PRACTICAL APPROACHES TO ATRIAL FIBRILLATION MANAGEMENT

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Disclosure

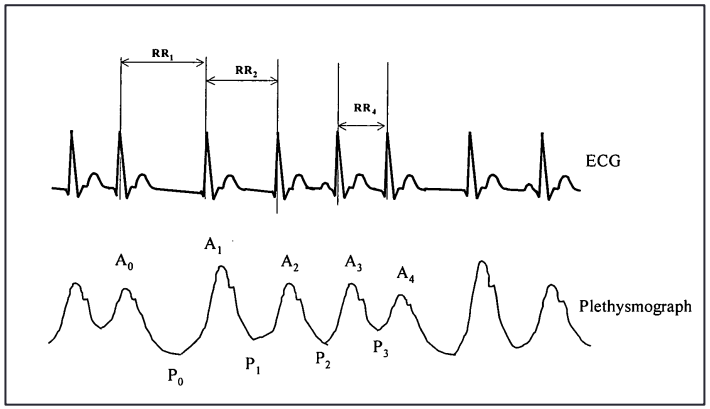
- None

Learning Objectives: Common Questions

- Practical approach to AF management
- Updates in current recommendations and evidence
- Triage, reducing stroke risk, management of AF

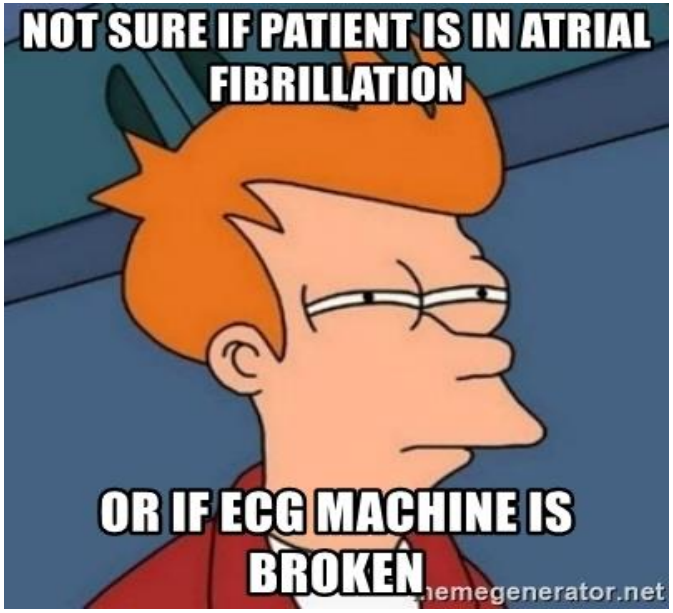
What to do with irregular rhythm?

- Setting: Outpatient clinic, Walk-in urgent care, inpatient, post-op, ED
- Reported symptom, on examination or wearable
- **CONFIRM DIAGNOSIS**
- Example of AF mimics:
  - Slow heart rate
  - Fast heart rate
  - PVCs
  - PACs
  - Multifocal atrial tachycardia
  - Wandering atrial pacemaker



What to do with irregular rhythm?

- Start with **ECG**
- New diagnosis or previously known
- Define symptom
  - Frequency, duration and severity => Ambulatory ECG monitor
- Define individual characteristic
  - Risk factors
  - Structural heart disease => **Echocardiogram**



EVERY diagnoses of AF should include assessment of cardiac structure/function baseline (even before or concurrent consideration for ischemic workup)

What do we do next?

- How is the patient feeling? How do they look?
- Most symptom response to simple rate control with oral medications
  - Beta-blockers
  - Calcium channel blockers
  - Digoxin
- **Very rarely is BP a limitation to starting oral rate control**
- *Elevated heart rate alone should not be the only factor in triage*

Why go to ED?

- Overlapping symptoms that concerning for decompensation such as extremely short of breath

- **Rapid IV rate control**
  - IV betablockers or calcium channel blocker

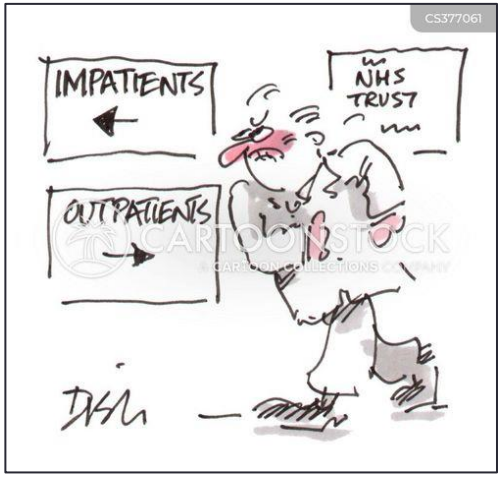
- Urgent rhythm control with DCCV
  - DCCV – Highly symptomatic
  - Antiarrhythmics – Moderately symptomatic requiring ED visits
  - Ablation – Never an emergent intervention

When do we hospitalize?

- Uncertain or unstable underlying arrhythmia
  - Acute MI, altered mental status, decompensated HF, or hypotension
  - Intolerable symptoms despite hemodynamic stability
- Telemetry monitoring during initiation of certain antiarrhythmic drugs
- For elective cardioversion when outpatient setting is not available

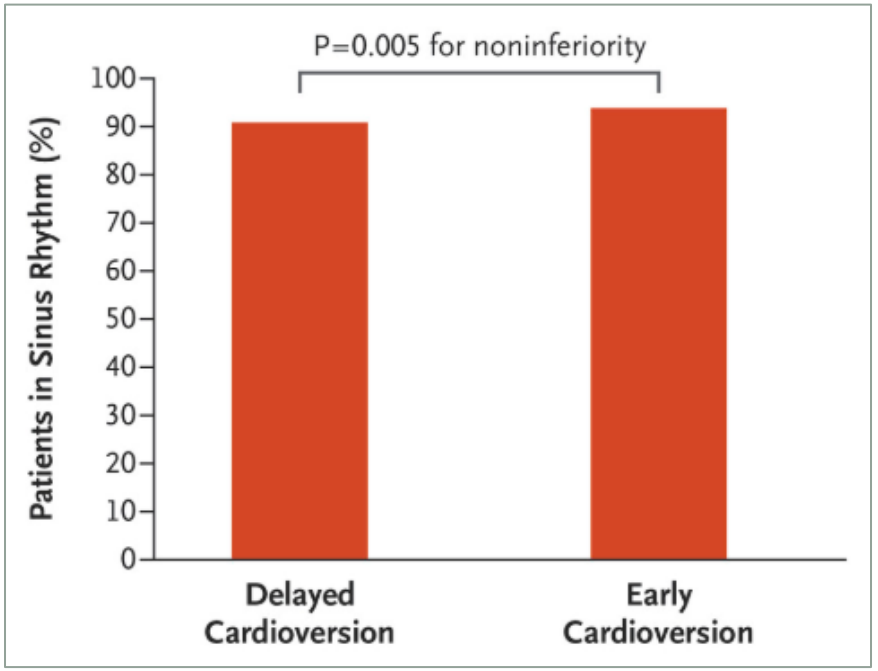
Ambulatory versus ED

- ED is rapid diagnosis and management => Increases cost, increases admission rate
- Ambulatory management improved patient satisfaction, decrease adverse outcome, less costly for patient
- Access to cardiology service

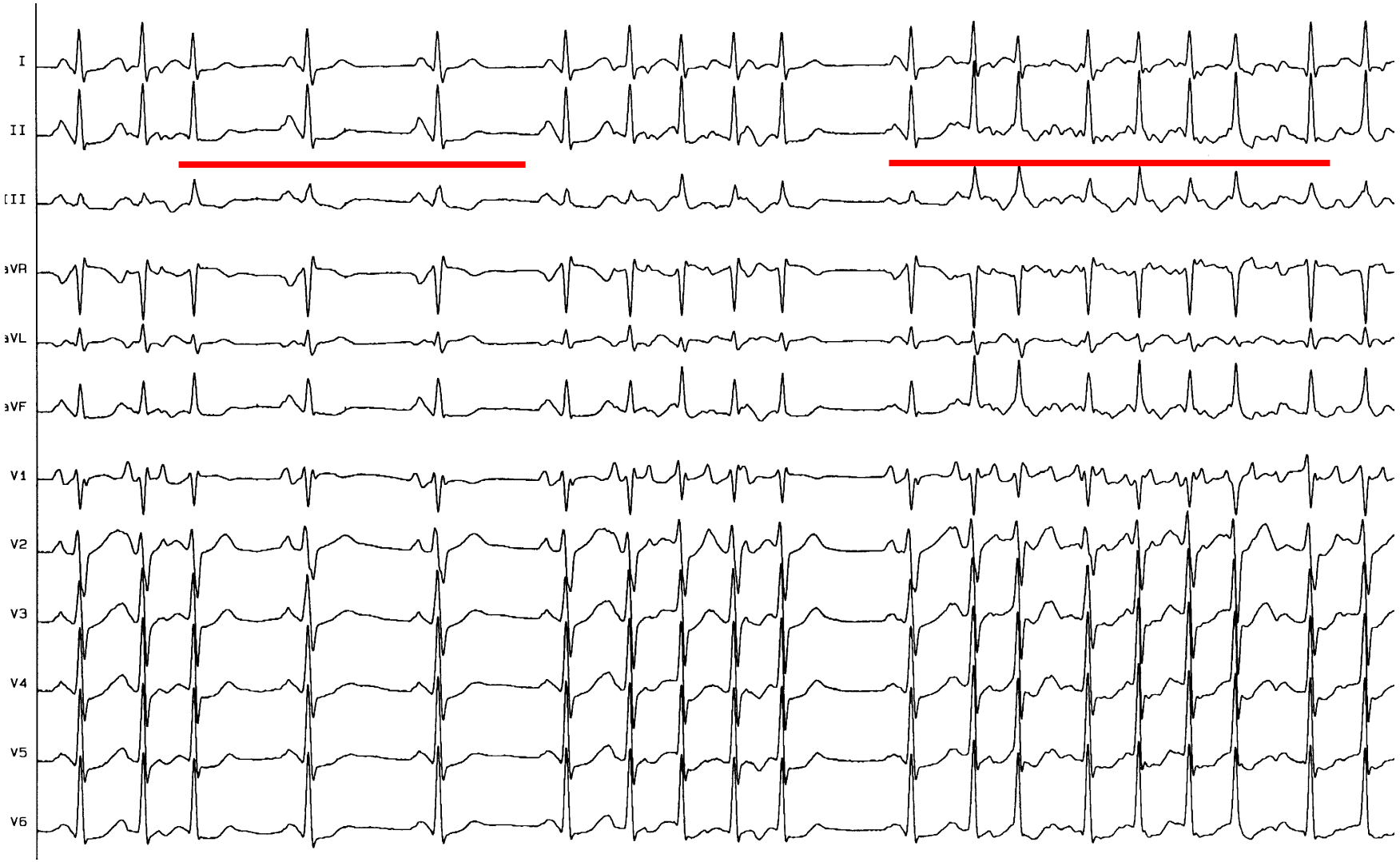


Why relaxed management is better in most clinical scenario?

- Most patient self cardiovert => 60% self cardiovert within 24 hours
- Spontaneous termination in ED on inpatient confirms the above

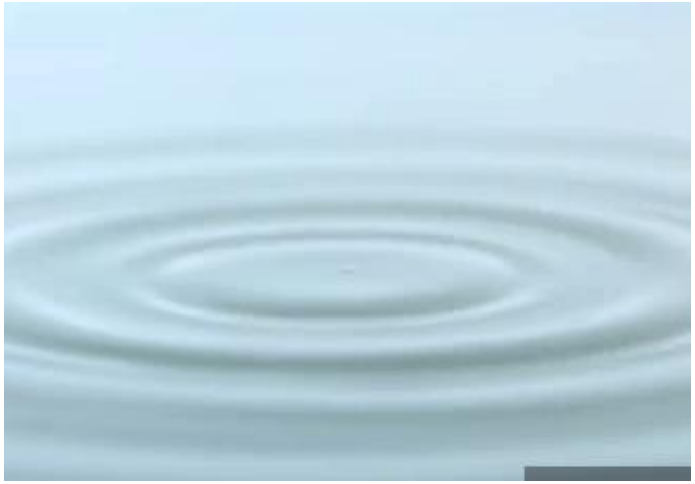


What is atrial fibrillation?



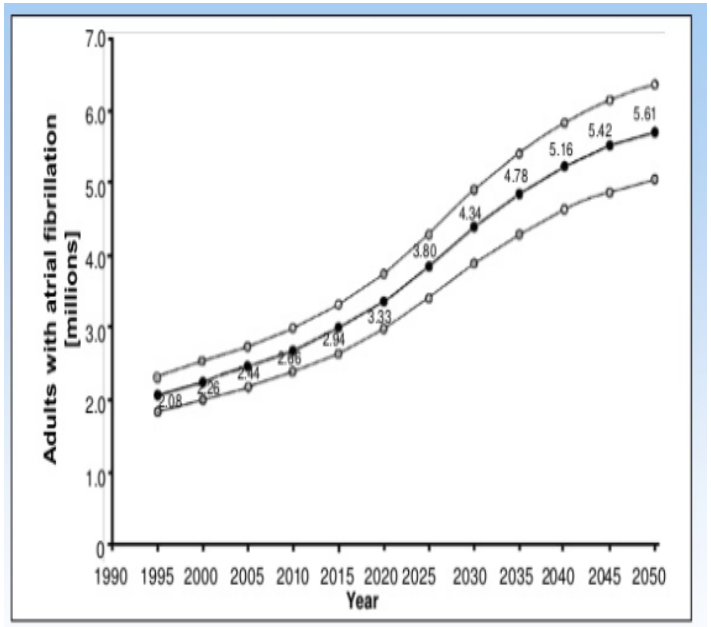
What is atrial fibrillation?

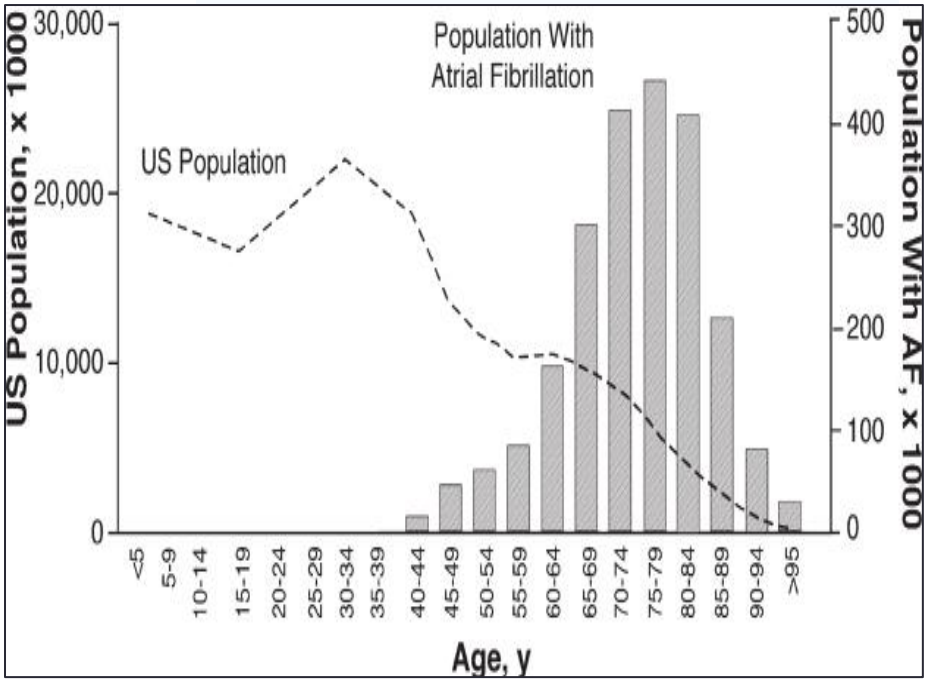
- Disorganized atrial activation due to ***changes in refractory period***
- ECG shows, *oscillations or fibrillatory P waves that vary in amplitude, shape, and timing*, associated with *irregular ventricular response*.
- Electromechanical dyssynchrony



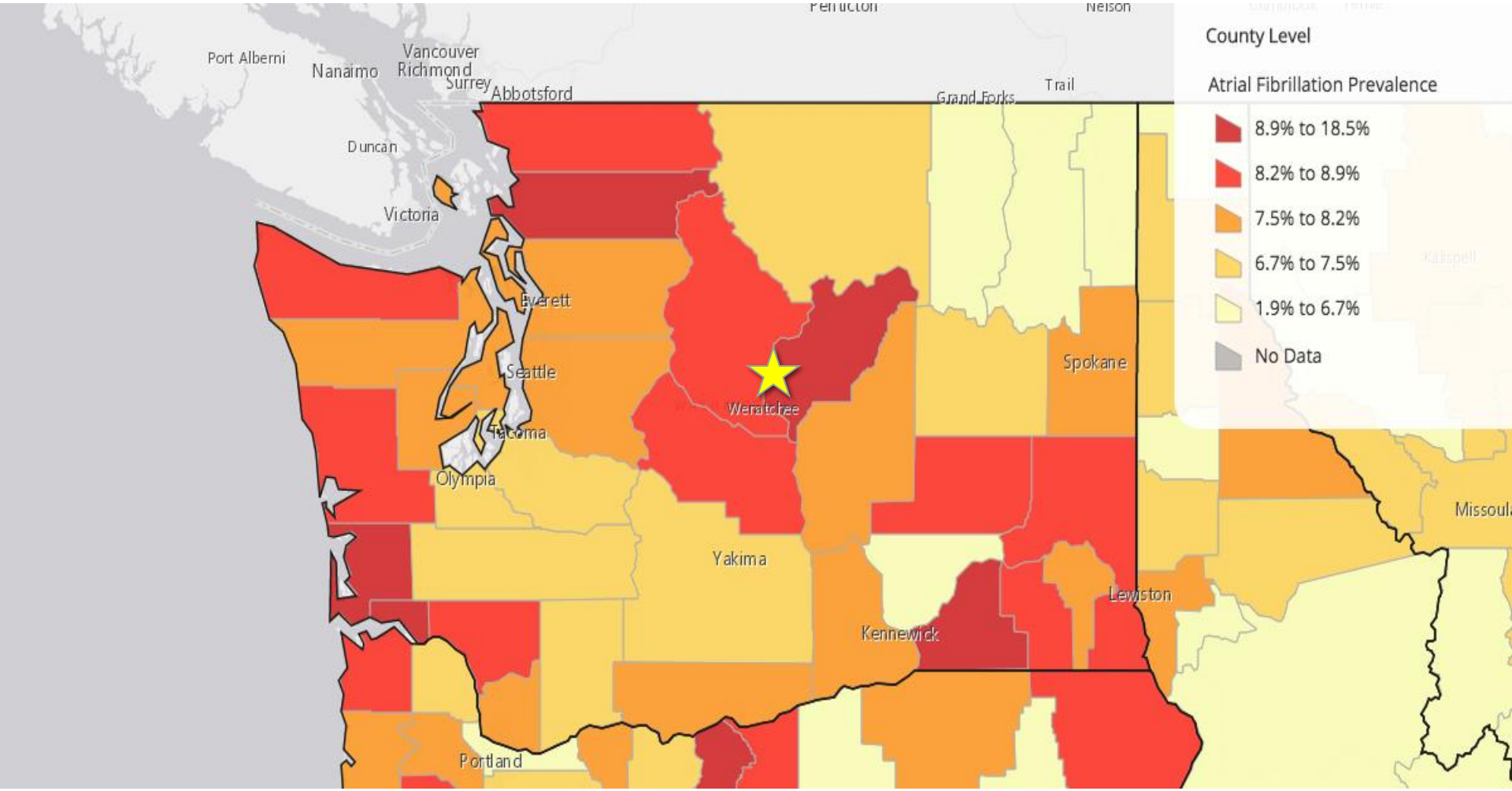
Why do I have AF?

