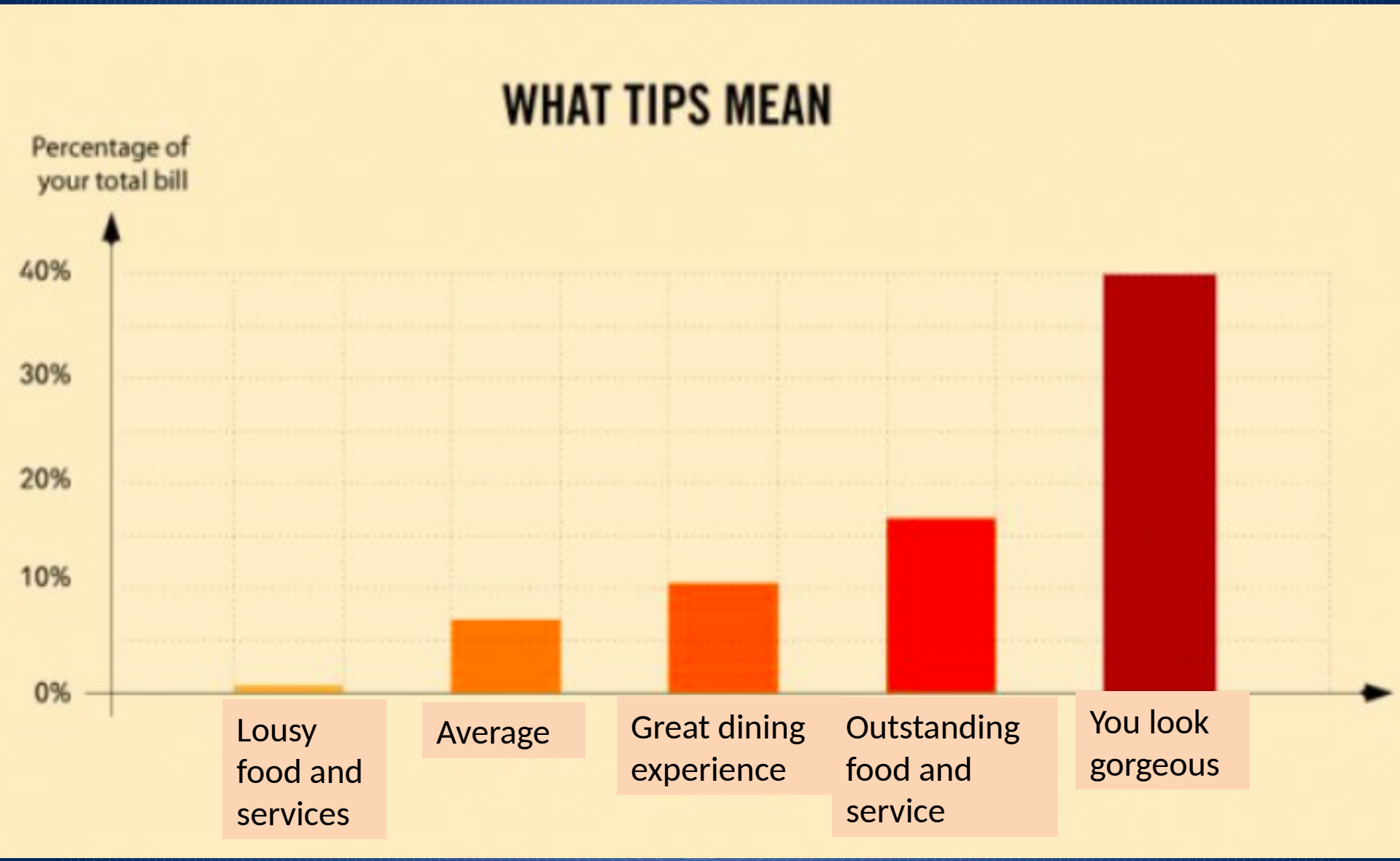
ECG in patient with AF

- Important diagnostic tool
- Rate, rhythm, change in rhythm
- Symptoms-rhythm correlation!
- Wide QRS during may represent WPW
- ST-T changes, LVH may provide a clue on underline disease
- Bradycardia, PR, QTc, QRSd are important to recognize Rx toxicities
- Ask and review the documentation of AF whenever feasible!!!!

