A Rational Approach to Atrial Fibrillation

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Disclosures

- None

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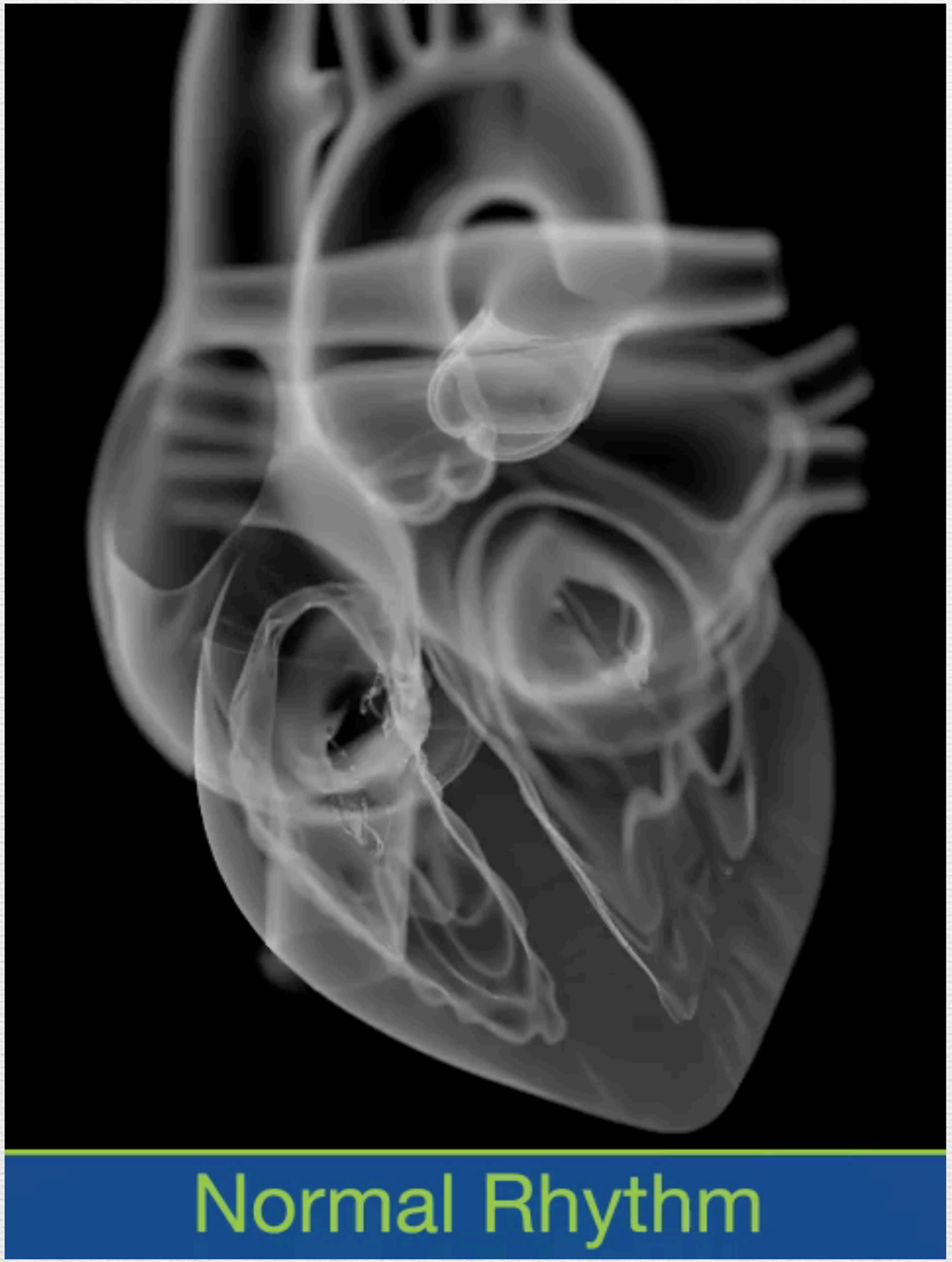
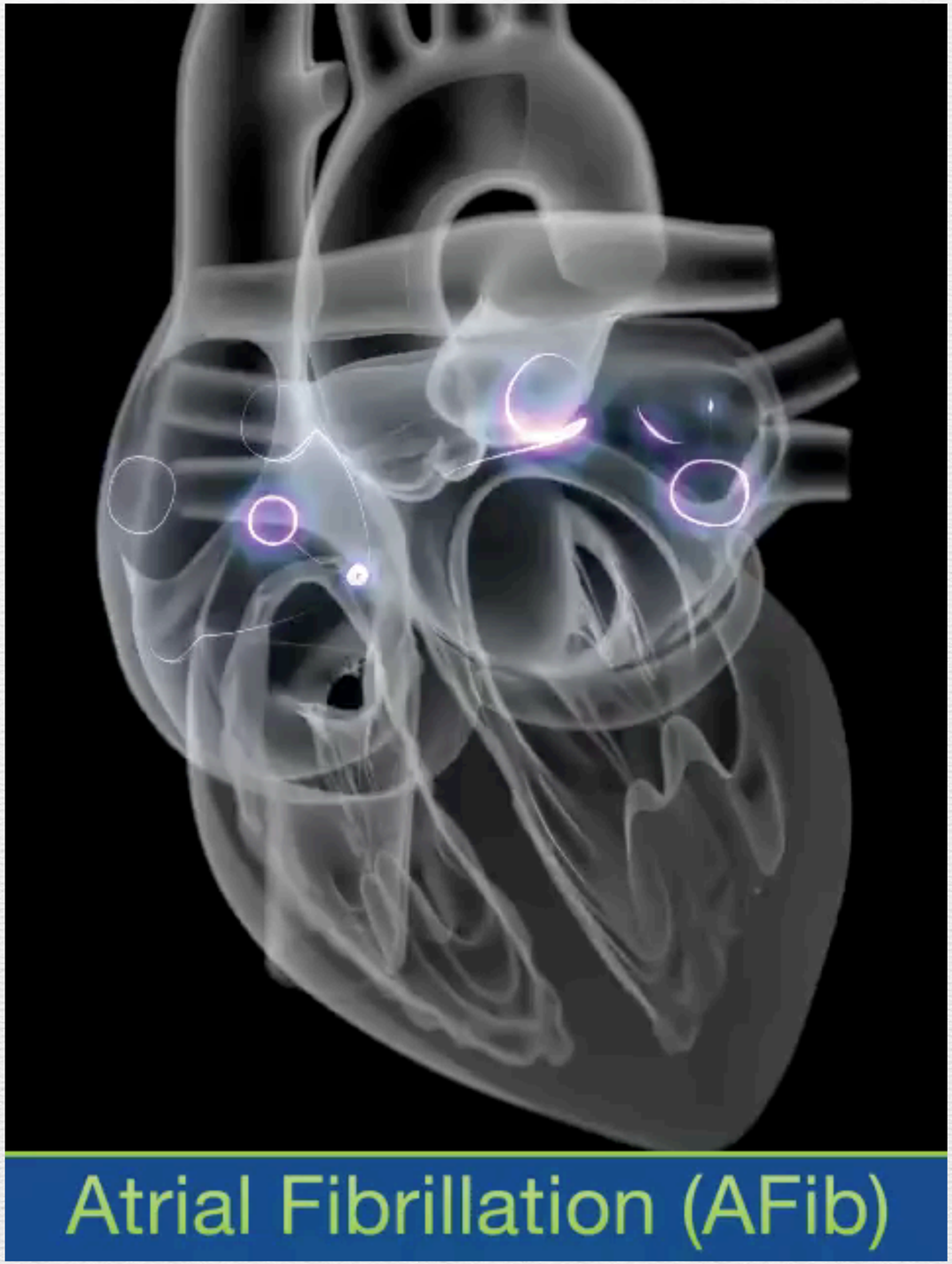
2019 AHA/ACC/HRS Focused Update of the 2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