- **Most common sustained arrhythmia in adults**
- 70% with AF are between 65 and 85
- Estimated 3-6 million people in US suffers from atrial fibrillation
- More than 750,000 hospitalizations each year due to AF



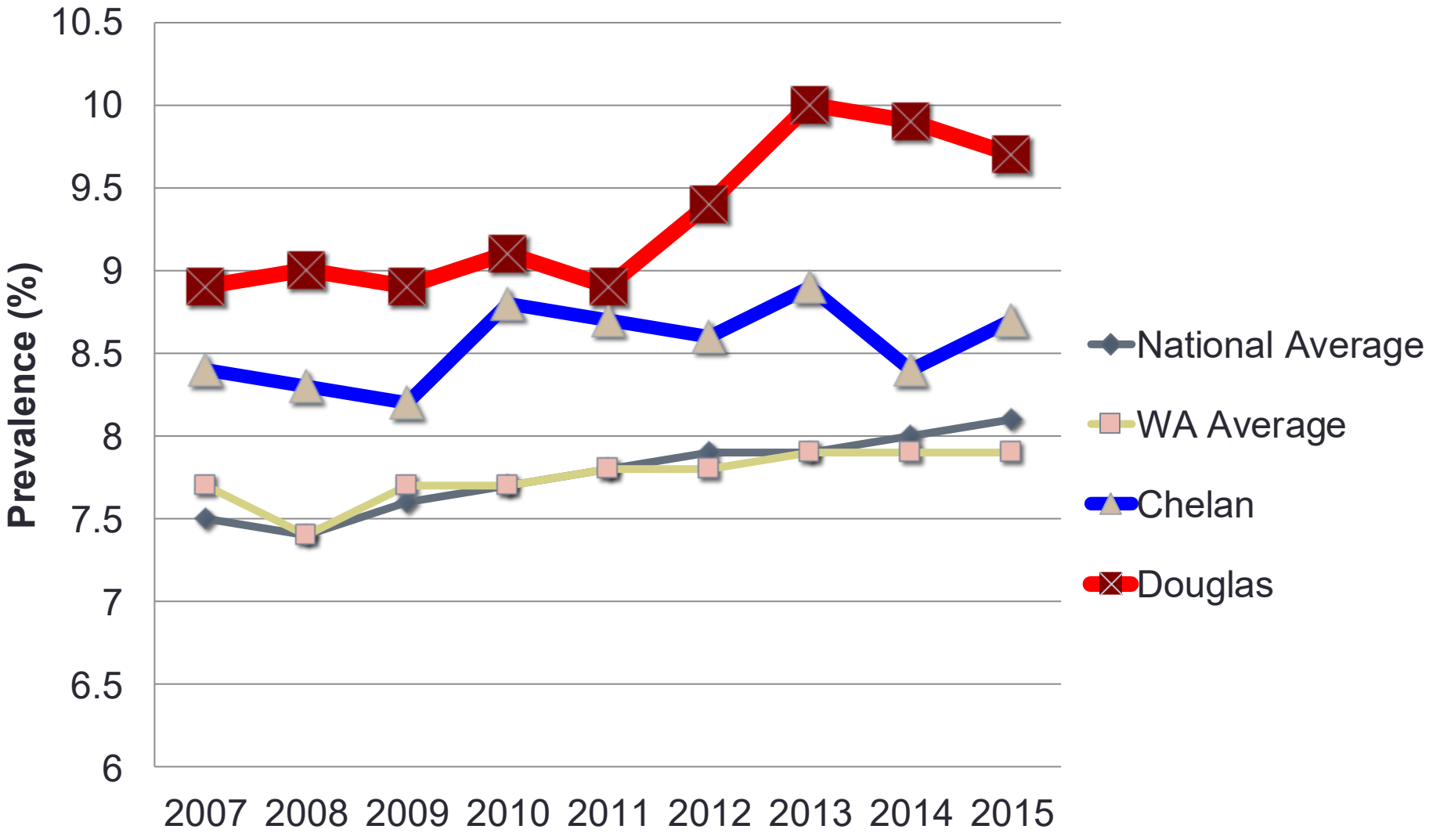


Prevalence in WA



Data.CMS.gov

Atrial Fibrillation Prevalence



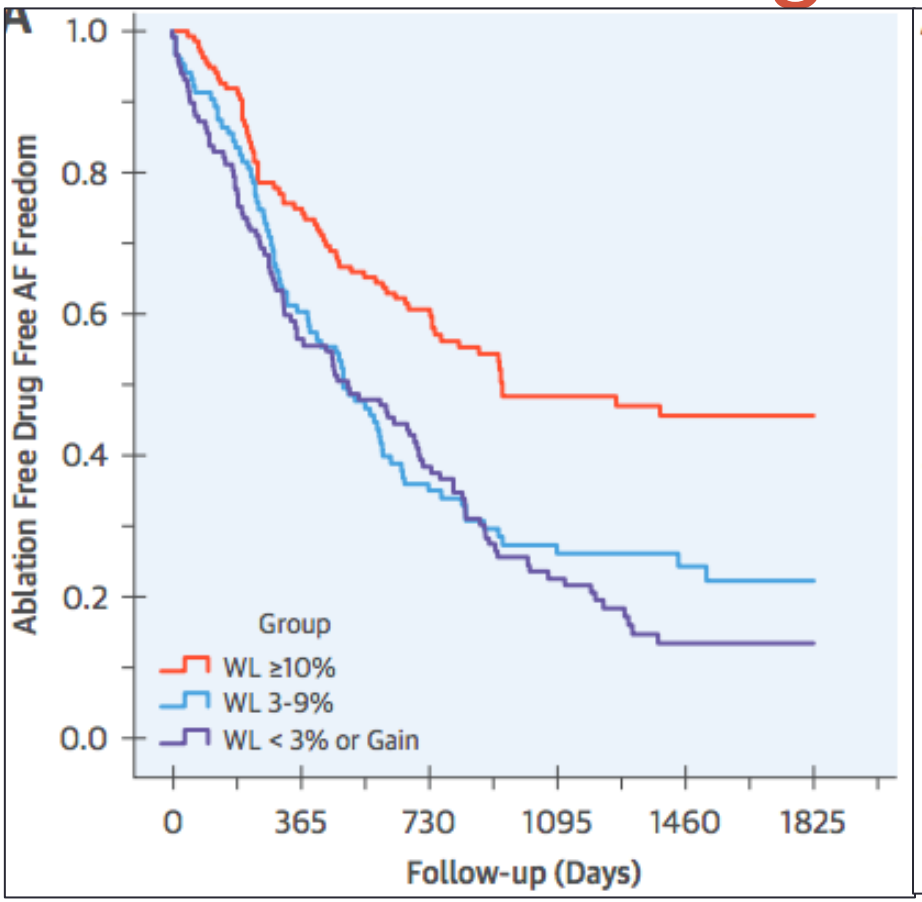
Data.CMS.gov

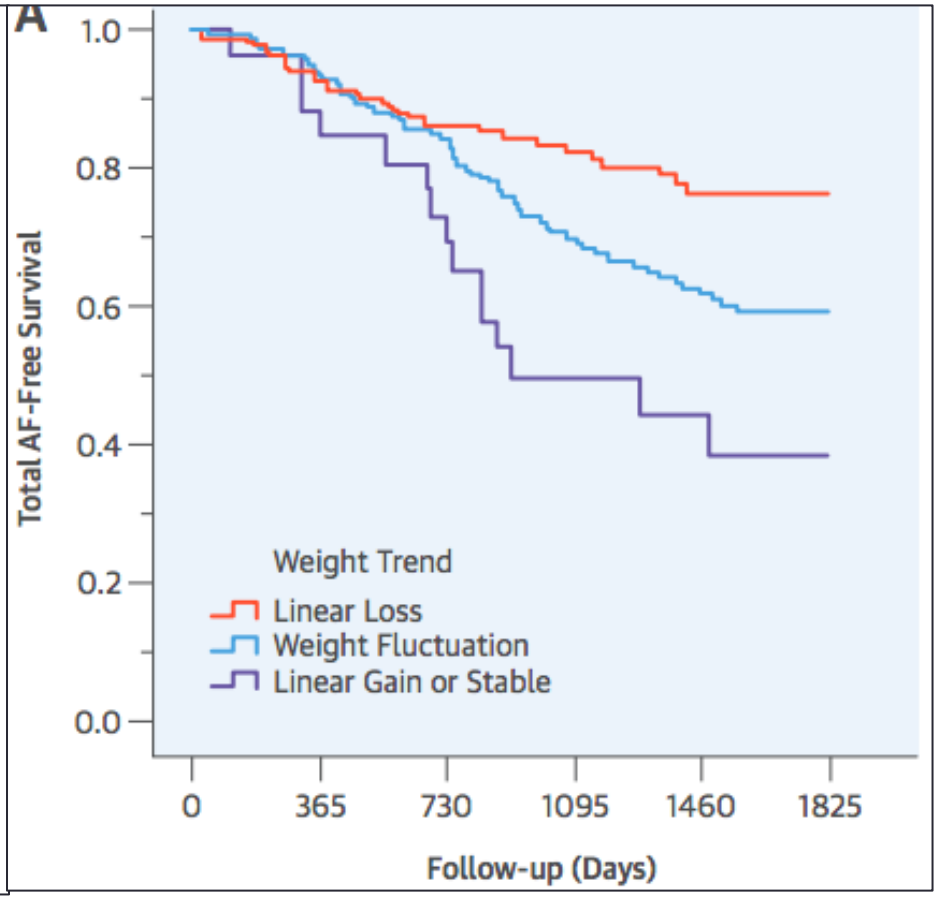
What can I do as a patient?

- Important to address as many of the modifiable risk factors as possible but also take the time to focus on the main drivers that accelerates AF progression
  - Weight
  - Uncontrolled hypertension
  - Alcohol
  - Untreated/undertreated OSA

  - NOT caffeine

LEGACY – Weight reduction

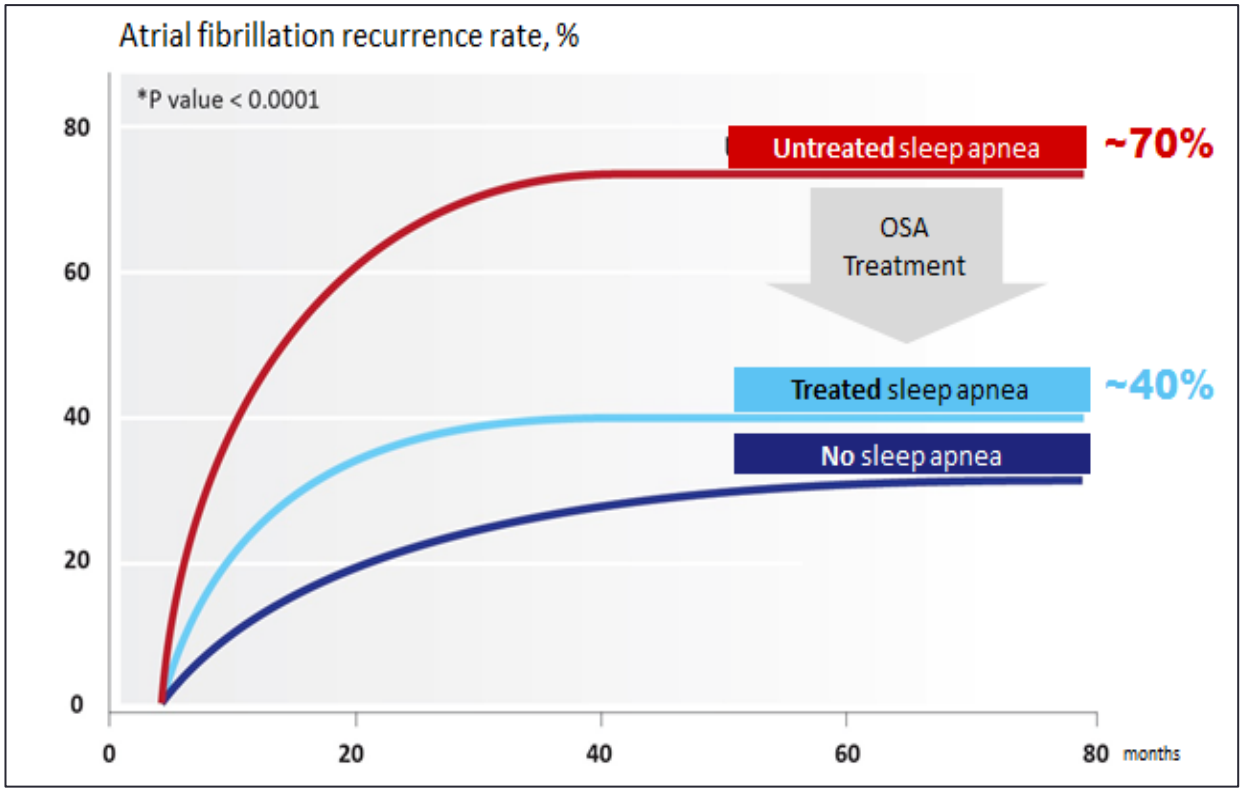




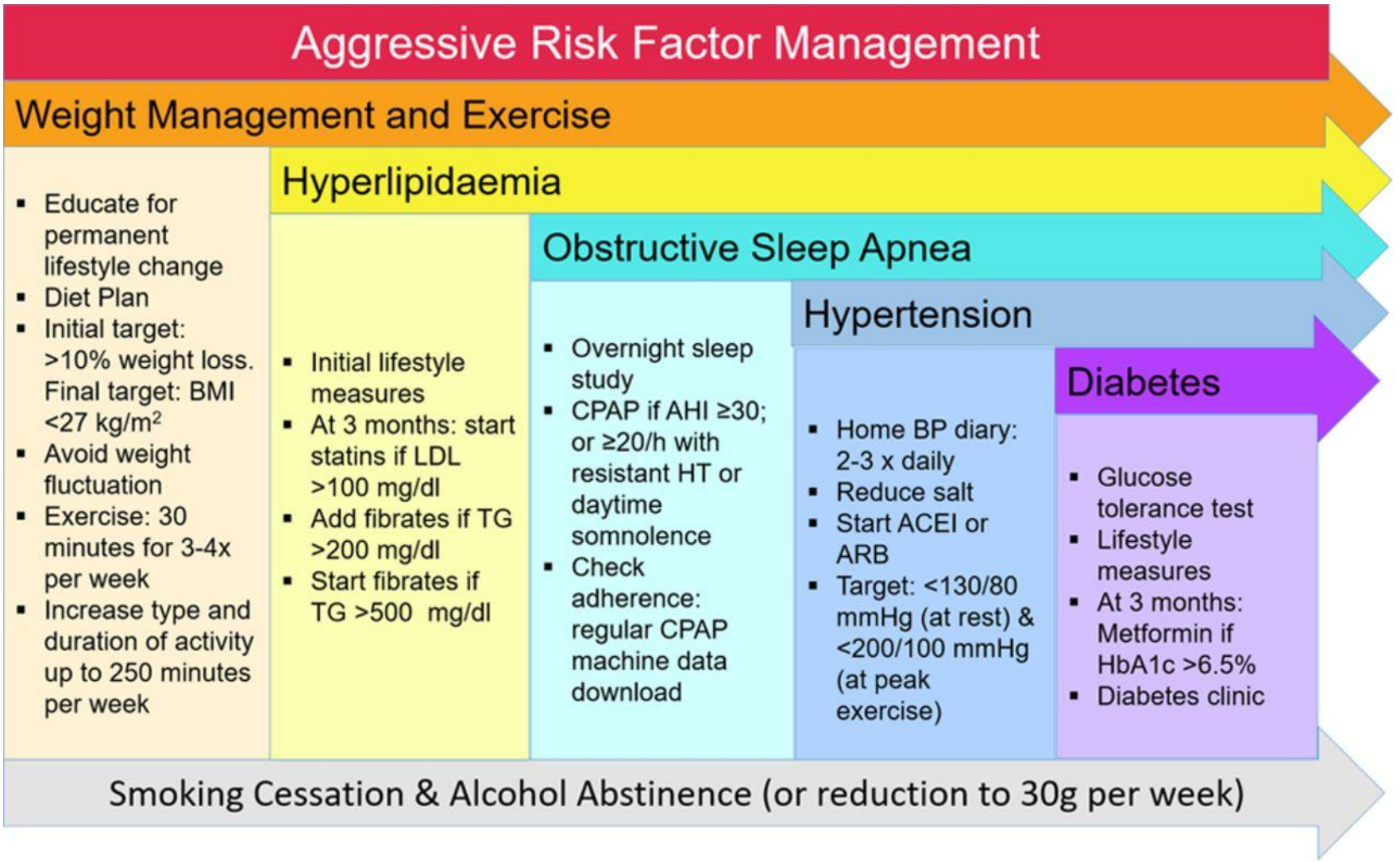
- More weight loss the better
- Steady and consistent wins the race