CCS 2014 on ablation

- We recommend catheter ablation of AF in patients who remain symptomatic after … AAD therapy and in whom a rhythm control strategy remains desired
- We suggest catheter ablation to maintain sinus rhythm as first-line therapy for relief of symptoms in highly selected patients with symptomatic, paroxysmal AF
- We suggest that catheter ablation of AF should be performed by electrophysiologists with a high degree of expertise and high annual procedural volumes

Tips…


WHAT TIPS MEAN
Percentage of your total bill
40%
30%
20%
10%
0%
Lousy food and services
Average
Great dining experience
Outstanding food and service
You look gorgeous

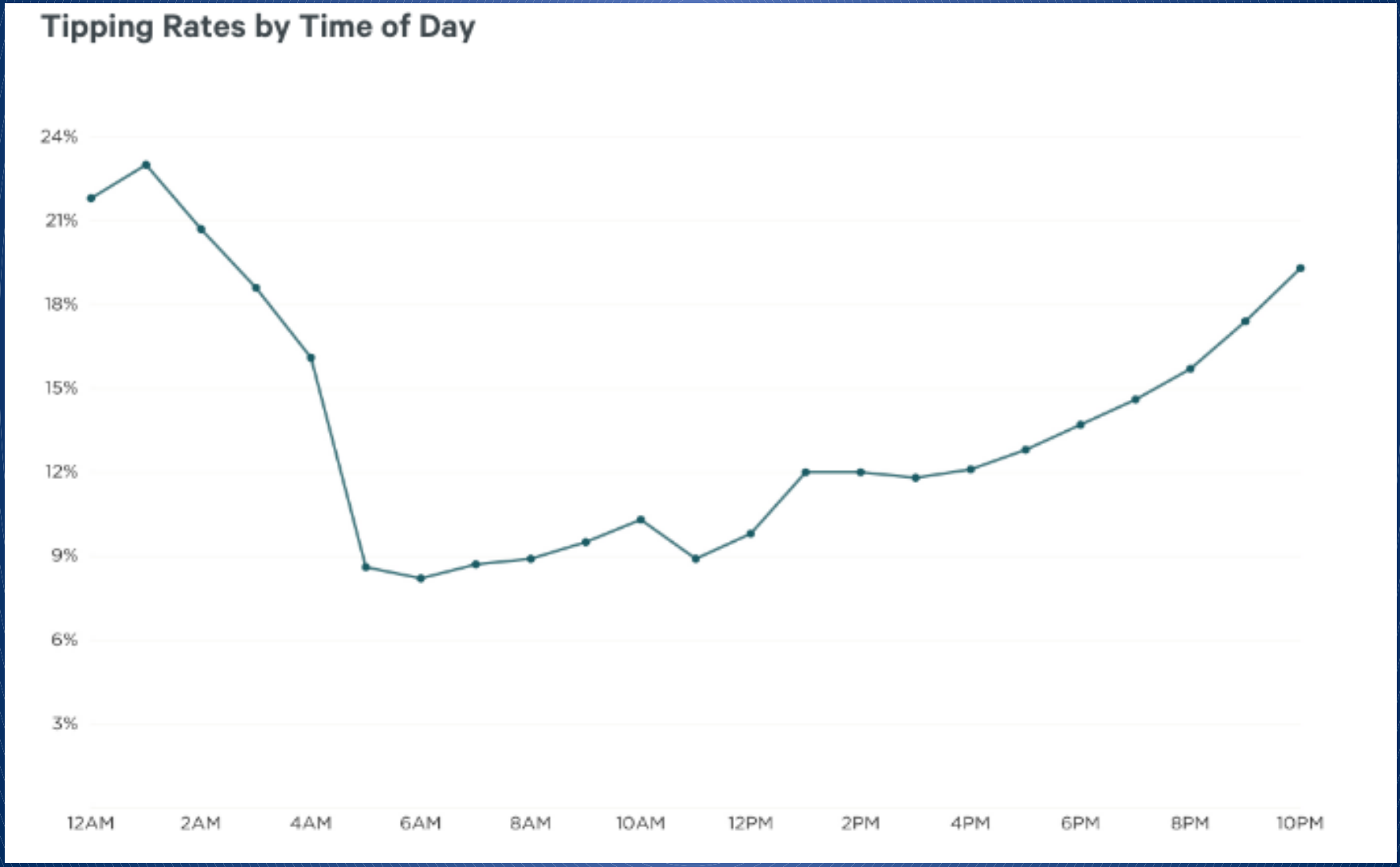
Practical tips from CCS

- The following represents an ideal, but not exclusive, profile of a patient who is referred for consideration of AF ablation today:
  - age < 80 years, symptomatic with their AF,
  - has tried but treatment has failed or is intolerant of AAD therapy,
  - has paroxysmal AF or short standing persistent AF, and minimal to moderate structural heart disease (such as left ventricular dysfunction or valvular disease).

CCS 2014 practical tips

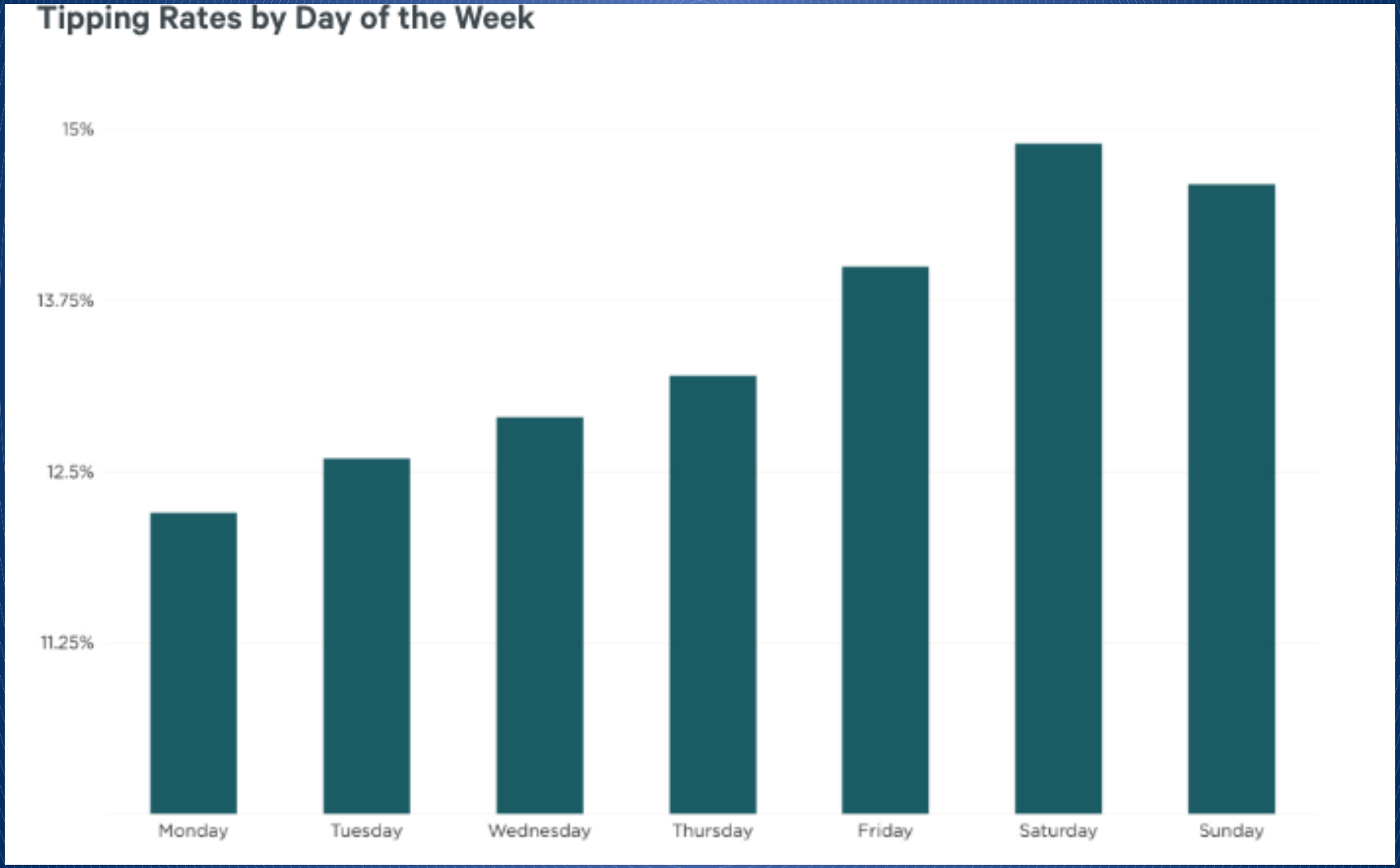
- AF ablation should not be considered as an alternative to OAC.
- …patient with high thromboembolic risk profile, … should continue anticoagulation … after successful AF ablation
  - Studies of long-term monitoring have consistently shown asymptomatic episodes of AF before and after ablation.
- Initiation of OAC should also not be delayed when indicated in patients pending referral for AF ablation