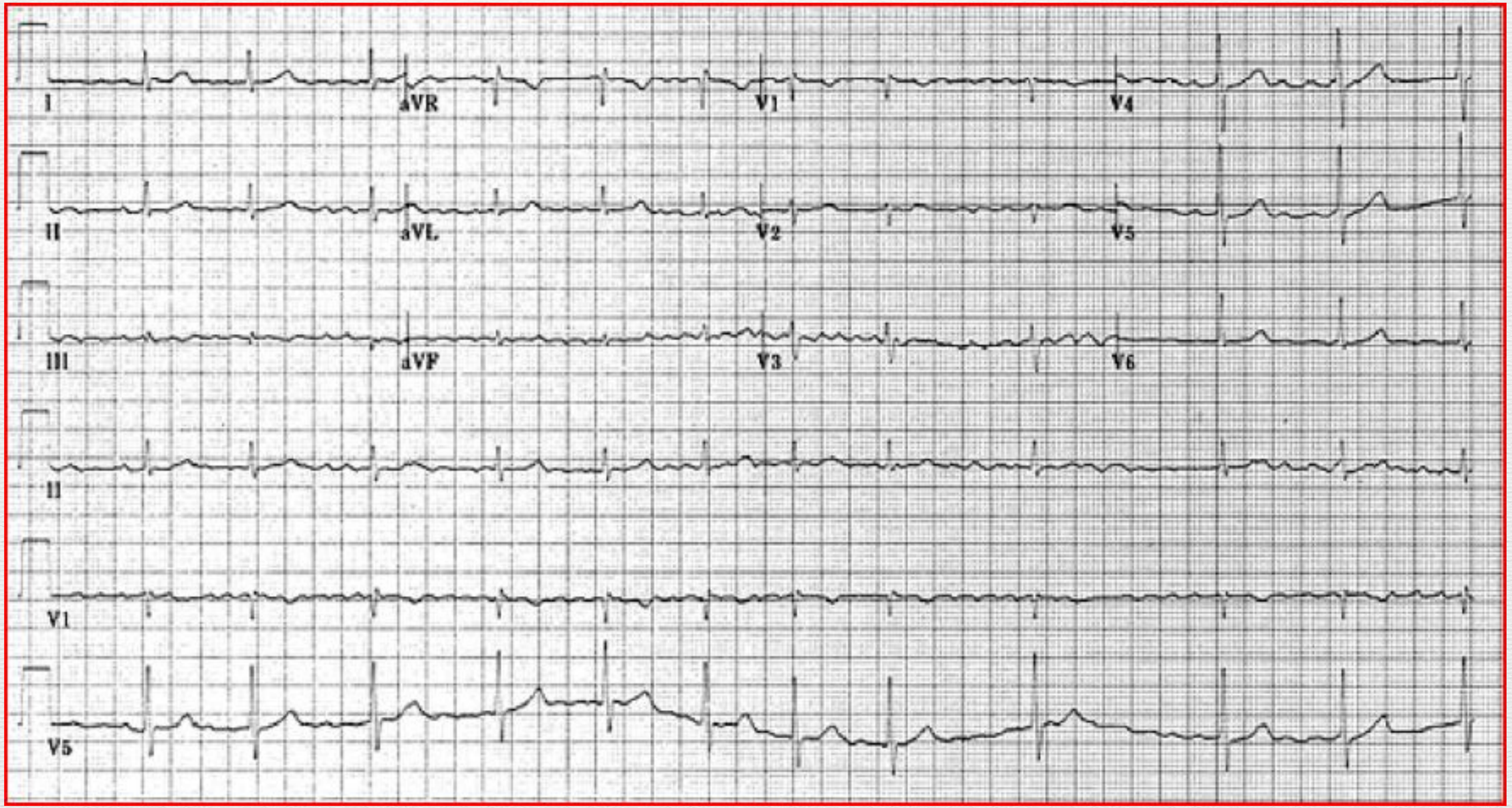
A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