JACC 2015;65:2159–69

Treatment of OSA



- Treatment of OSA improves AF burden and slows progression, regardless of management strategy


Aggressive Risk Factor Management
Weight Management and Exercise
Hyperlipidaemia
Obstructive Sleep Apnea
Hypertension
Diabetes
Educate for permanent lifestyle change
Diet Plan
Initial target: >10% weight loss. Final target: BMI <27 kg/m2
Avoid weight fluctuation
Exercise: 30 minutes for 3-4x per week
Increase type and duration of activity up to 250 minutes per week
Initial lifestyle measures
At 3 months: start statins if LDL >100 mg/dl
Add fibrates if TG >200 mg/dl
Start fibrates if TG >500 mg/dl
Overnight sleep study
CPAP if AHI ≥30; or ≥20/h with resistant HT or daytime somnolence
Check adherence: regular CPAP machine data download
Home BP diary: 2-3 x daily
Reduce salt
Start ACEI or ARB
Target: <130/80 mmHg (at rest) & <200/100 mmHg (at peak exercise)
Glucose tolerance test
Lifestyle measures
At 3 months: Metformin if HbA1c >6.5%
Diabetes clinic
Smoking Cessation & Alcohol Abstinence (or reduction to 30g per week)

Summary

- Confirm diagnosis with ECG
- Echocardiogram for everyone to establish baseline and help in management decision
- Most patient does not benefit from ED/Admission management of AF
- Take the opportunity to address modifiable risk factors

PART II: STROKE RISK REDUCTION

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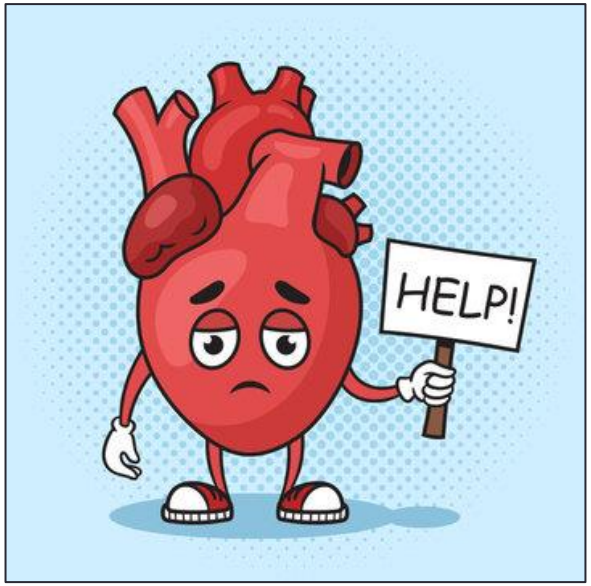
What is the main goals of AF management?

- **We focusing on**
  - **1. Reduce AF complications**
  - **2. Improve Quality of Life**



- Complications related to AF
  - Stroke or thromboembotic risk
  - Heart failure

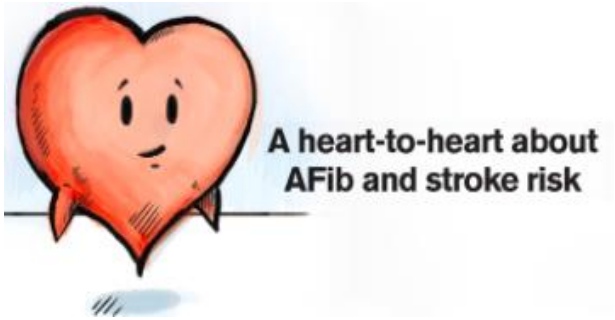
- Management guided by the effect on patient
  - Individual symptom and cardiac consequence
  - Minimizing ED visit, admissions, healthcare utilization
  - Gradual change in habit, activity level, etc

Why do we talk about stroke?

- **Strokes as a complication of AF are more severe**

- N = 1061 admitted with acute ischemic stroke
  - 20.2% had AF

- Bedridden state
  - With AF - 41.2%
  - Without AF - 23.7%



- Odds ratio for bedridden state following stroke due to AF = 2.23 ($P < 0.0005$)

Dulli DA et al. Neuroepidemiology. 2003;22:118-23.

How to assess stroke risk?

	Condition	Points
C	**Congestive heart failure** (or LV dysfunction)	1
H	**Hypertension** BP>140/90 or treated hypertension on medication	1
A_2	**Age** ≥ 75 years	2
D	**Diabetes Mellitus**	1
S_2	**Prior Stroke** or **TIA** or **Thromboembolism**	2
V	**Vascular disease** (e.g. MI, PVD, Aortic plaque)	1
A	**Age 65-74 years**	1
Sc	**Sex category** (female gender)	1

Stroke risk by CHA_2DS_2-VASc		
CHA_2DS_2-VASc score	Patients (n=7329)	Adjusted stroke rate (%/year)
0	1	0%
1	422	1.3%
2	1230	2.2%
3	1730	3.2%
4	1718	4.0%
5	1159	6.7%
6	679	9.8%
7	294	9.6%
8	82	6.7%
9	14	15.2%

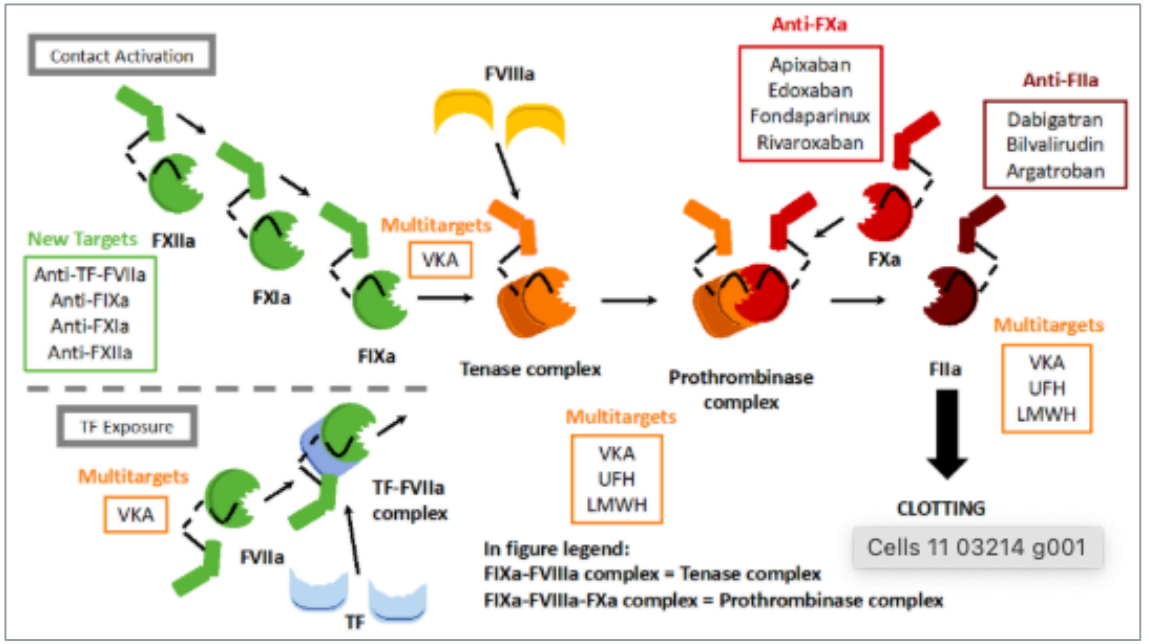
- **Female gender is no longer a risk factor**

2019 ACC/AHA/HRS Recommendation Updates

1. **In AF patients with a CHA2DS2-VASc score ≥2 in men or ≥3 in women, oral anticoagulation are recommended – *i.e. GENDER is removed as a risk factor***
2. **DOACs are recommended over warfarin** *except* in patients with moderate to severe mitral stenosis or a prosthetic heart valve
3. **There are now four DOACs**
   - Apixaban (Eliquis), rivaroxaban (Xarelto), dabigatran (Pradexa), edoxaban (Savaysa)
4. Creatinine clearance <15 ml/min or who are on dialysis, it is reasonable to use warfarin or apixaban for oral anticoagulation **(IIb)**

What are anticoagulation?

- OAC does not dissolve clot
- DOACs
- Warfarin



- **Note: The use of heparin or low molecular weight heparin has not been shown to have benefit**

Available agents

- Direct-acting oral anticoagulation (DOACs)
  - Apixaban - BID
  - Dabigatran - BID
  - Rivaroxaban - Daily
  - Edoxaban – Daily
- Warfarin

- **Aspirin alone or with clopidogrel are no longer recommended**

Using ASA for stroke prevention in AF makes no sense and results in harm

European Heart Journal (2015) **36**, 653–656
doi:10.1093/eurheartj/ehu494

CURRENT OPINION

Misperceptions of aspirin efficacy and safety may perpetuate anticoagulant underutilization in atrial fibrillation

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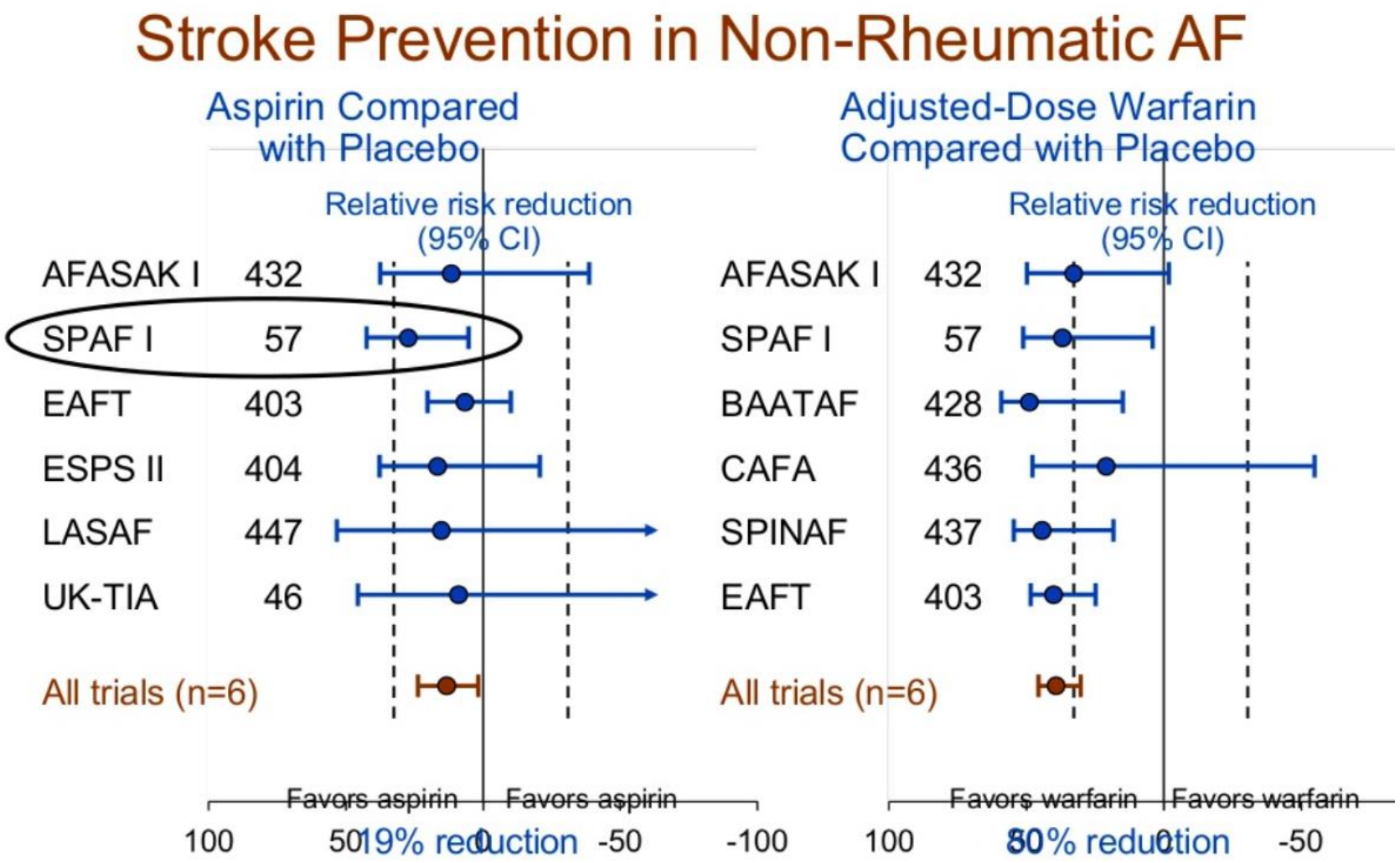
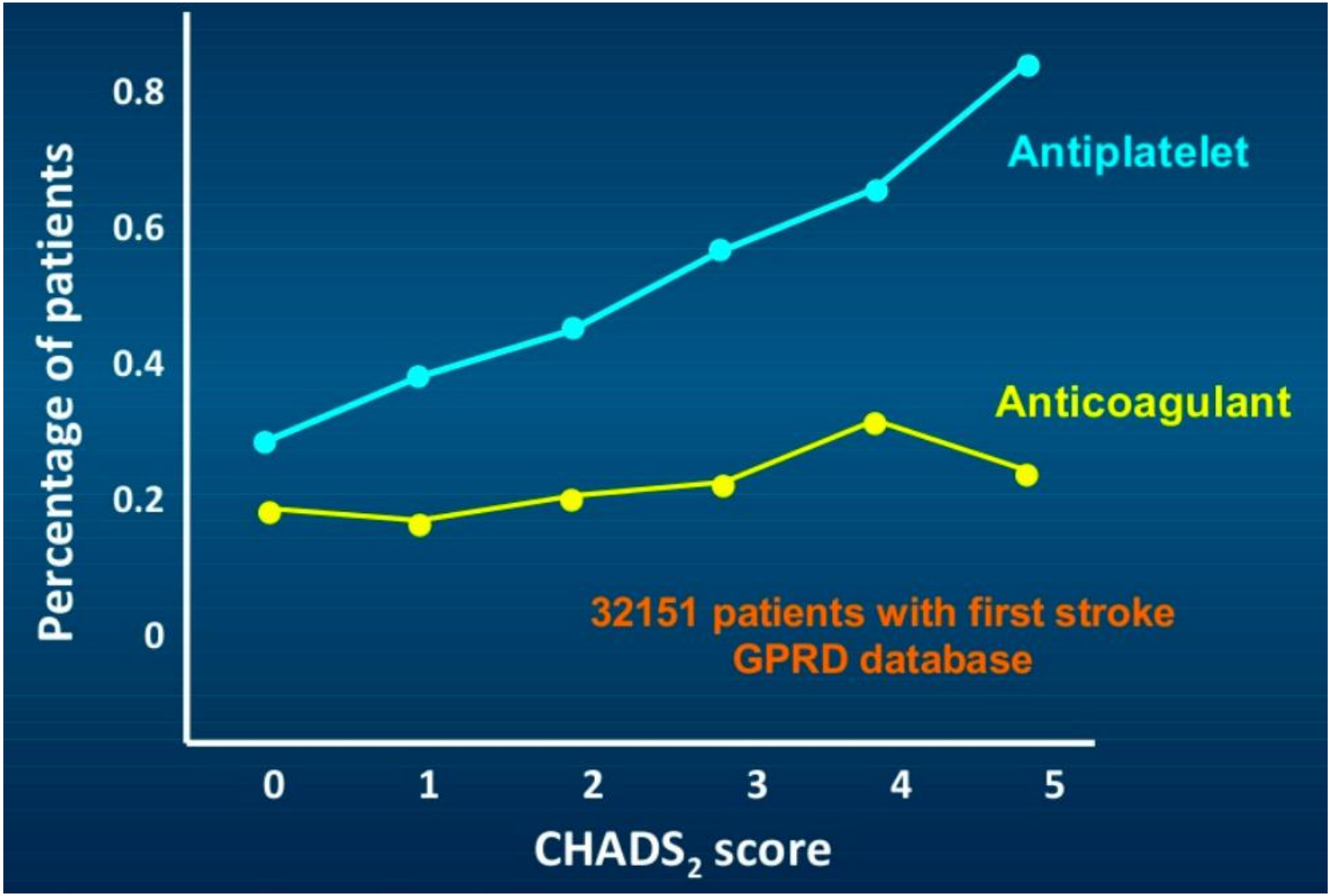
Received 18 July 2014; revised 16 October 2014; accepted 6 November 2014; online publish-ahead-of-print 29 December 2014

- No reduction in stroke
- Results in undertreatment with OAC
- Still comes with risk