Tipping science



https://www.simple.com/blog/simple-insights-lets-talk-tipping

Tipping science



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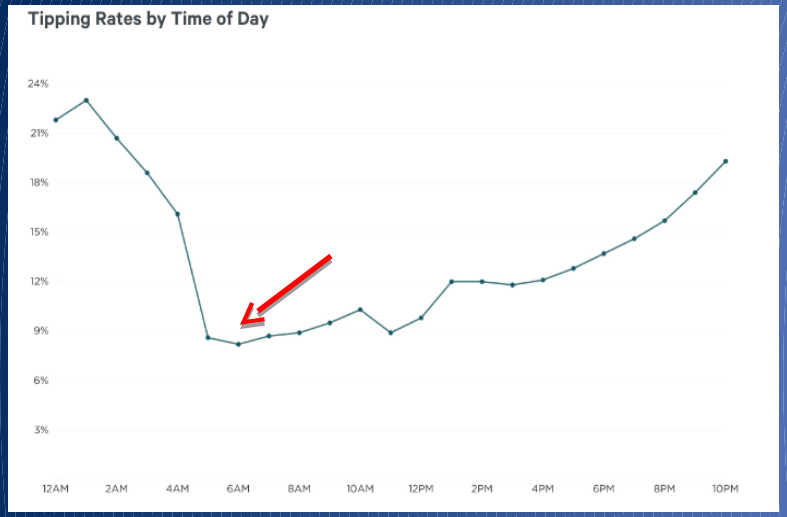
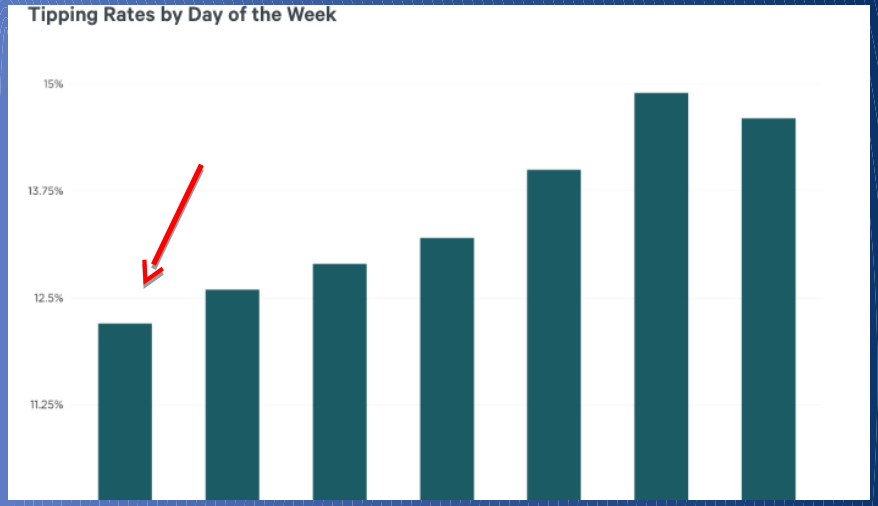
Tipping Science: Conclusion





Conclusion:
Dinner is between 4 and 5 AM on Monday is a better deal

Science of tipping

- The expectations for the tip are lower during the earlier meals (by about 50%) and is raising up from Monday toward the weekend by 50%