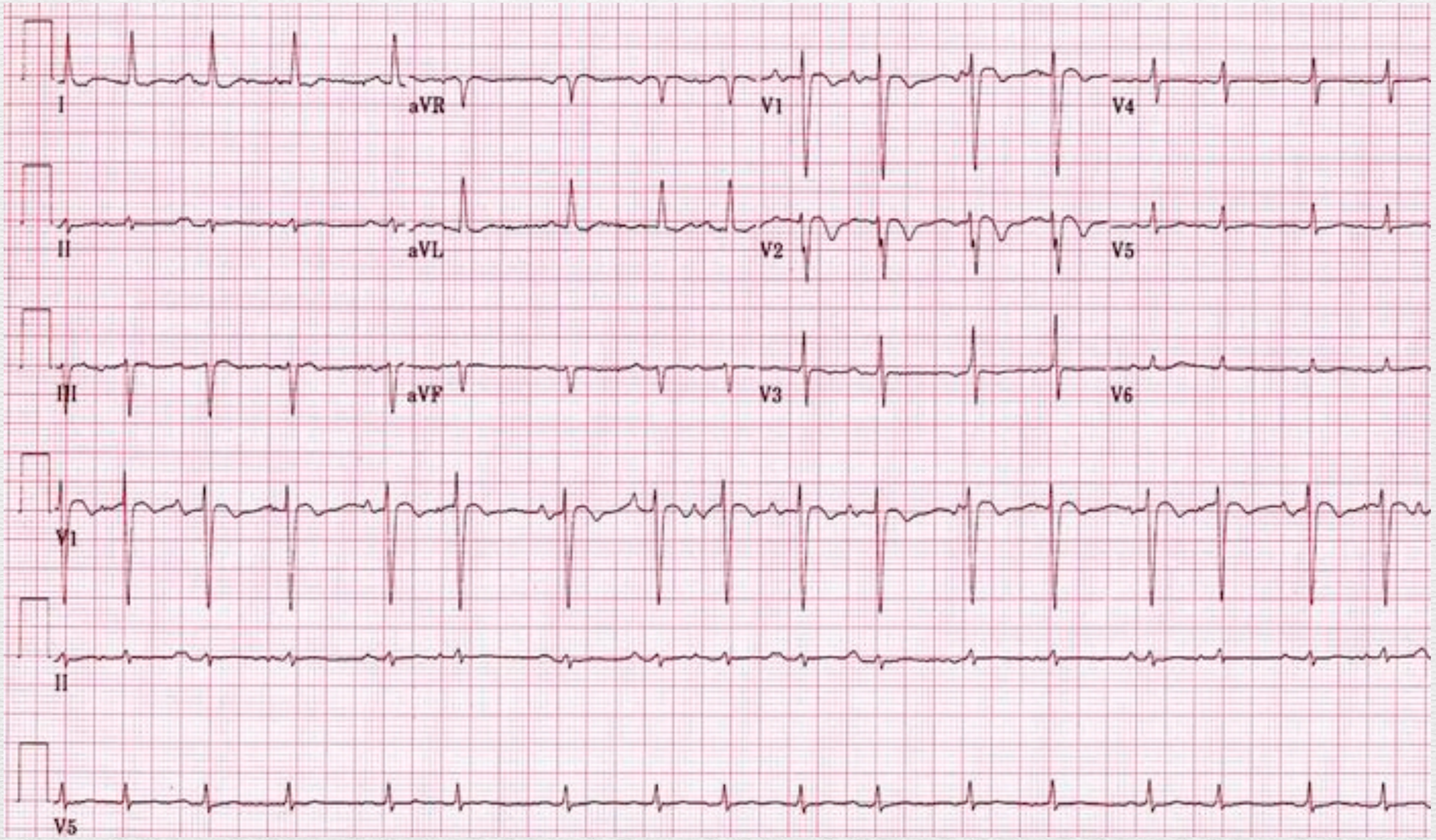
Developed in Collaboration With the Society of Thoracic Surgeons