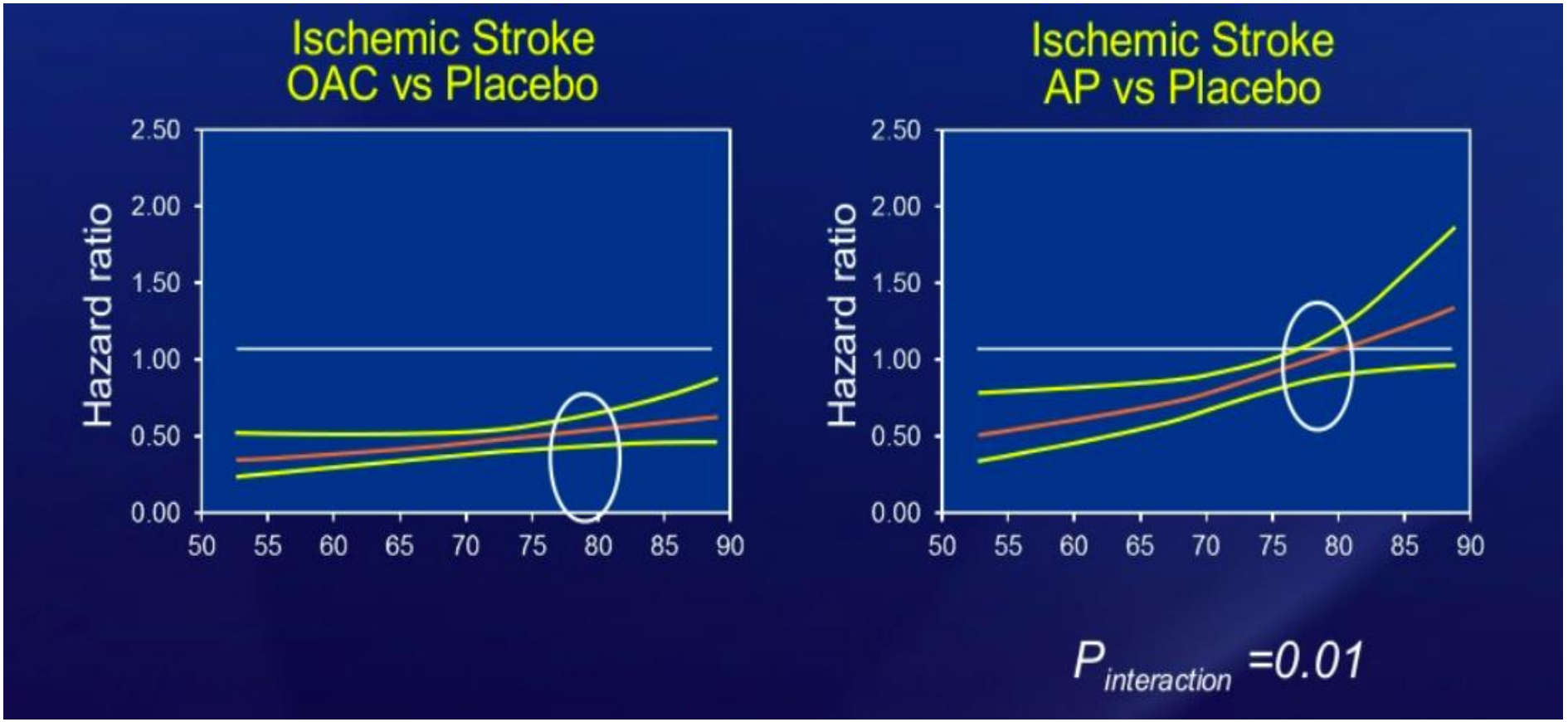
Early use of aspirin is driven by a single study



Stroke risk increase unaltered in aspirin group

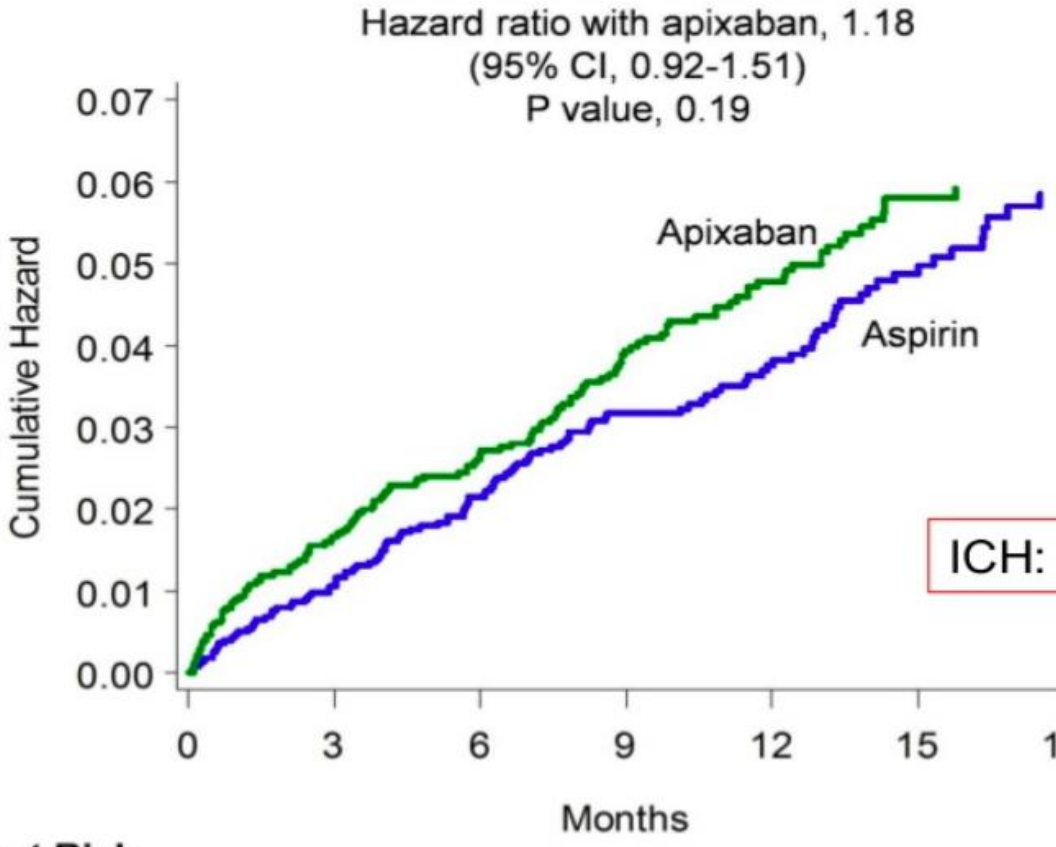


Our older patients have even less benefit in stroke prevention



Stroke. 2009;40:1410–1416

Bleeding events between apixaban and aspirin are very similar



ICH: 11 apix, 13 ASA

No. at Risk							
Aspirin	2791	2716	2513	2097	1534	1045	622
Apixaban	2807	2724	2517	2066	1477	1014	596

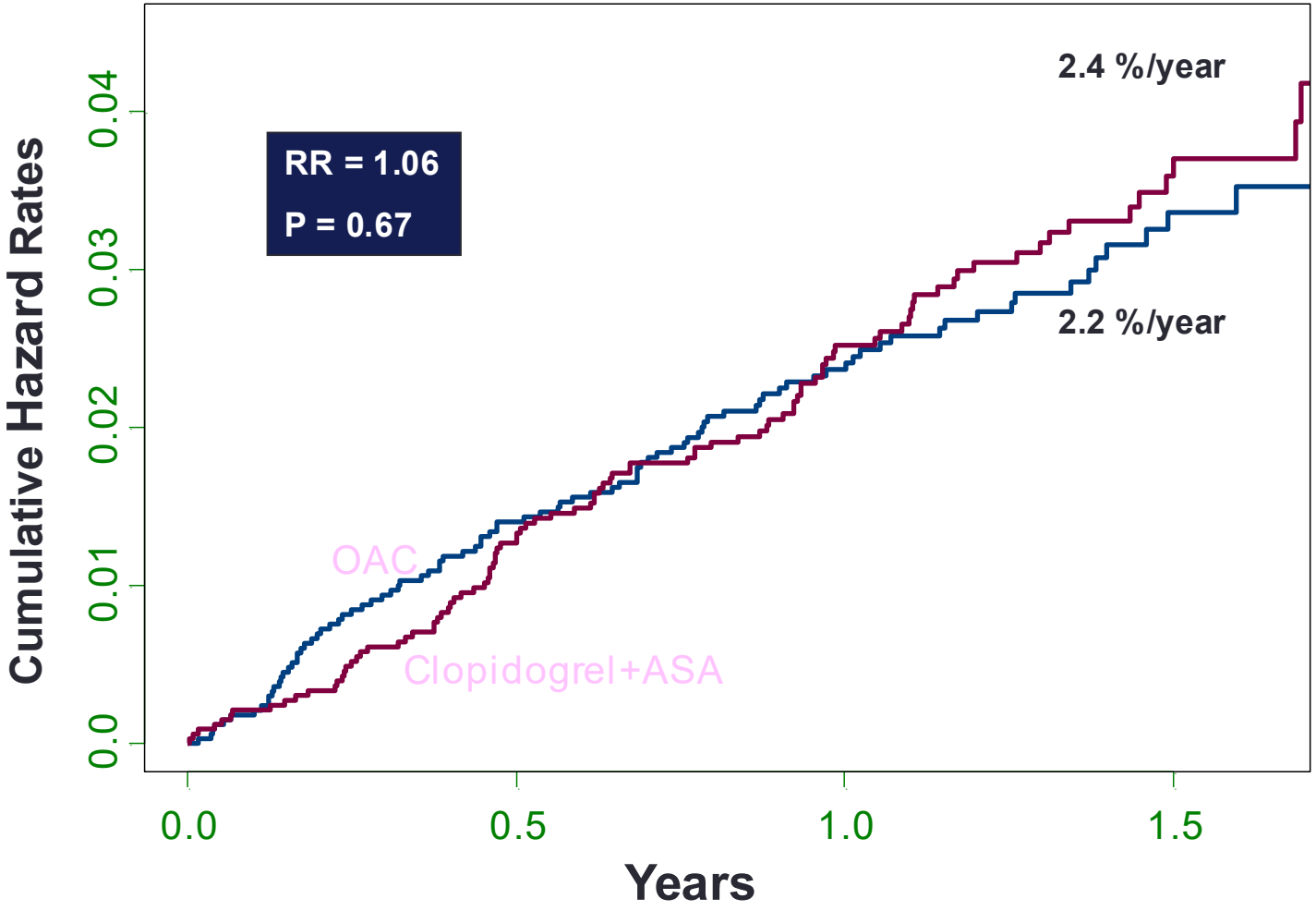
Flaker G. Stroke. 2012;43:3291-7

Guidelines no longer recommends aspirin

Risk	Recommended Therapy	
	ESC 2012	AHA/ACC/HRS 2014
No risk factors CHA_2DS_2-VASc= 0	No antithrombotic therapy	No antithrombotic therapy
CHA_2DS_2-VASc= 1	NOAC > VKA (IIaA)	None or OAC or ASA (IIbC)

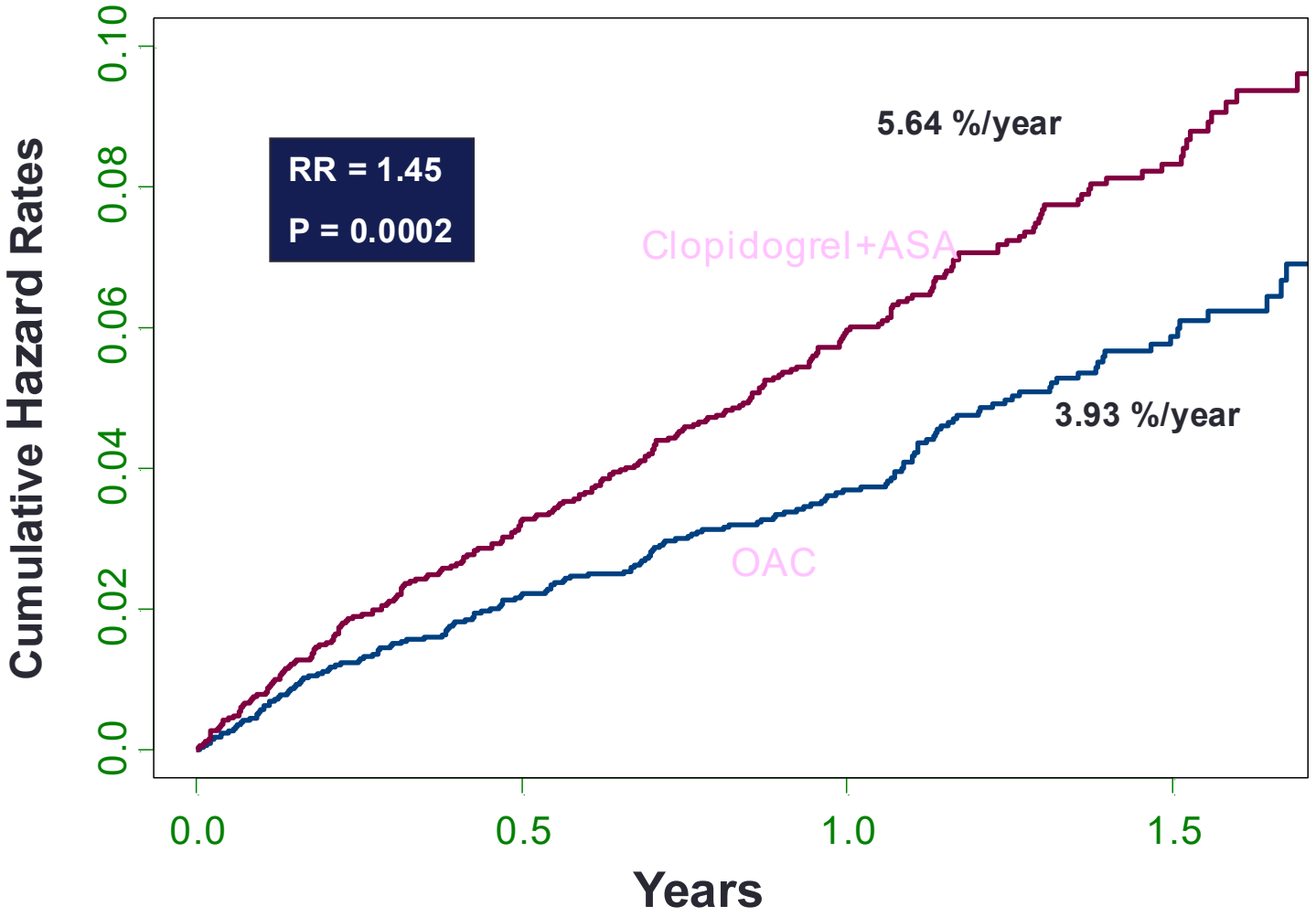
- In fact, it's now a class III (No benefit; Harm)

Aspirin and clopidogrel may be similar to OAC



Lancet 2006; 367: 1903-12.

But aspirin and clopidogrel has significant bleeding risk, negating the benefit



Lancet 2006; 367: 1903-12.

There are CHA2DS2-VASc exceptions

- **BELOW ARE ALL HIGH RISK**
- **Cardiac amyloidosis**, hypertrophic cardiomyopathy
- Valvular – rheumatic mitral valve, prosthetic valve and mitral valve repair
- Mechanical prosthetic valve

What are some of the challenges with DOACs?

- Limited evidence in use for ESRD
- Not for valvular AF, mechanical heart valves
- Assessment of compliance more difficult than with vitamin K antagonists
- Lack of head-to-head studies comparing DOACs
- **Balancing cost against efficacy**

- *?No reversal for DOACs at many clinical setting?*

Concern for no reversal for DOAC may be more psychological

- Correction of warfarin is not immediate
- Aspirin and clopidogrel also binds irreversibly
- Data showing patients who experienced a major bleed on a DOAC do no worse than those who had a major bleed on warfarin…(maybe fare better?)