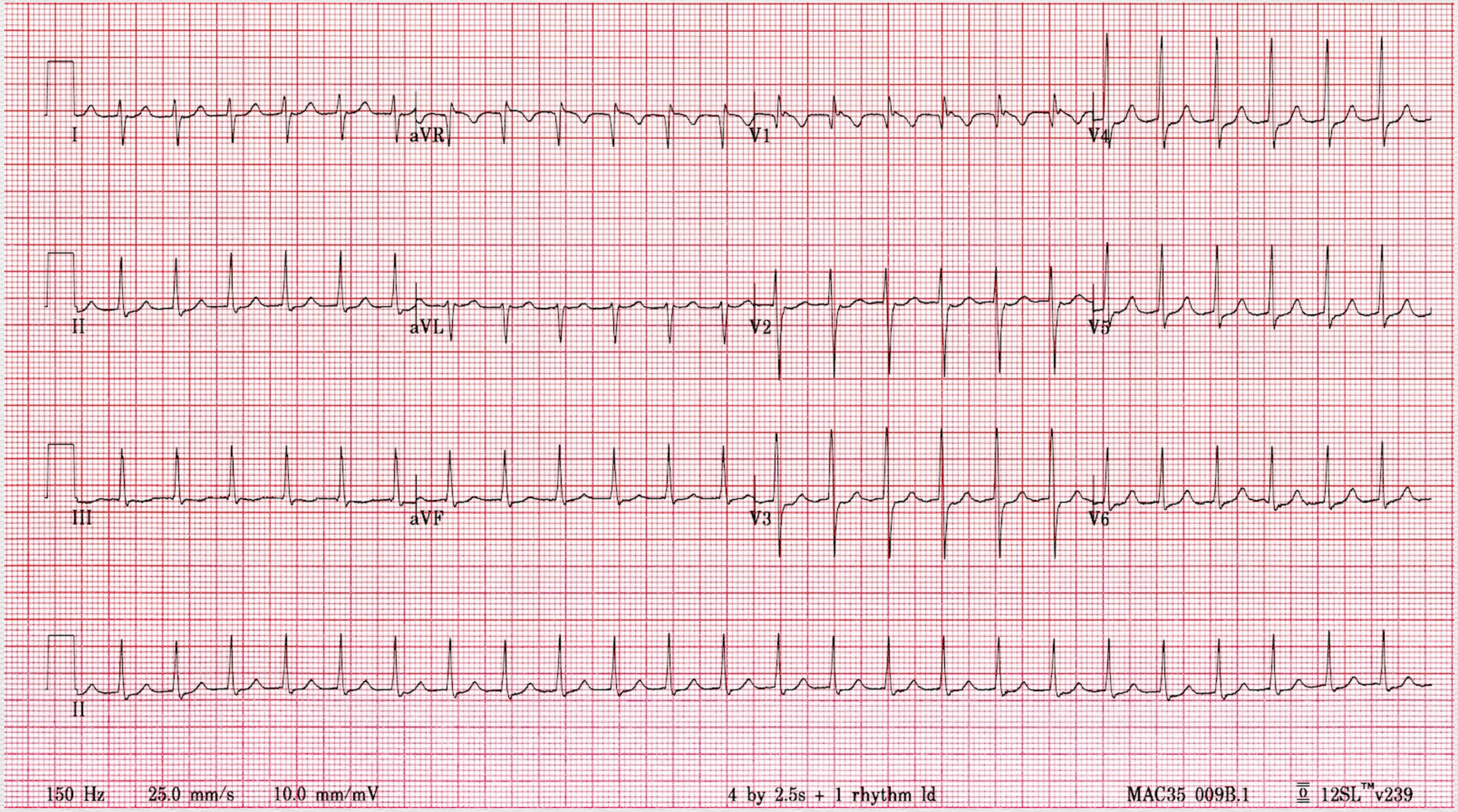
Definition/Pathophysiology/ Epidemiology