Fall risk is also NOT an important factor

- Risk of fall is not an important factor in deciding stroke prevention
- **Persons taking warfarin must fall about 295 times annually for warfarin to not be the optimal therapy**

- *Of all age groups, >65 years of age gain the greatest absolute benefit from anticoagulation*
- Focus on modifiable risk factors

Arch Intern Med. 1999;159:677-685

HAS-BLED

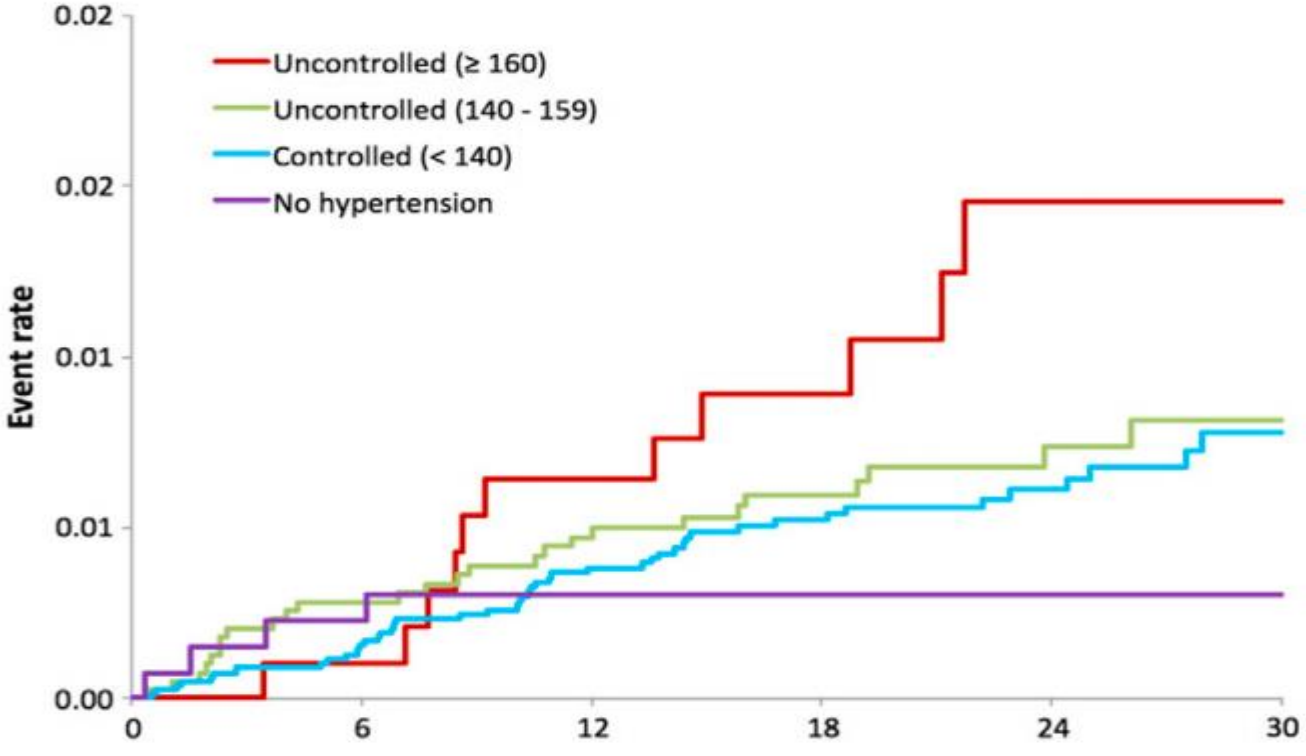
Condition	Points
H - Hypertension	1
A - Abnormal renal or liver function (1 point each)	1 or 2
S - Stroke	1
B - Bleeding	1
L - Labile INRs	1
E - Elderly (> 65 years)	1
D - Drugs or alcohol (1 point each)	1 or 2

HAS-BLED score	Bleeds per 100 patient-years
0	1.13
1	1.02
2	1.88
3	3.74
4	8.70
5	12.5

- High risk for bleed with risk factor of ≥3
- Reversible factors (EtOH, NSAIDS, BP control)
- ***Flag patients for close monitoring***…NOT sole reason to discontinue
- *Swedish AF Cohort showed similar bleed with ASA and warfarin*

Eur Heart J 2012;33:1500-10

Modest BP control -> significant decrease in ICH



Number at risk						
Uncontrolled (≥ 160)	963	938	909	653	386	149
Uncontrolled (140 - 159)	3943	3792	3640	2674	1631	680
Controlled (< 140)	7910	7607	7282	5316	3260	1409
No hypertension	1347	1295	1236	894	506	196

Cumulative unadjusted rate of hemorrhagic stroke by hypertension bracket.

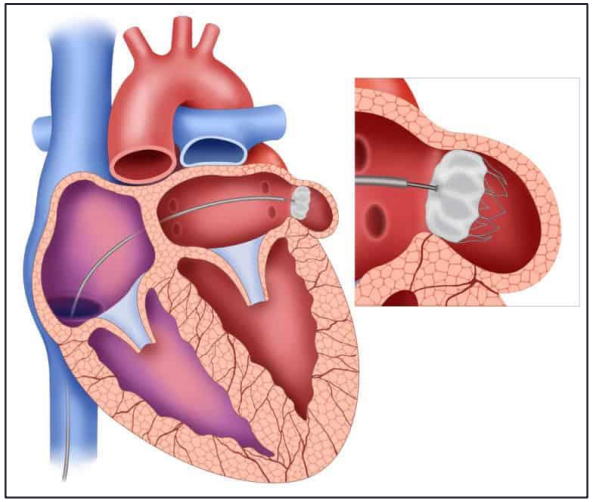
Am Heart J 2016;178:74-84.

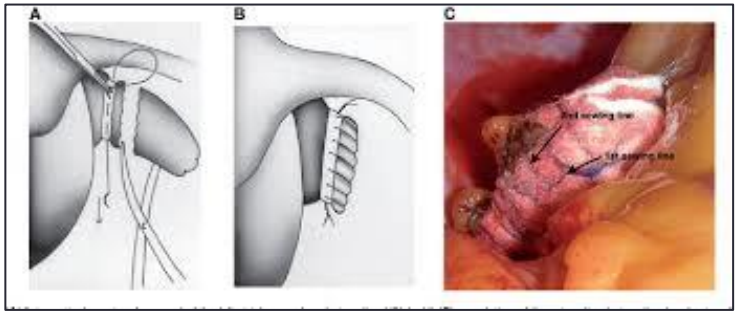
Minimizing bleeding risk

- Avoid combination of OAC and antiplatelets
  - May not even be necessary in most patient with CAD
- Keep INR ≤ 3
- **Modest blood pressure-lowering profoundly reduces CNS bleeding**

Left atrial appendage ligation or occlusion

- LAAO => Percutaneous
- Left atrial appendage ligation => Surgical
- **Though, NOT equivalent to OAC!**
- LAAO have no class I recommendation and recommends continue aspirin which have similar bleeding risk as DOAC
- Surgery have data to support ligation+OAC not ligation alone





Summary

- Aspirin has fallen out of favour in benefit and often harmful
  - Bleeding risk similar between aspirin and apixaban
- Address modifiable bleeding risk factors – reduces bleeding complications
- High risk patients such as cardiac amyloidosis and hypertrophic cardiomyopathy should all be on OAC
- Rhythm control help reduce stroke risk…more to come

PART III: ATRIAL FIBRILLATION MANAGEMENT

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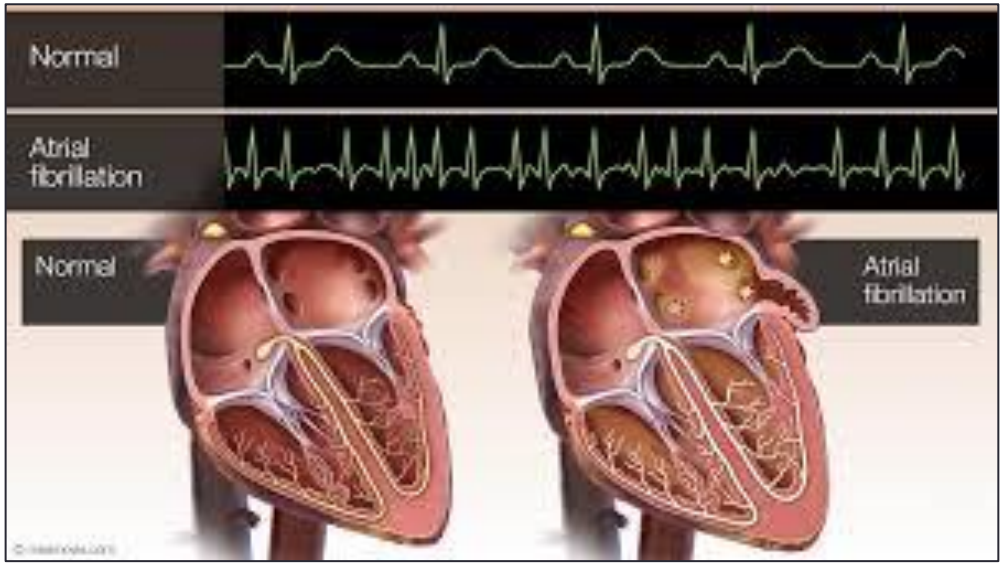
Rate versus Rhythm?

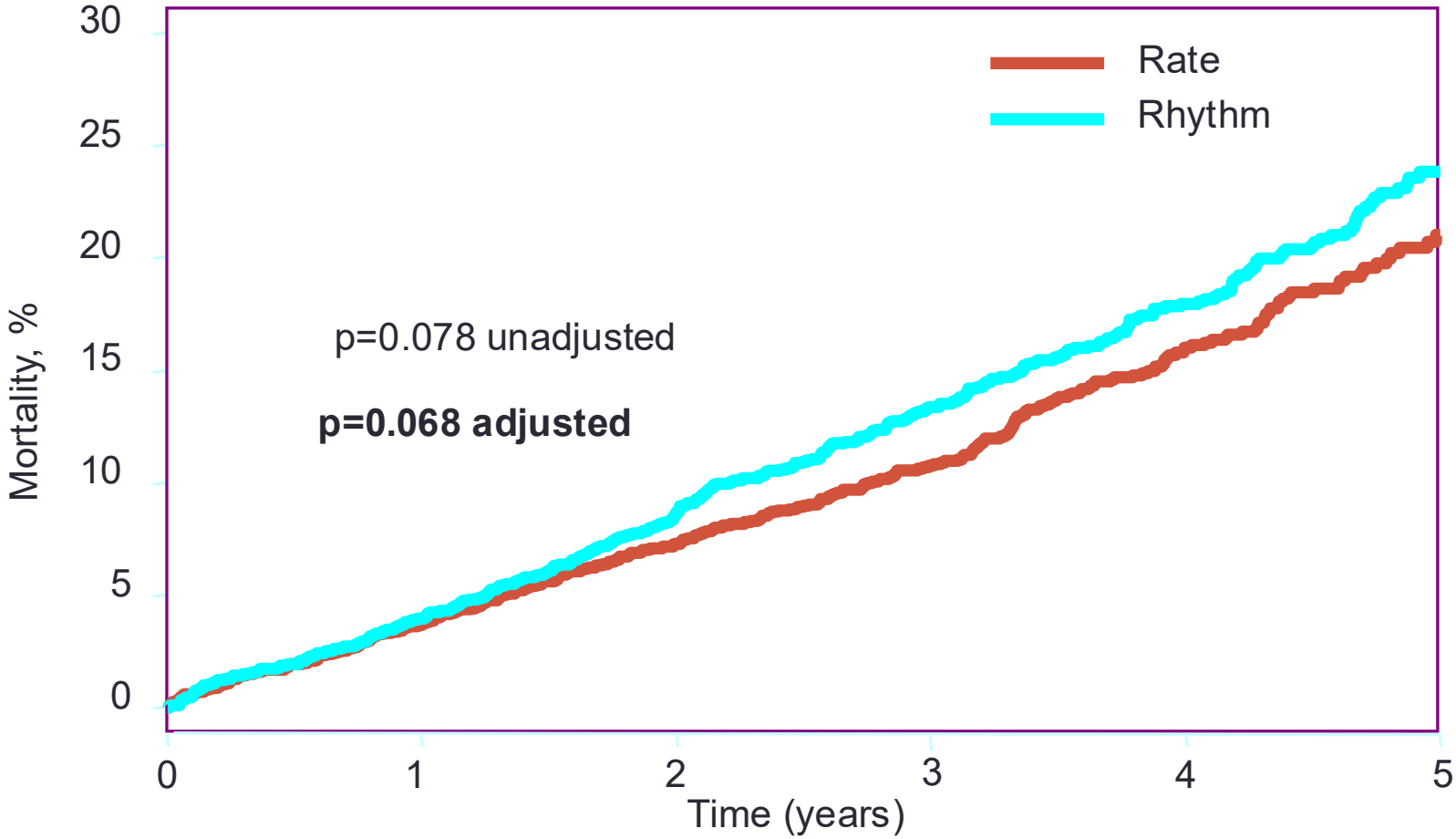
- The question was never whether if AF is equivalent to sinus rhythm



- Rate control is easy
  - Medication
  - Pacemaker

- **Rhythm control take more effort from both the patient and provider; and for both to understand the expectation and ultimate goal**

AFFIRM: All-Cause Mortality



Rhythm N:	2033	1932	1807	1316	780	255
Rate N:	2027	1925	1825	1328	774	236

***N Engl J Med.* 2002;347:1825-1833.**

Rate control

- **To decrease AV nodal conduction (first-line): β-blockers, nondihydropyridine calcium-channel antagonists**
- To slow conduction through AV node *(but **not** first-line monotherapy for rate control)*: digoxin, amiodarone
- To reduce ventricular response if other agents have failed: **amiodarone (difficult to justify due to associated toxicities)**
- CCB should not be used as first line in decompensated HF

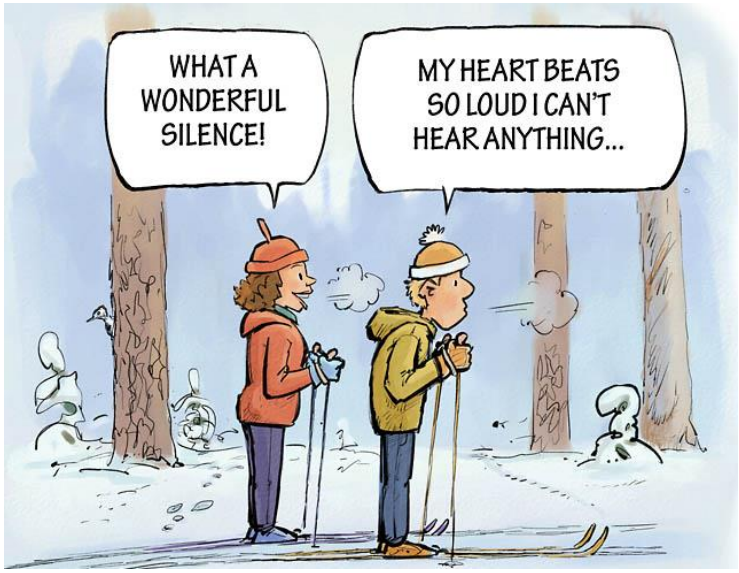
Rate control

- No difference between Lenient and Strict Rate Control

- **Rate <80 bpm (IIa)**
- Rate <110 bpm if *asymptomatic* and *normal LVEF* (*IIb*)

- Assess rate control with monitoring and treadmill

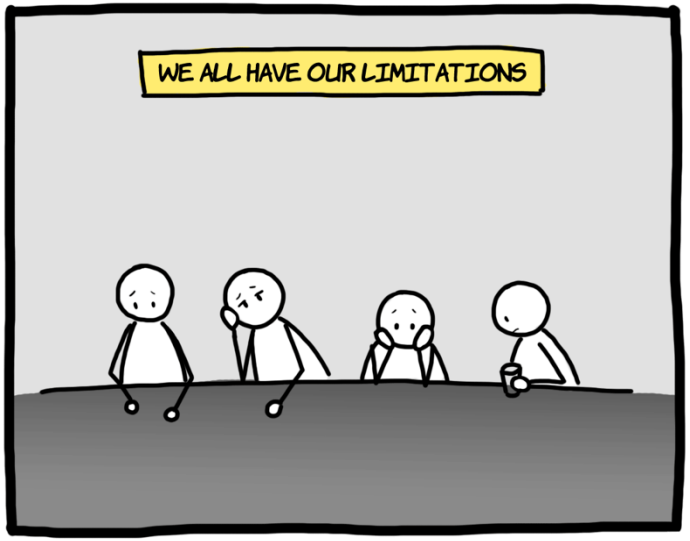
- **Check serial echo for declining LV function over the years**



NEJM April 15, 2010, No. 15, Vol 362: 1363-1373

Limitation of Rate control

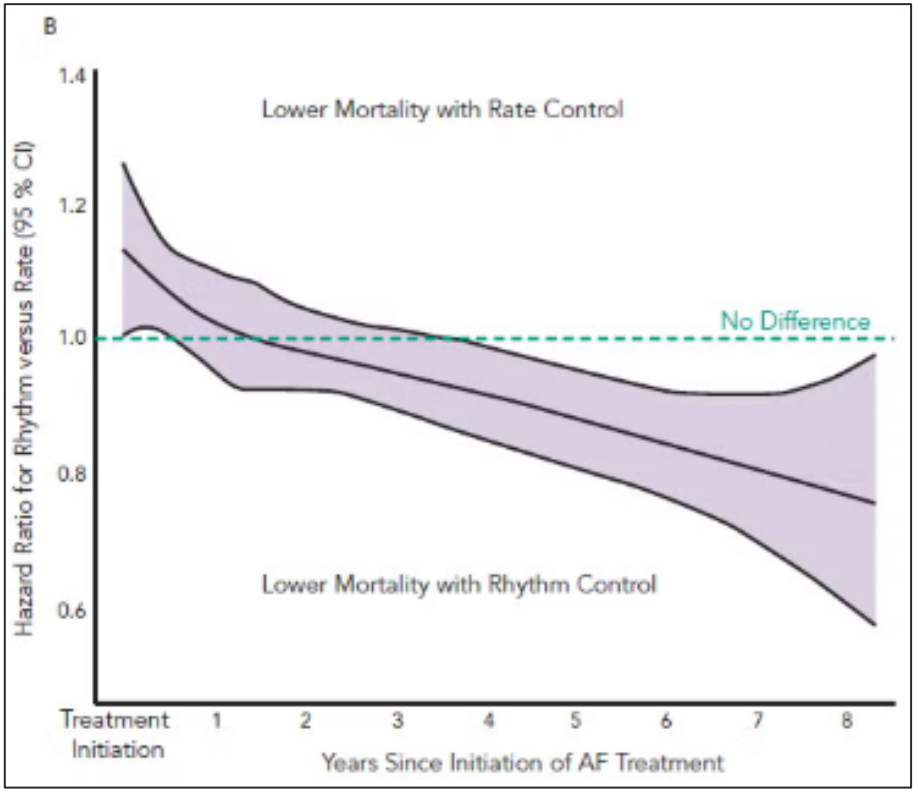
- Mean ages in AFFIRM and RACE were older
- AADs in AFFIRM was associated with a significant increase in mortality – don't know how to use
- *Data was largely gathered before catheter ablation was common*



- **Rate control trades issue for another**
- Need to be vigilant about progression of symptoms and/or cardiac structure changes

Rate is not equivalent to Rhythm Control

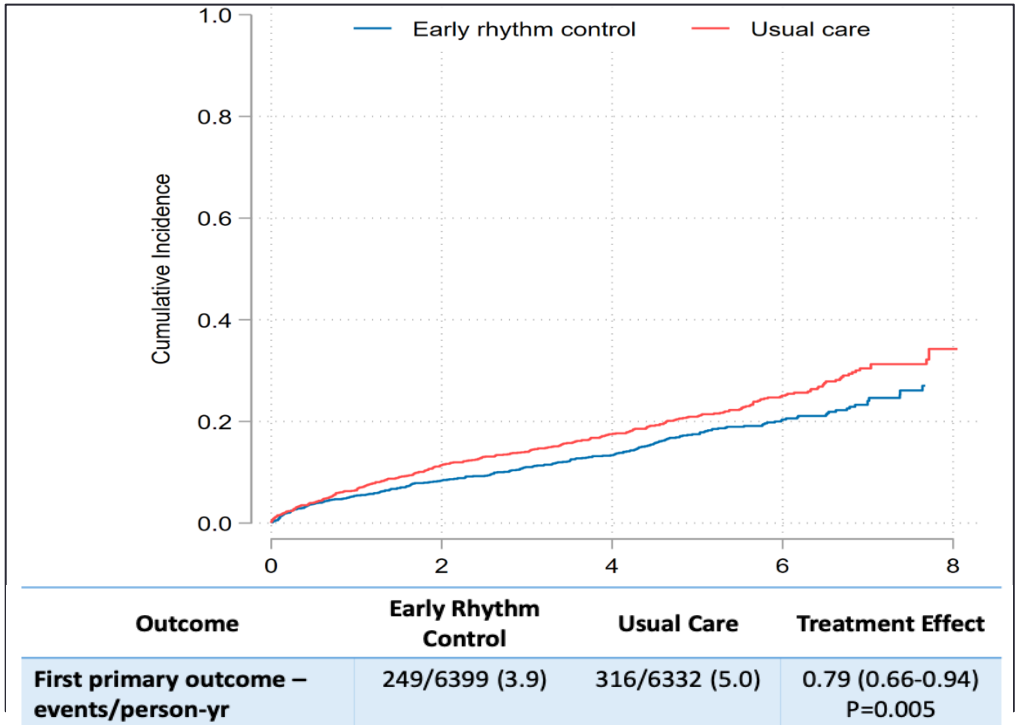
- However, for years we've observed a clinical difference in these two treatment strategies
- Some symptoms are less obvious and can be insidious (eg. Heart failure)
- **Delayed rhythm control results in decreased efficacy** (ie. Less appealing to intervene at later stages



Arrhythmia & Electrophysiology Review 2013;2(1):30-5

Early rhythm control has better outcome

- EAST-AFNET 4
- Diagnosed with AF randomized to early rhythm control and usual care
- Early rhythm control **reduced** cardiovascular outcome (CV death, stroke, hospitalization for HF or ACS)
- Safety compare comparable

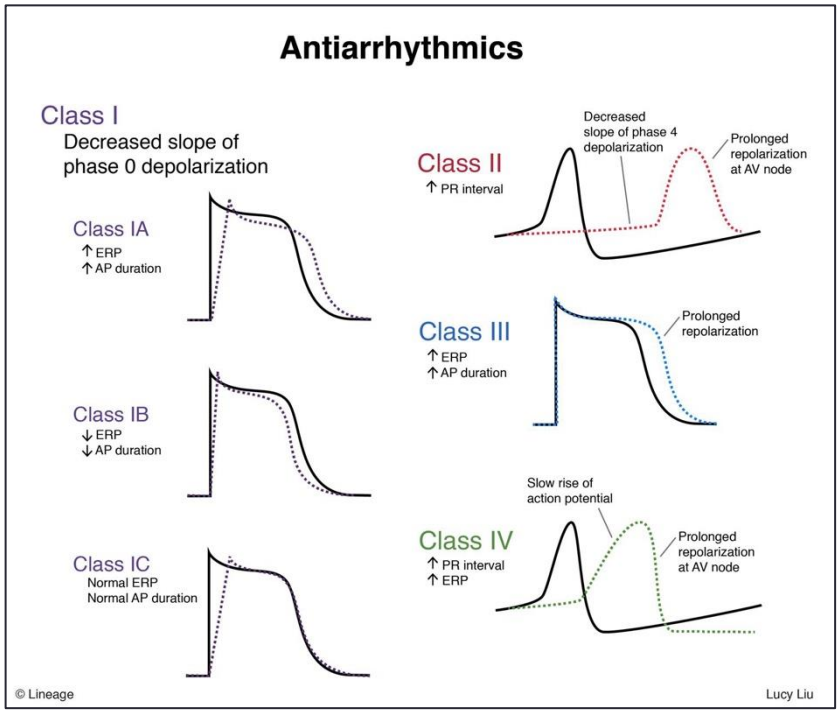


Outcome	Early Rhythm Control	Usual Care	Treatment Effect
First primary outcome – events/person-yr (incidence/100 person-yr)	249/6399 (3.9)	316/6332 (5.0)	0.79 (0.66-0.94) P=0.005
• Death from CV causes	67/6915 (1.0)	94/6988 (1.3)	0.72 (0.52-0.98)
• Stroke	40/6813 (0.6)	62/6856 (0.9)	0.65 (0.44-0.97)
• Hospitalization w/ worsening HF	139/6620 (2.1)	169/6558 (2.6)	0.81 (0.65-1.02)
• Hospitalization w/ ACS	53/6762 (0.8)	65/6816 (1.0)	0.83 (0.58-1.19)
Second primary outcome – nights spent in hospital/yr	5.8 ± 21.9	5.1 ± 15.5	1.08 (0.92-1.28) P=0.23

N Engl J Med 2020;383:1305-1316

Rhythm control with AAD is complex

- **Class Ic drugs**, such as flecainide and propafenone, are useful in patients without significant structural heart disease
  - Other class I drugs are used infrequently because of noncardiac side effects and concern for proarrhythmia
- **Class III drugs**, such as sotalol and dofetilide, can prolong the QT interval and cause torsades de pointes
  - Amiodarone: permanent liver and lung toxicity is dose- and duration-dependent
- **Dronedarone**: similar in structure to amiodarone but without iodine and with less antiarrhythmic efficacy
  - Contraindicated for decompensated CHF and for permanent atrial fibrillation

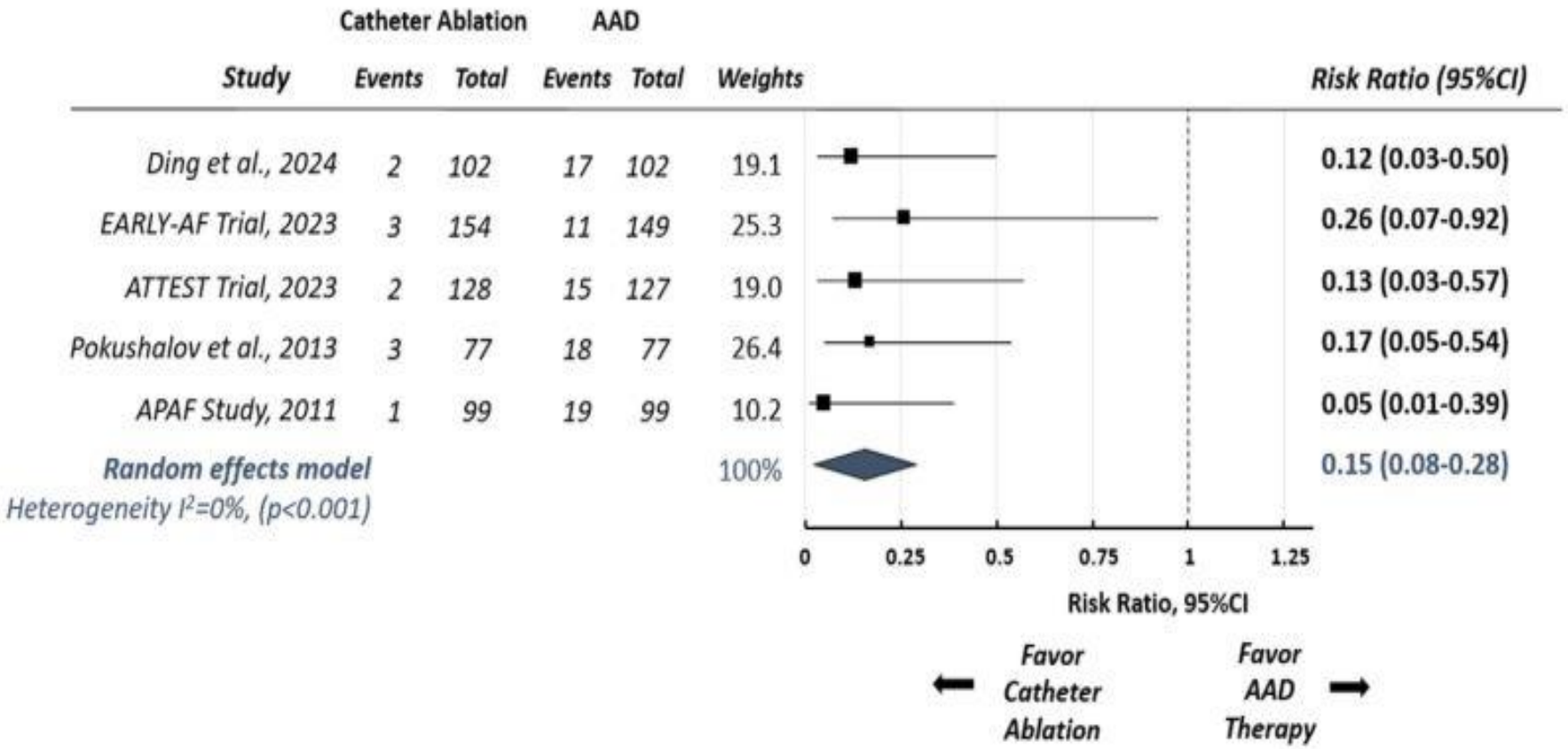


Rhythm control with AAD is complex

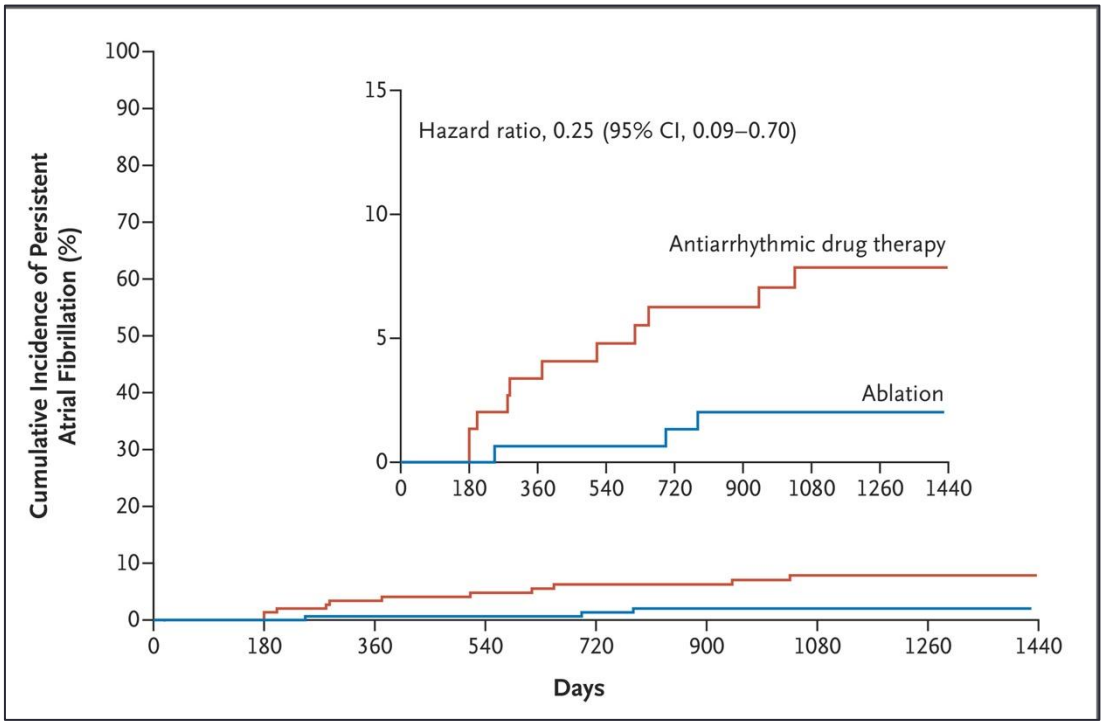
- **Proarrhythmic:**
  - VT with Flecainide, Propafenone in LVH, CAD, Decreased EF
  - Torsades in Dronedarone, Sotalol, Dofetilide

- **Organ Toxicity:**
  - Amiodarone, procainamide, quinidine
  - Organ Toxicity: Lupus, agranulocytosis, thrombocytopenia, optic neuritis, pulmonary fibrosis, hepatitis, etc.

Ablation consistently have better rhythm control



Ablation also decrease progression to Persistent AF

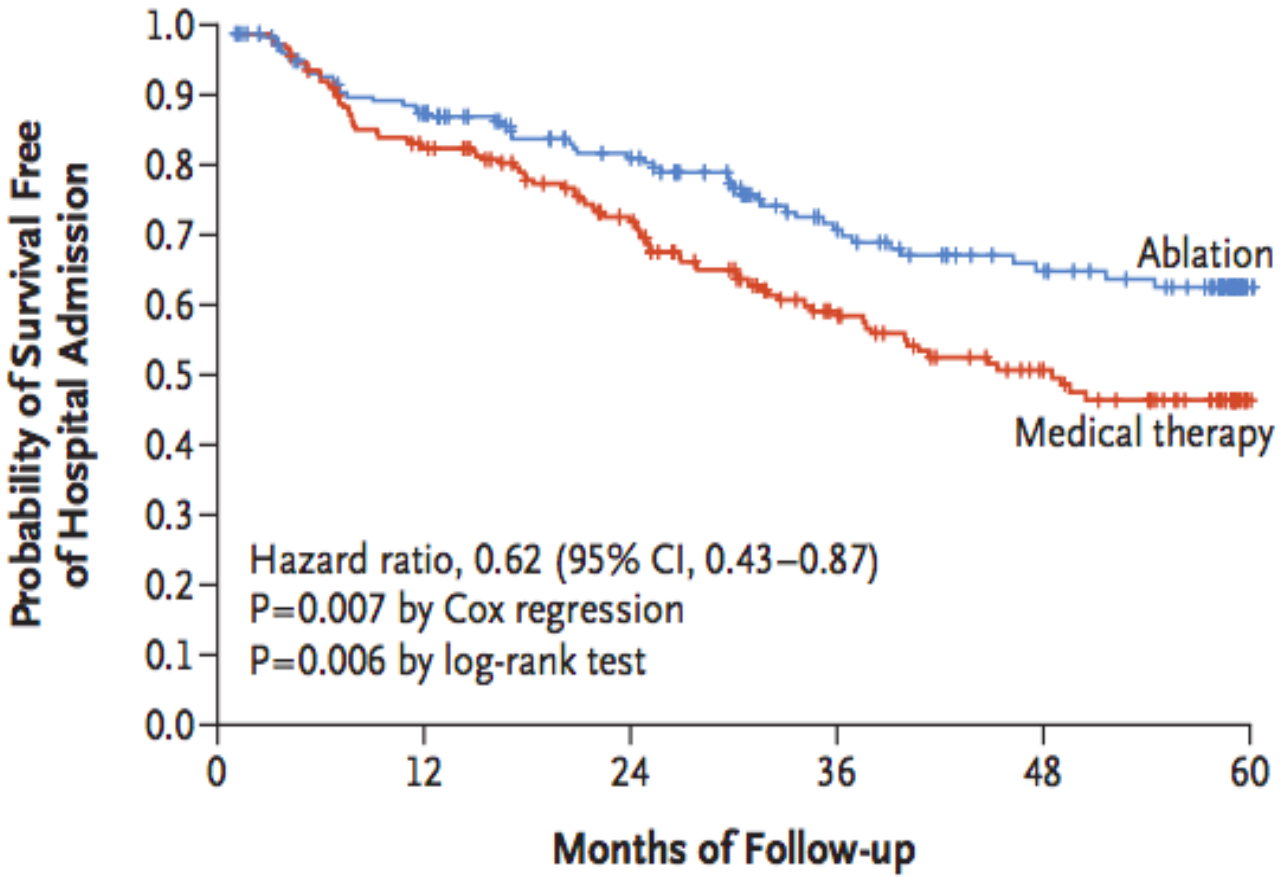


- EARLY-AF
- Decrease AF reoccurrence over Rx
- Decrease incidence of progression to PeAF over Rx
- Trend towards less hospitalization
- **Risk events are similar**

N Engl J Med 2023;388:105-116

Are there patients that benefit most from rhythm control via ablation?