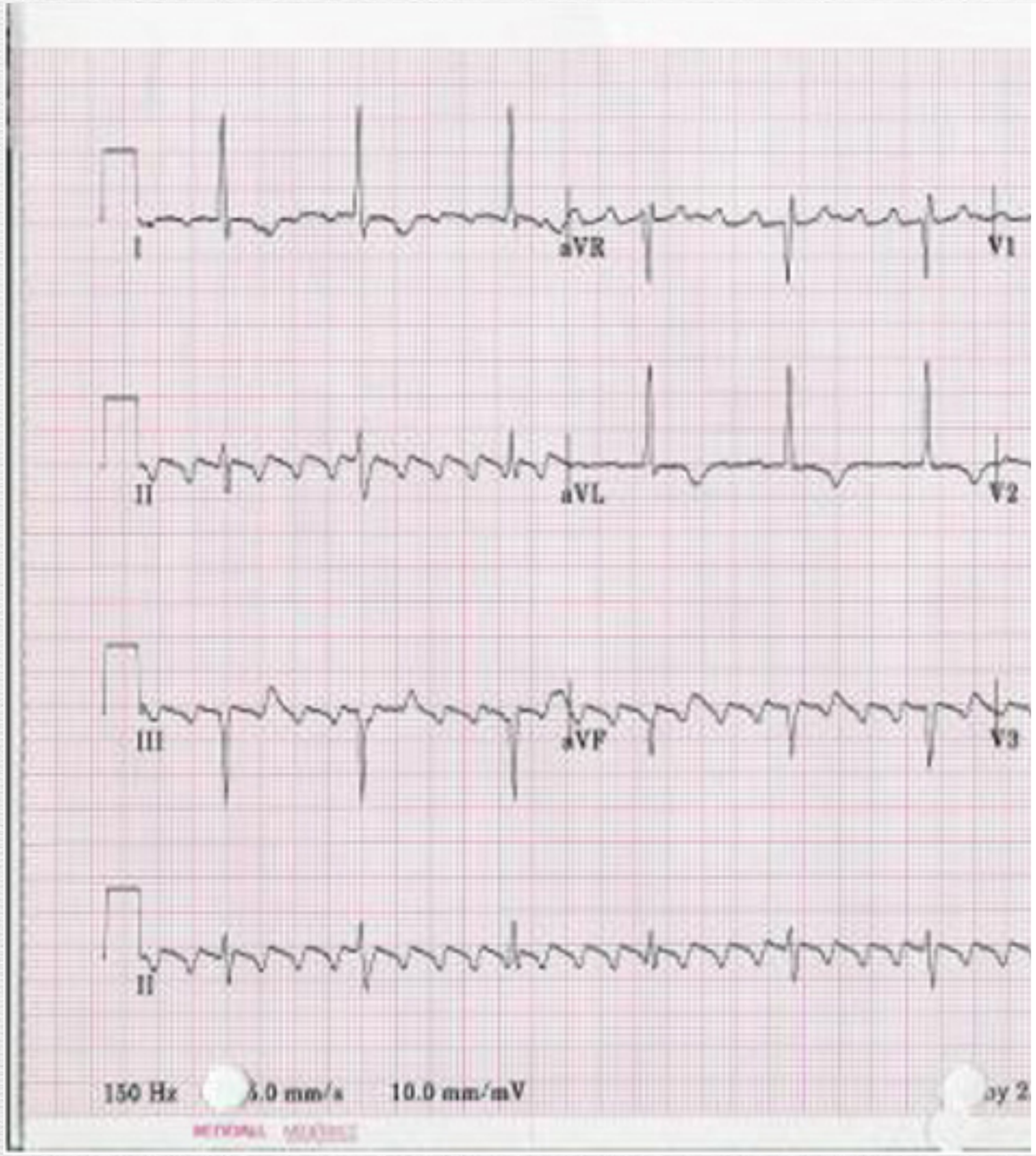

Normal Rhythm

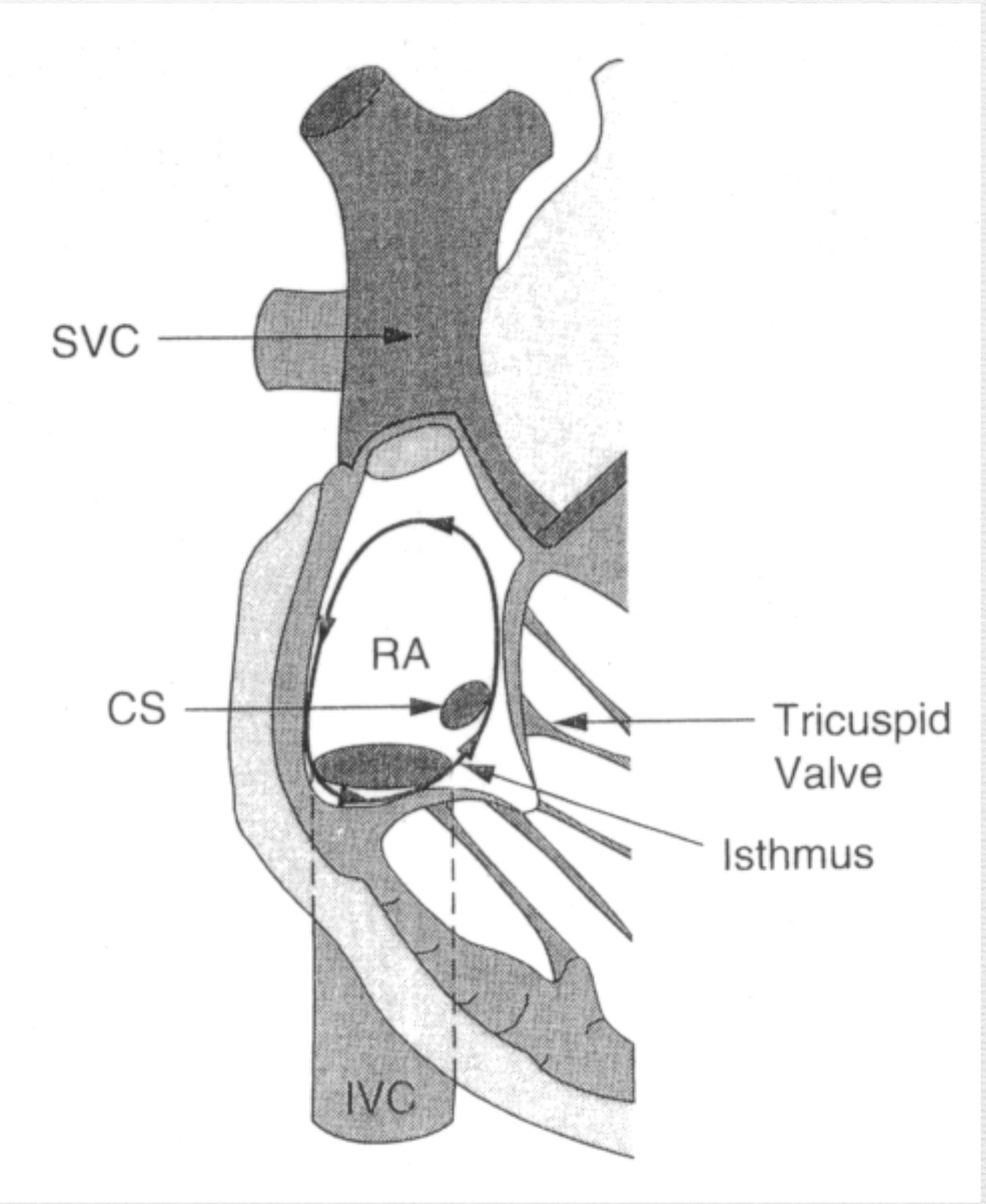

Atrial Fibrillation (AFib)