- CASTLE-AF
- **AF with HF symptoms**
- LVEF ≤ 35%
- CA associated with 16.1% ARR

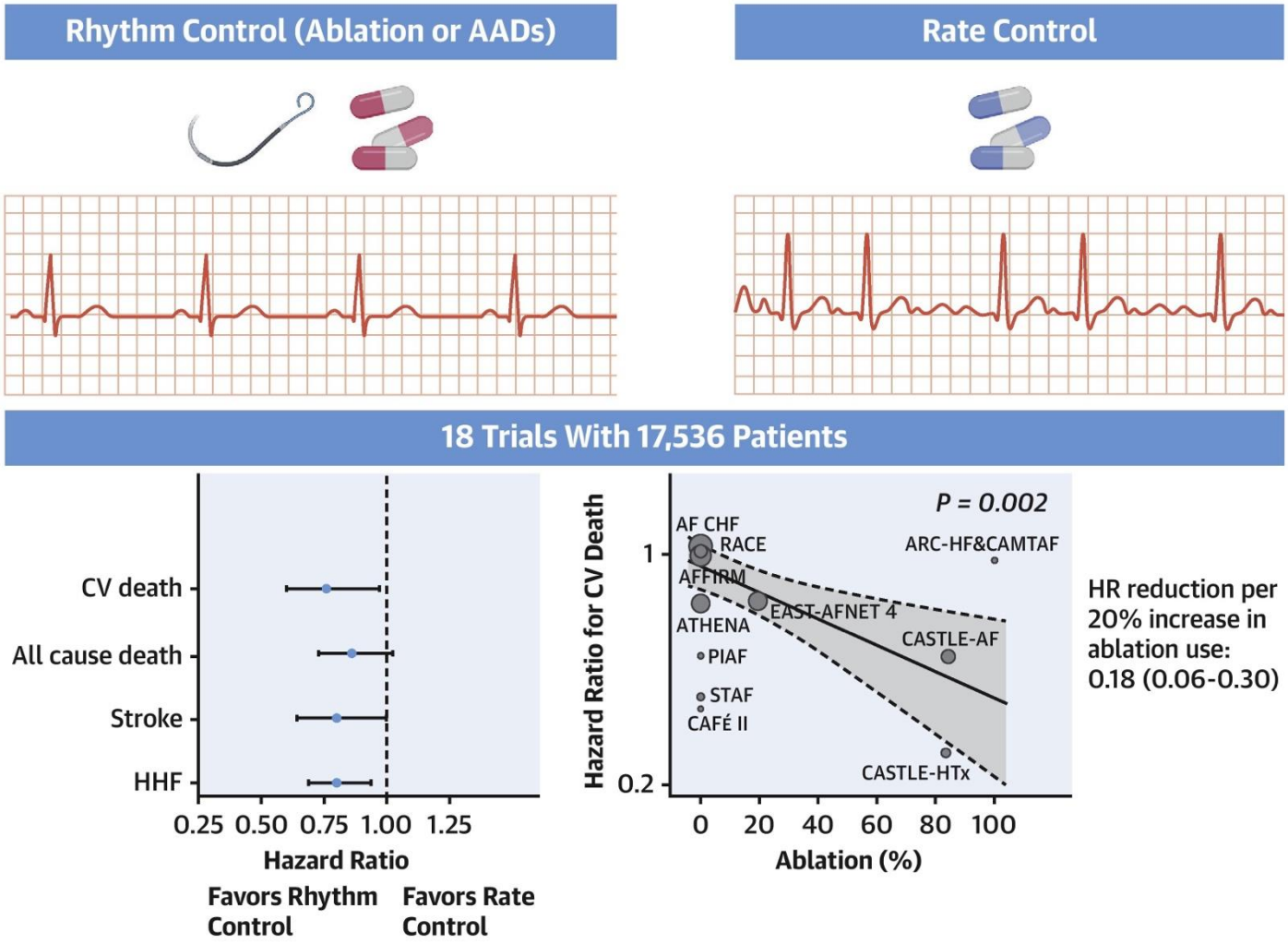


NEJM 2018;378(5):417-27

What is the expectations of rhythm control?

- Recurrence, per se, is not failure of therapy
  - Complete suppression is desired but most AF recurrence - not uncommon
- **Moved away from binary of yes or no**
- **Goal is reducing arrhythmia burden**
  - More realistic measure of efficacy
  - Burden reduction of >98% for PAF

CENTRAL ILLUSTRATION: Rhythm vs Rate Control Effects on Clinical Outcomes



Zafeiropoulos S, et al. J Am Coll Cardiol EP. 2024;10(7):1395-1405.

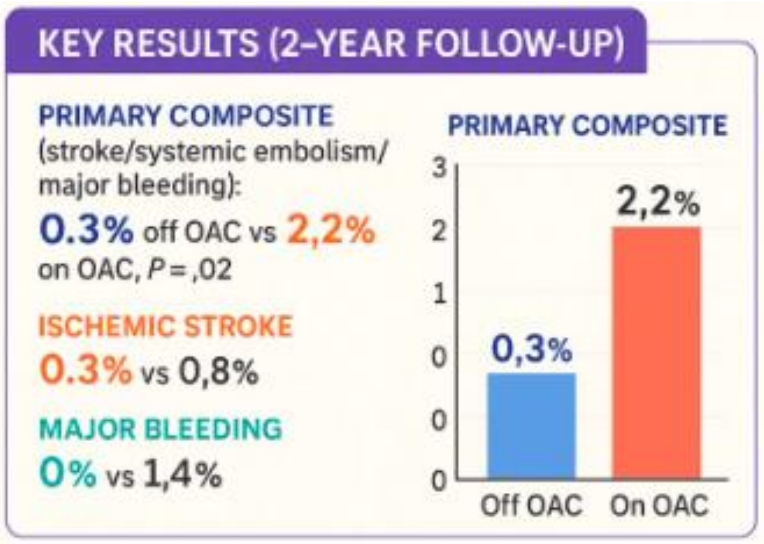
2023 ACC/HRS/AHA Guideline

- Both antiarrhythmics and catheter ablation both are first-line for paroxysmal AF (**Class I**)

- Catheter ablation considered over antiarrhythmics for rhythm control in heart failure patients (**Class I**)

Rhythm control for stroke prevention

- ALONE-AF
  - 840 patients, no AF reoccurrence post ablation
  - 1:1 randomized
- OCEAN-AF
  - 641 patients, no AF reoccurrence post ablation
  - 1:1 randomized



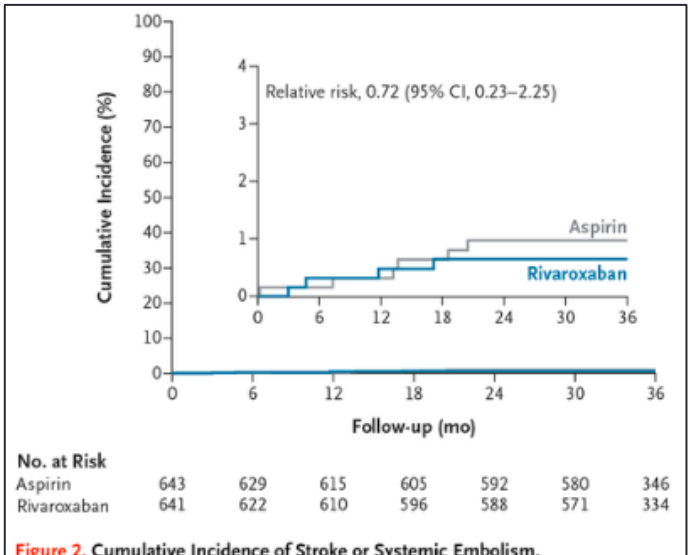
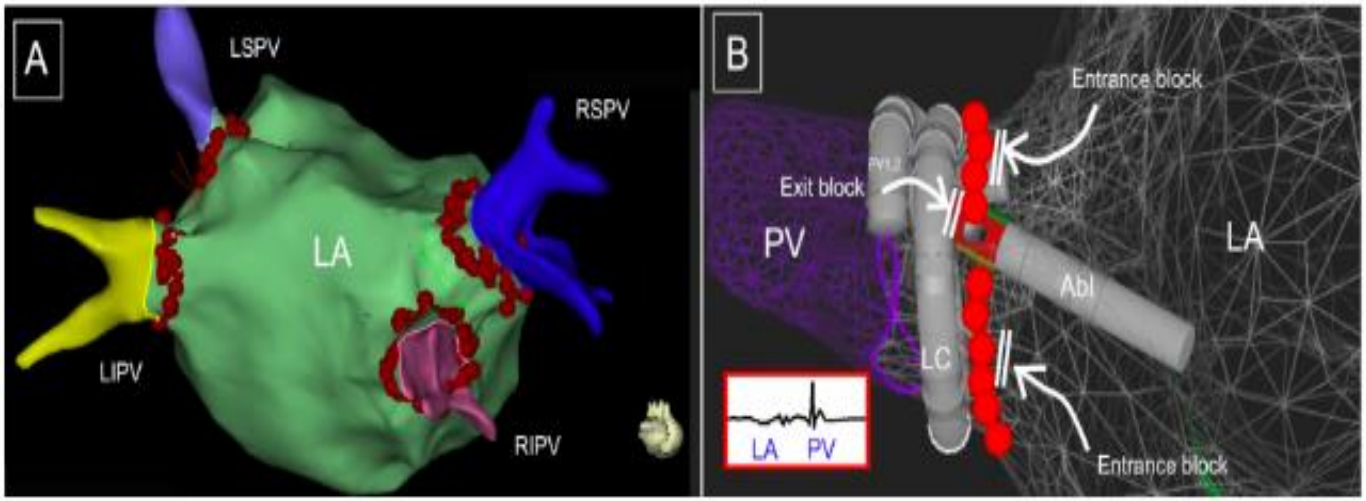


Figure 2. Cumulative Incidence of Stroke or Systemic Embolism.

JAMA 2025;334;(14):1246-
NEJM 2026;394:323-332

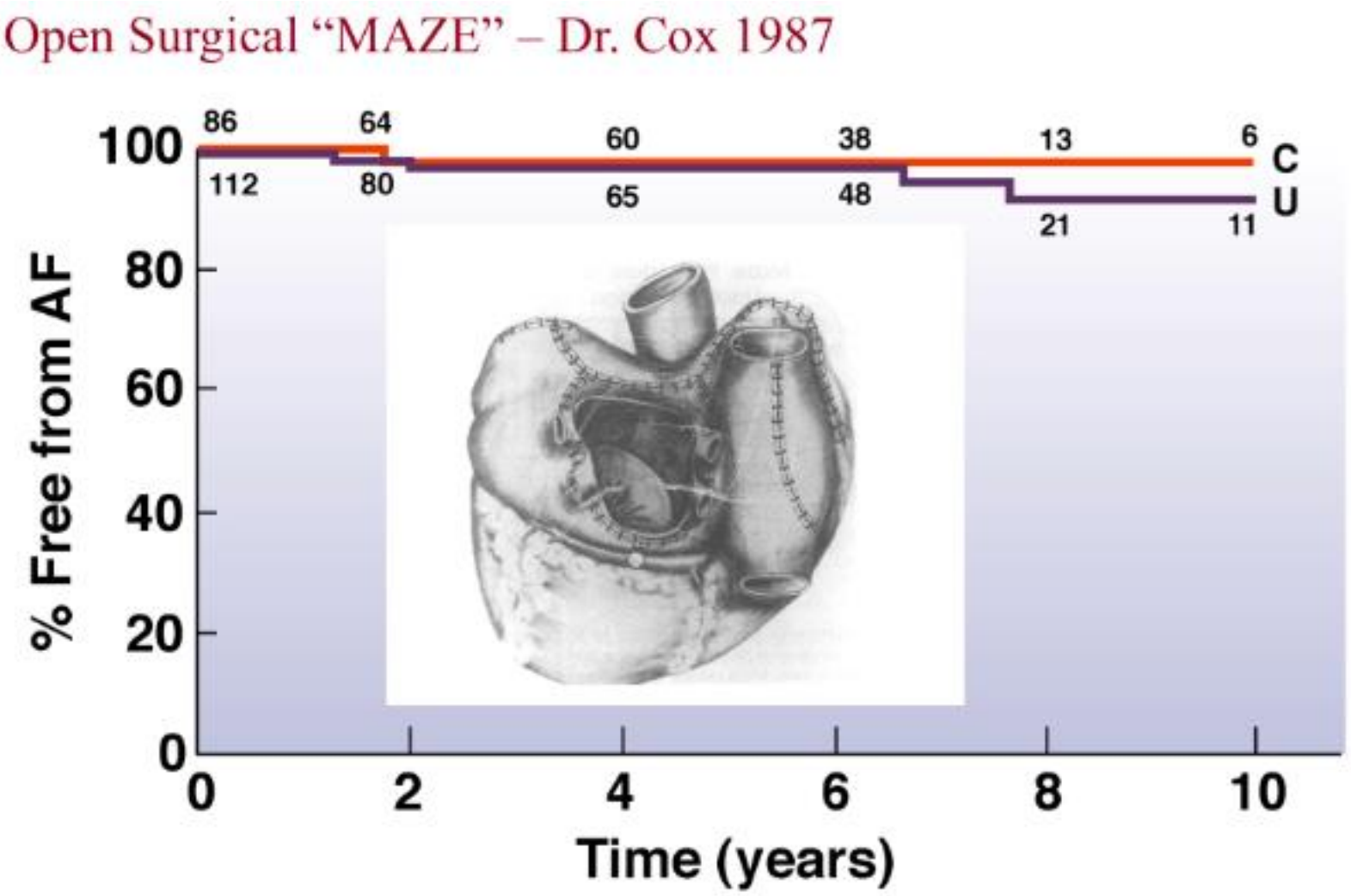
What is AF ablation?

- AF ablation a misnomer
- **Ablating substrate** of atrial fibrillation, anatomically-based, triggered-based
- The goal is to *electrically* isolate pulmonary veins



Circulation 2012

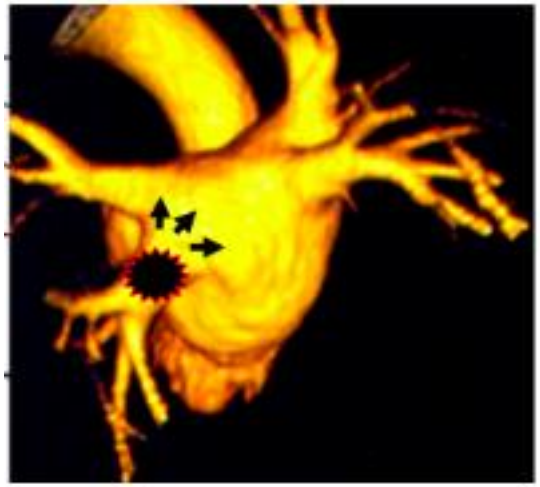
What is AF ablation?

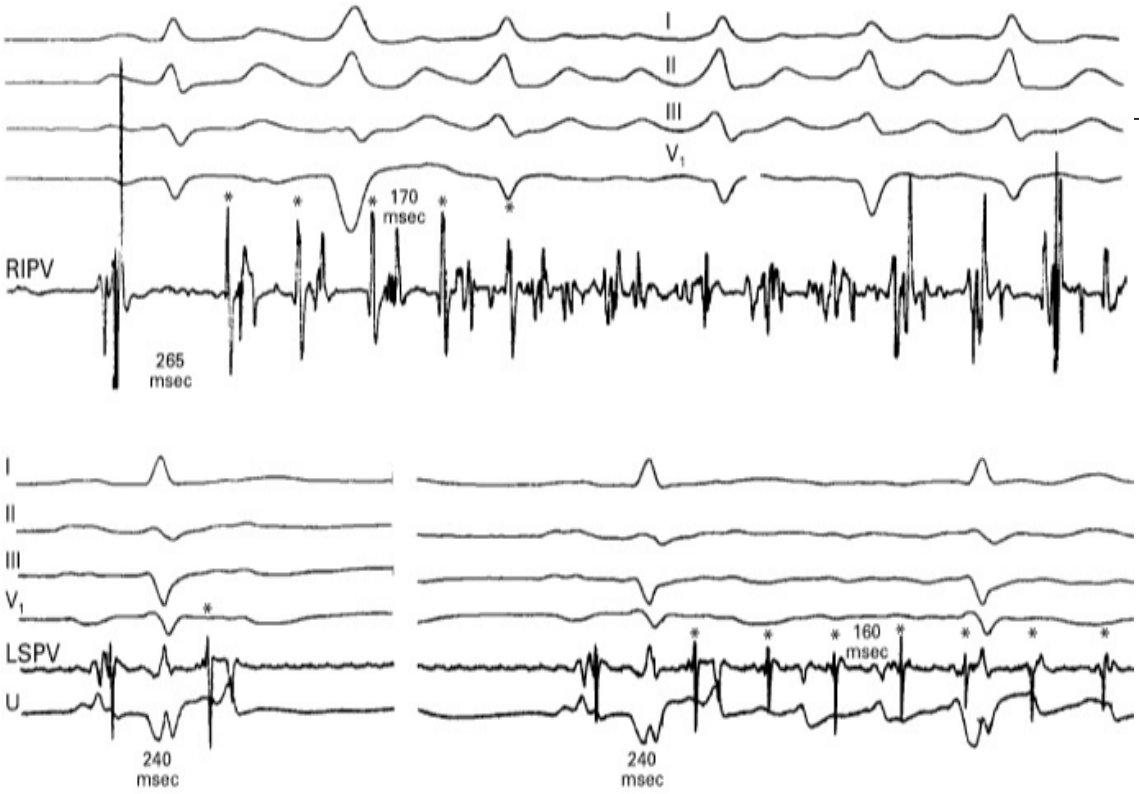


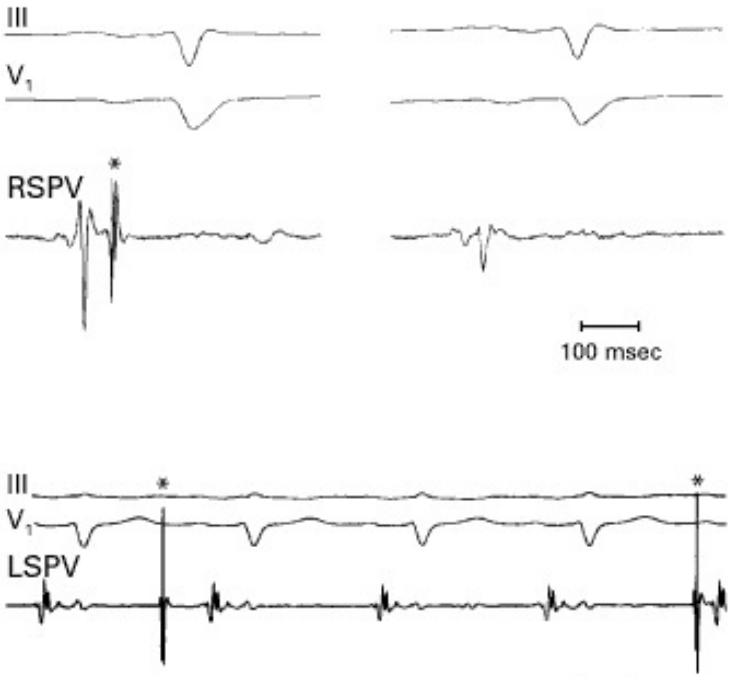
Prasad, M. et al. J Thorac Cardiovasc Surg. 2003 Dec;126(6):1822-8.

Pulmonary vein isolation

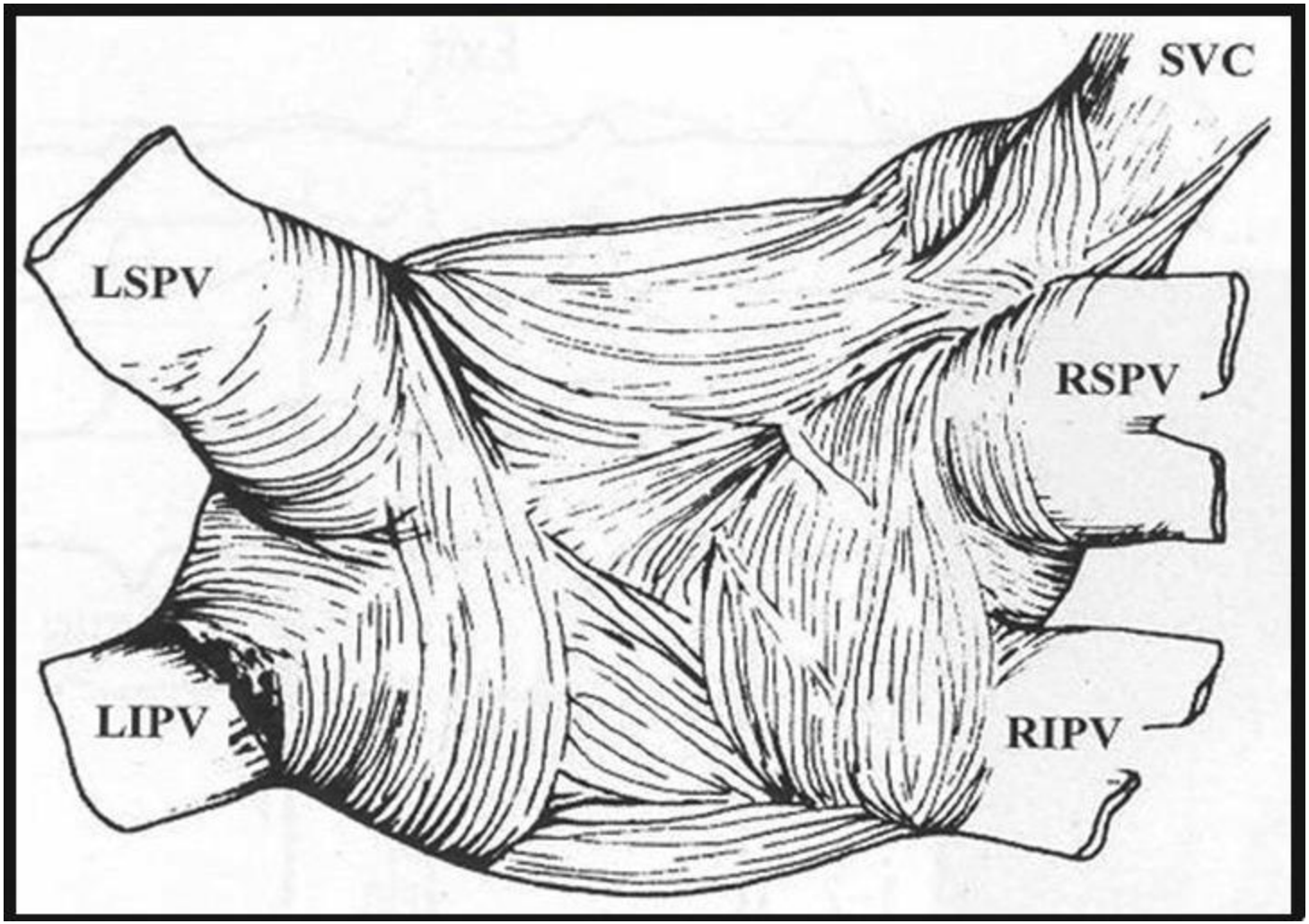
- Haissaguerre the first to detect the importance of pulmonary vein **triggers**



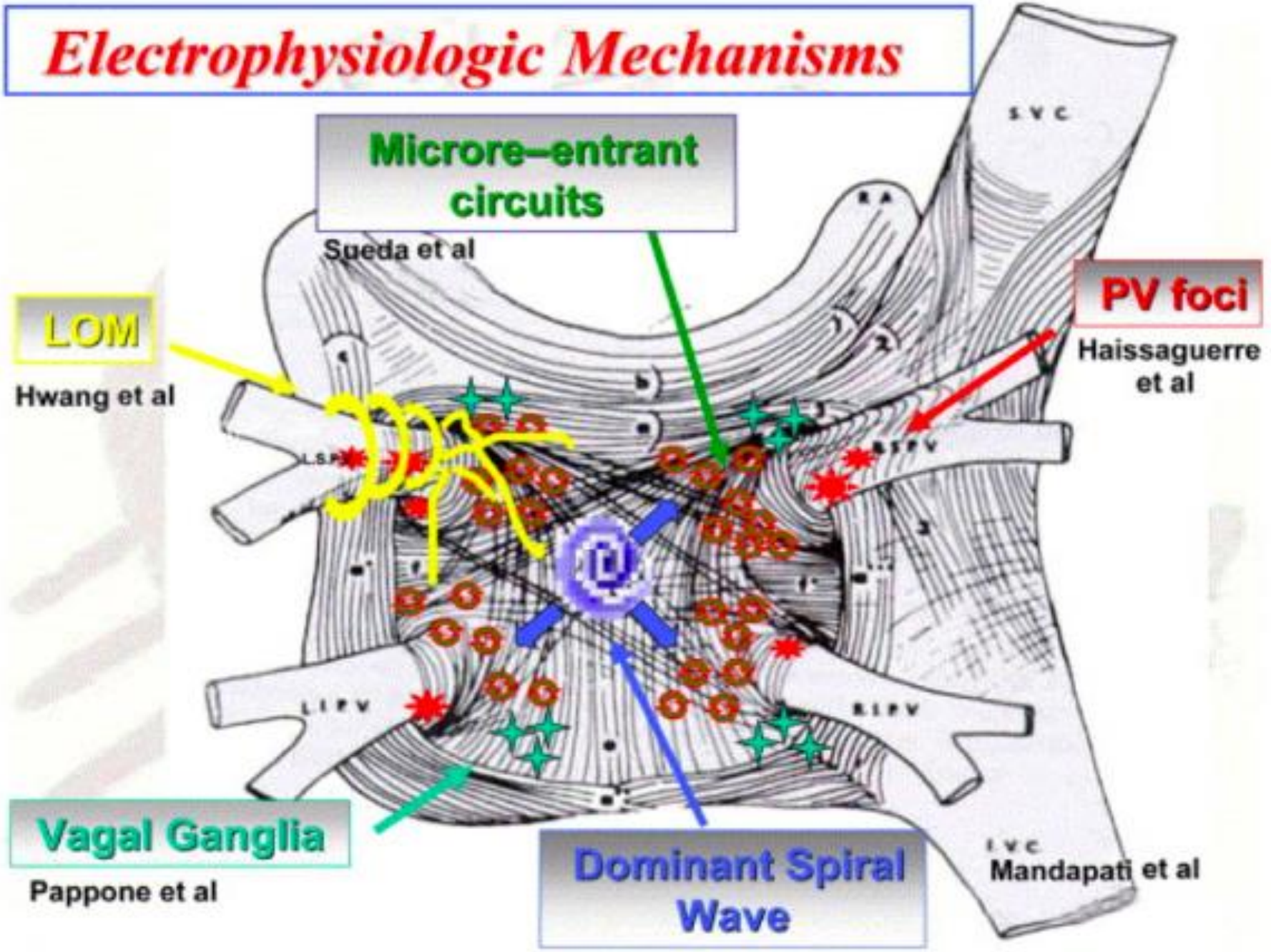




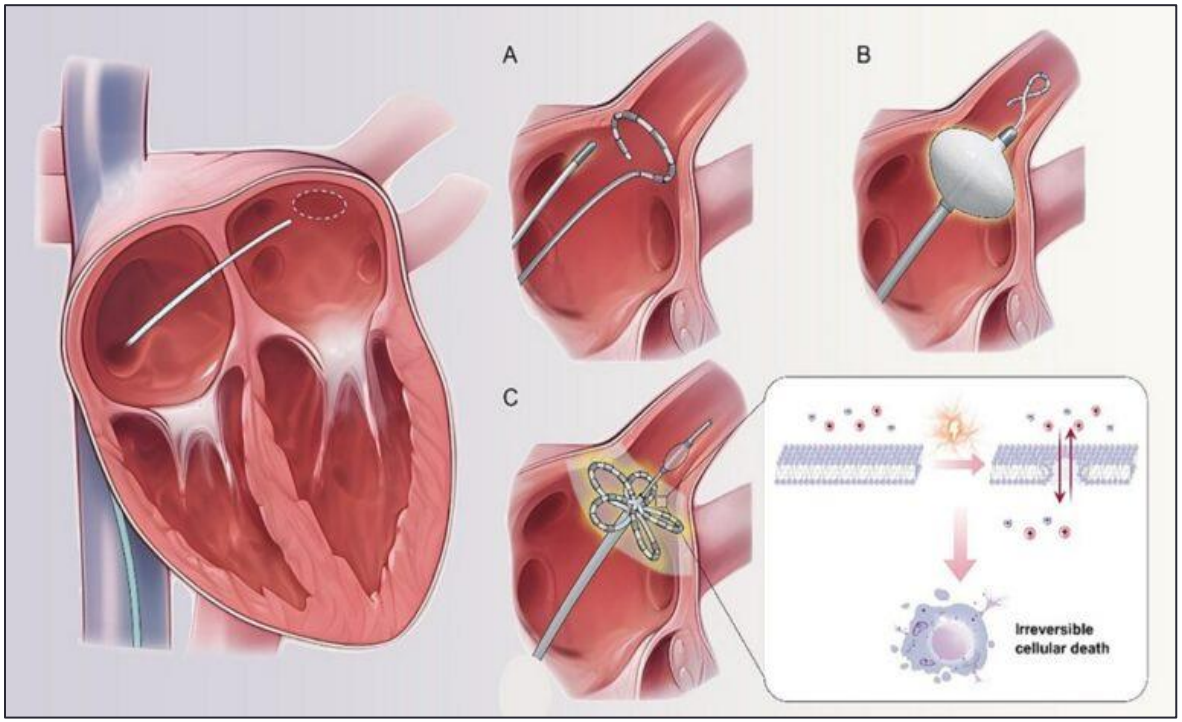
NEJM 1998;339:659-666


SVC
LSPV
RSPV
LIPV
RIPV

Electrophysiologic Mechanisms

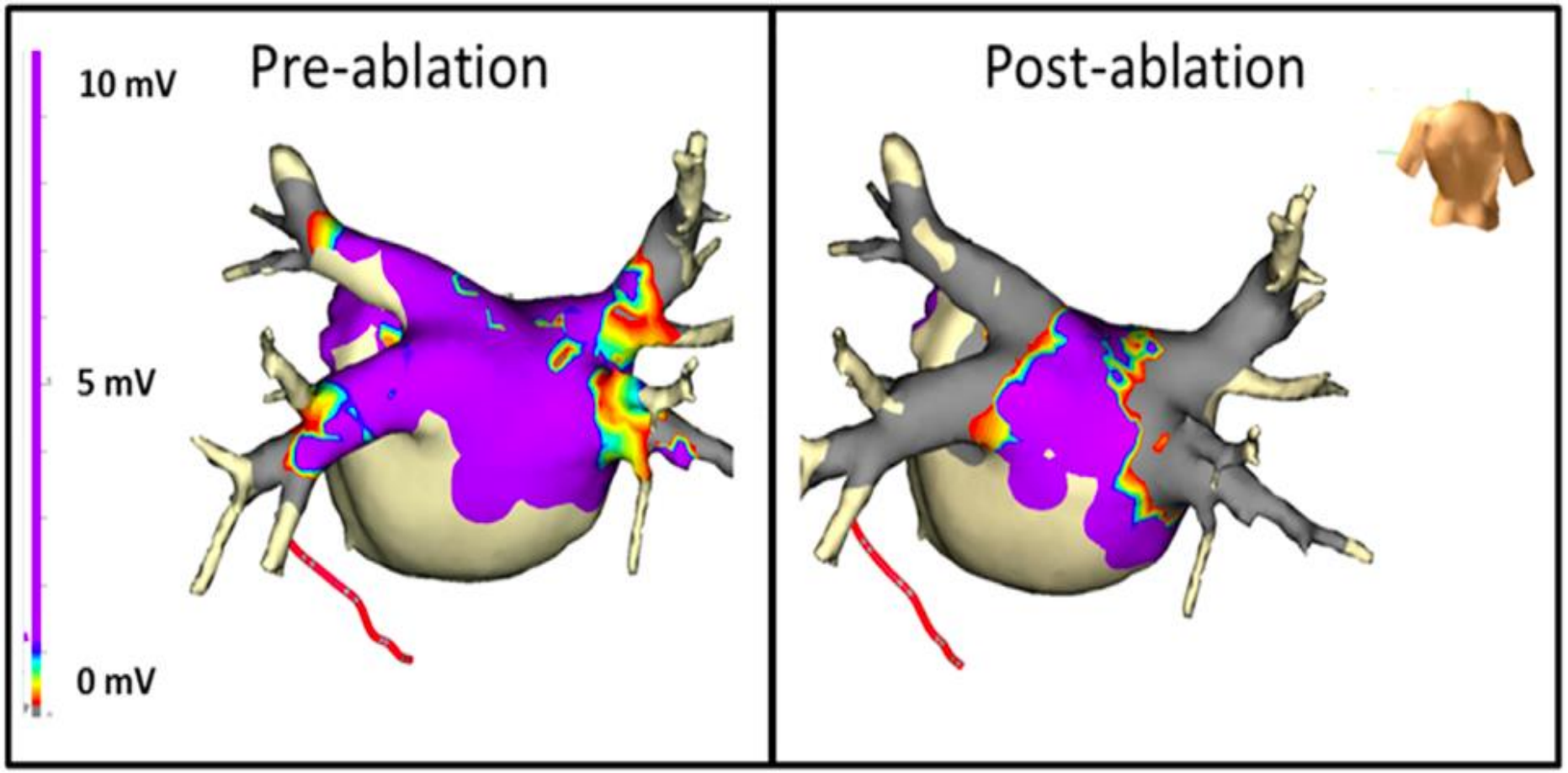


Multiple options in ablation technology



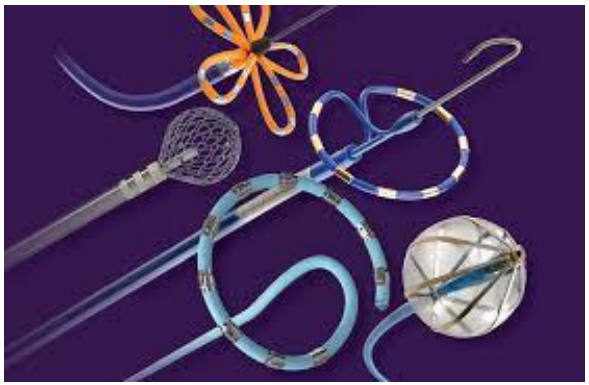
- Radiofrequency
- Cryoablation
- Laser
- Pulse Field Ablation

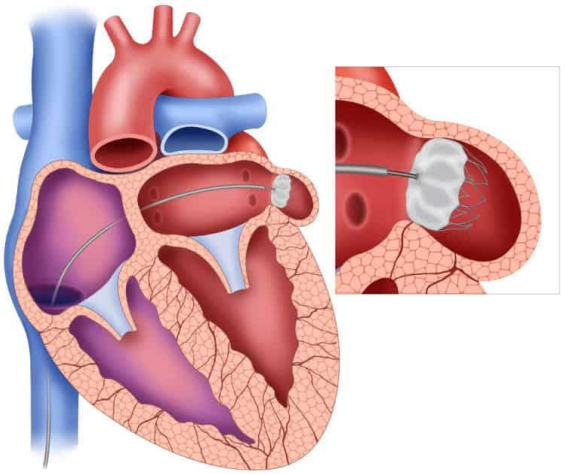
- Shorter procedure time
- Better tolerated peri-procedure
- However, more or less similar efficacy outcome across all technology

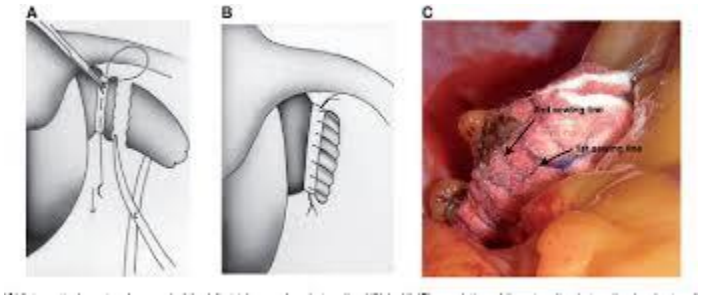

10 mV
5 mV
0 mV
Pre-ablation
Post-ablation

New technology

- Ablation technology – PFA, AI
- Stroke reduction
  - Safer OAC
  - Left atrial appendage occlusion
  - Surgical left atrial appendage ligation
- Future: Better stroke risk predictors, OAC PRN dosing







Key take home points

- Most patient does not require ED visit or admission
- *Take the opportunity to address and treat concurrent risk factor*
- Rate not equal to rhythm – Worth consideration for rhythm control
- *Therapy is tailored to individual patient*
- ***Feel free to reach out to myself via Teams or Epic Chat anytime: Roy Lin***

THANK YOU