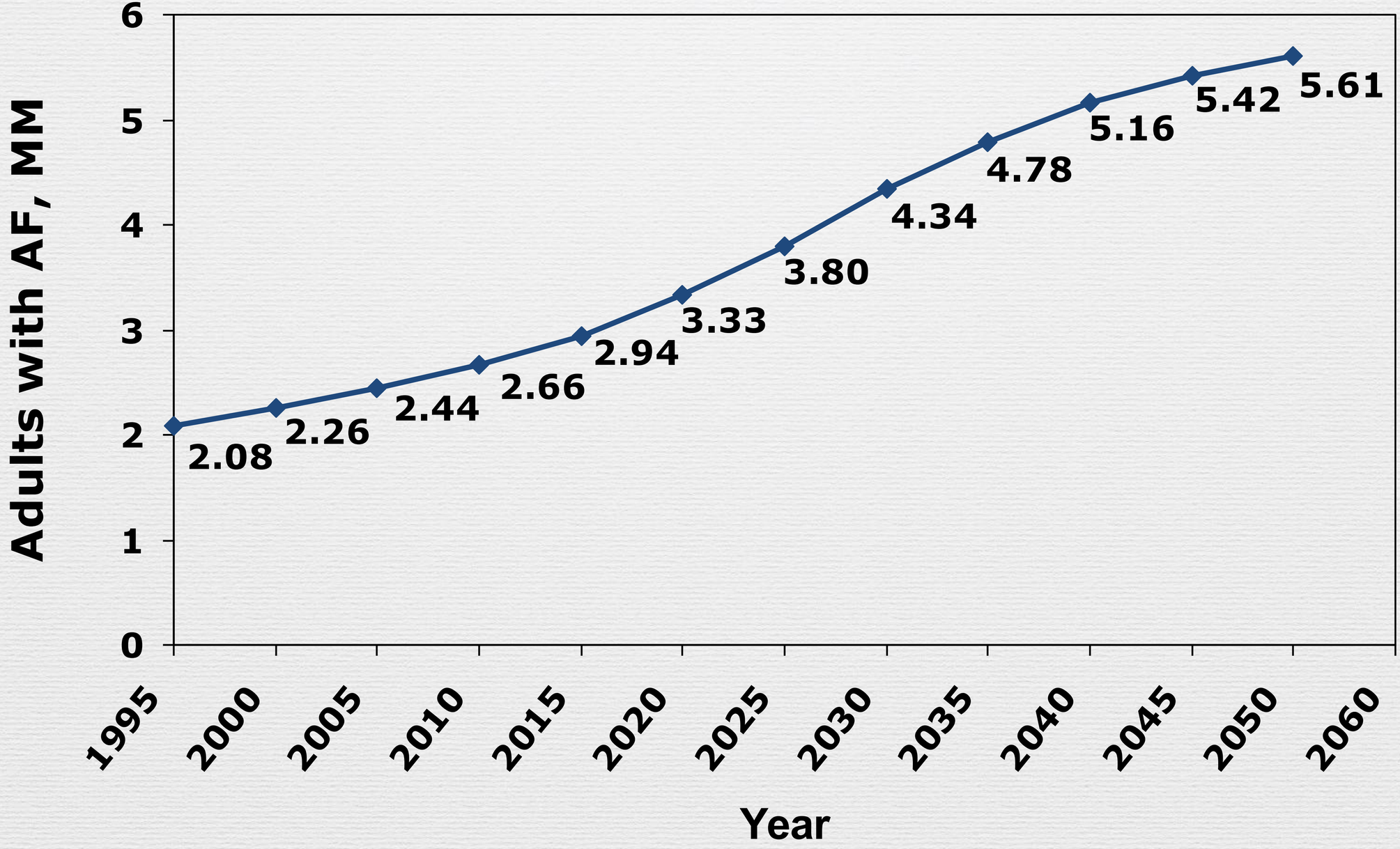

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
V1
V5


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II
150 Hz
25.0 mm/s
10.0 mm/mV
4 by 2.5s + 1 rhythm ld
MAC35 009B.1
12SL™v239

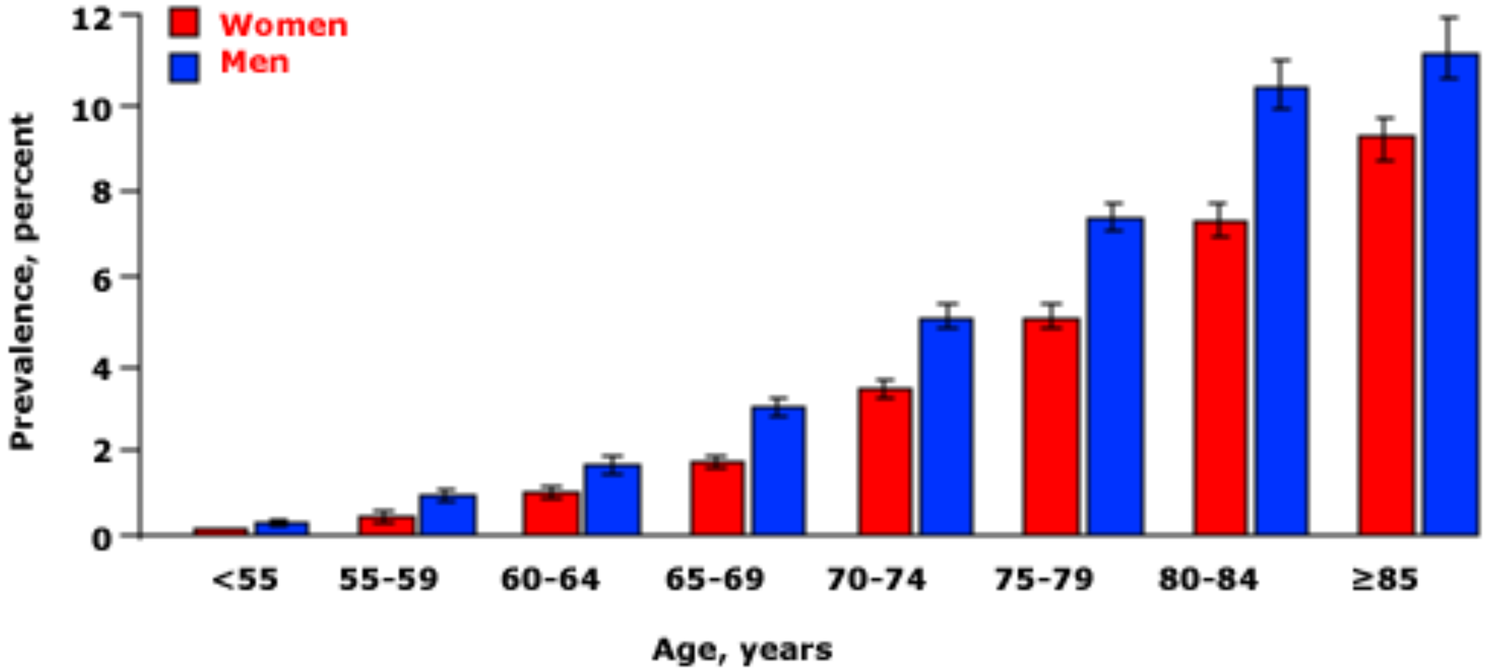

I
aVR
V1
II
aVL
V2
III
aVF
V3
II
150 Hz
10.0 mm/mV


SVC
RA
CS
Tricuspid Valve
Isthmus
IVC



Go A et al. JAMA 2001:285:2370-2385

Prevalence of atrial fibrillation with age



In a cross-sectional study of almost 1.9 million men and women, the prevalence of atrial fribillation increases with age, ranging from 0.1 for those less than 55 years of age to over 9 percent in those ≥85 years of age. At all ages, the prevalence is higher in men than women.

Data from Go, AS, Hylek, EM, Phillips, K, et al, JAMA 2001; 285:2370.

Definitions

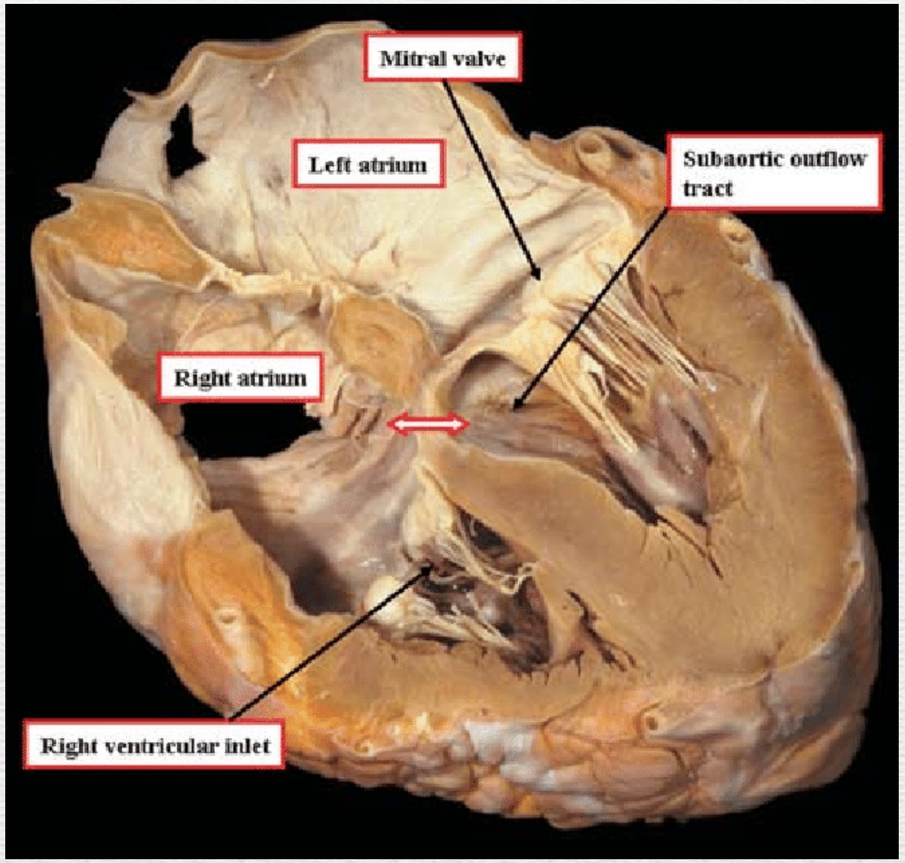
- Paroxysmal AF: terminates spontaneously within 7 days
- Persistent AF: will not terminate spontaneously
- Longstanding persistent AF: > 1 year
- Permanent AF
- “Nonvalvular” AF: Not in the guidelines anymore


Shoot system
Root system

“R”ational Approach to AF

- Root Control
- Risk Control
- Rate Control
- Rhythm Control

Root Control



Things that put stress on the heart

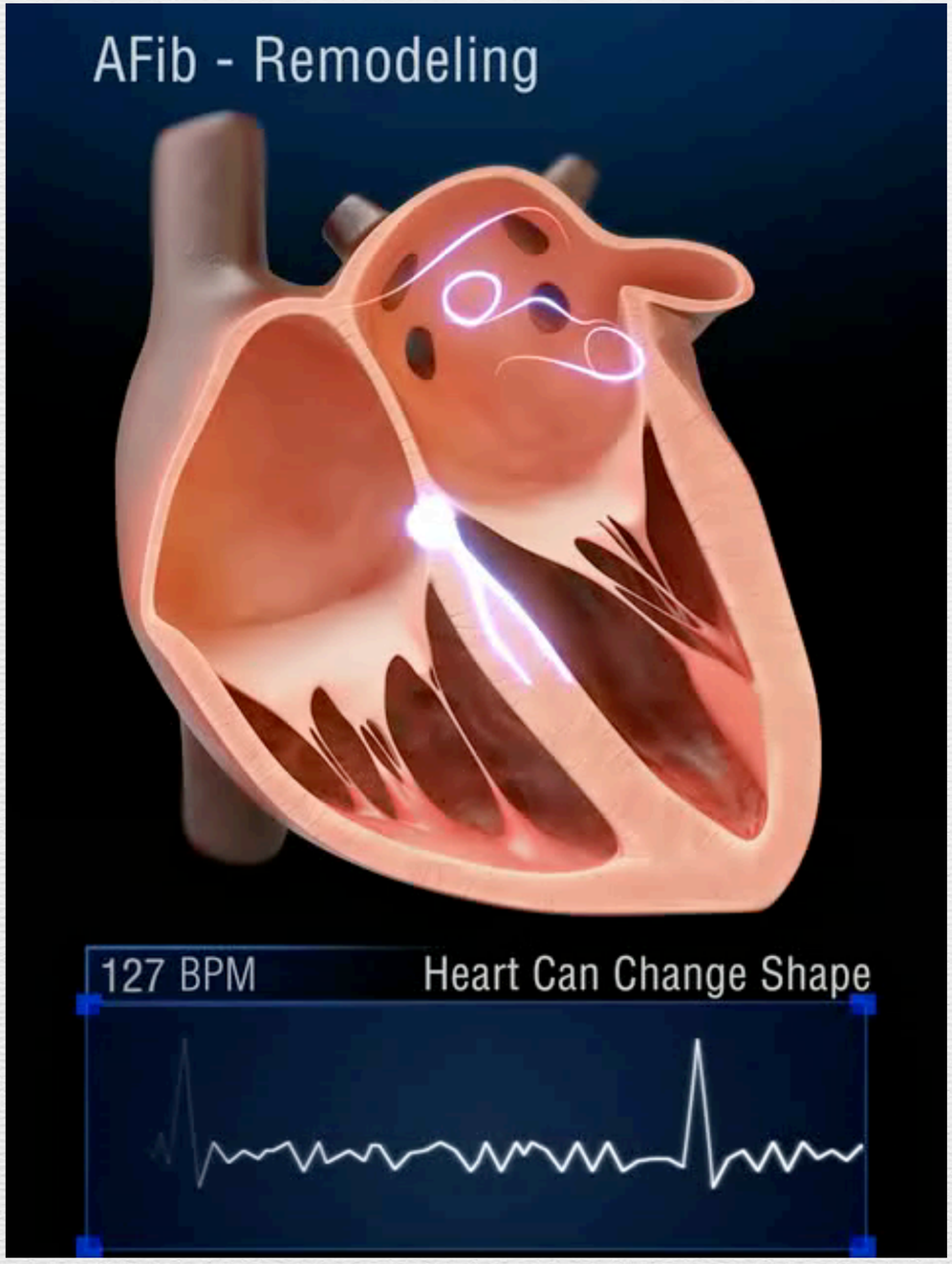
- Being alive

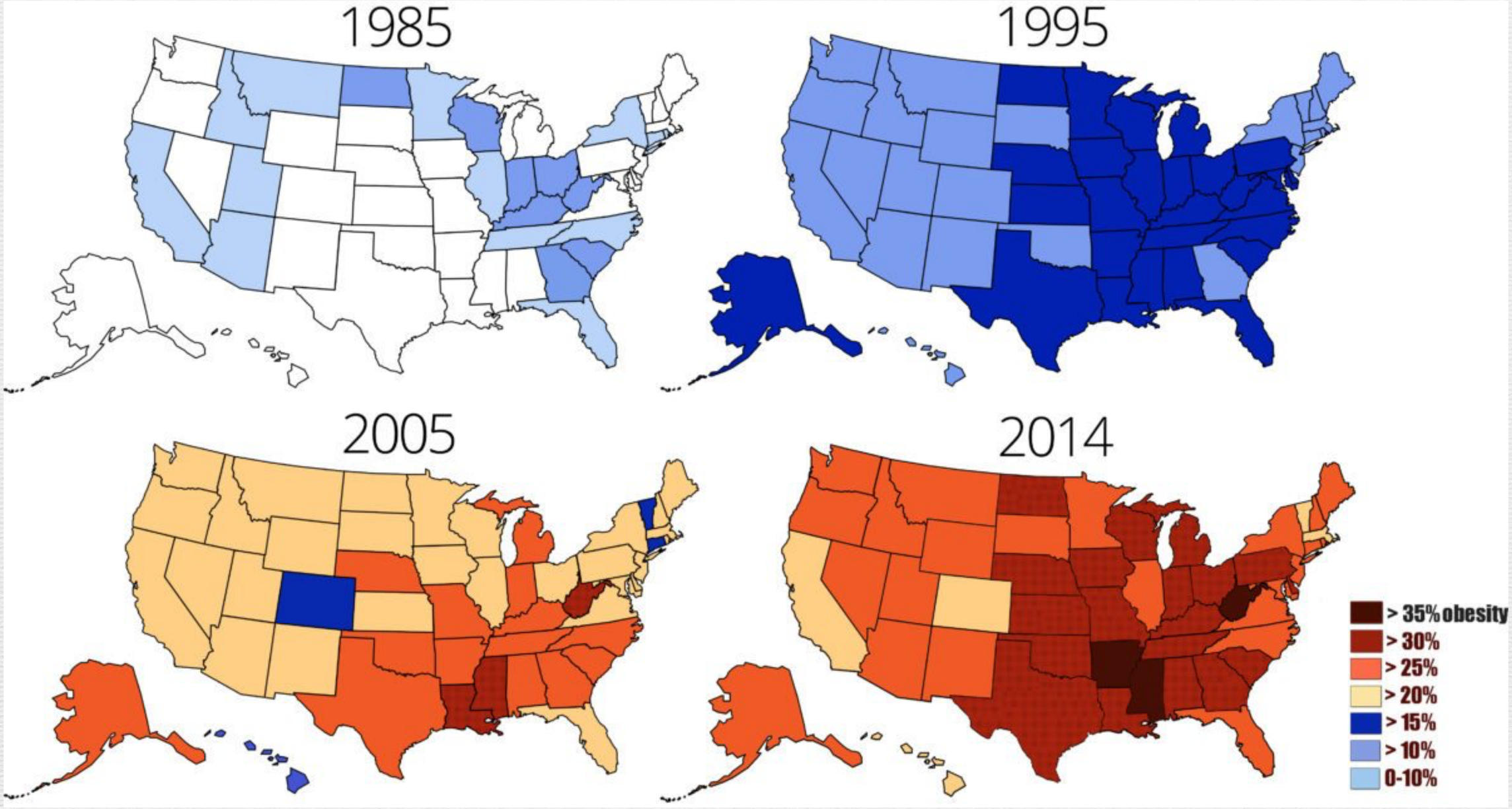
Things that put stress on the heart

- Being alive
- Alcohol
- Obstructive sleep apnea
- Hypertension
- Other comorbidities

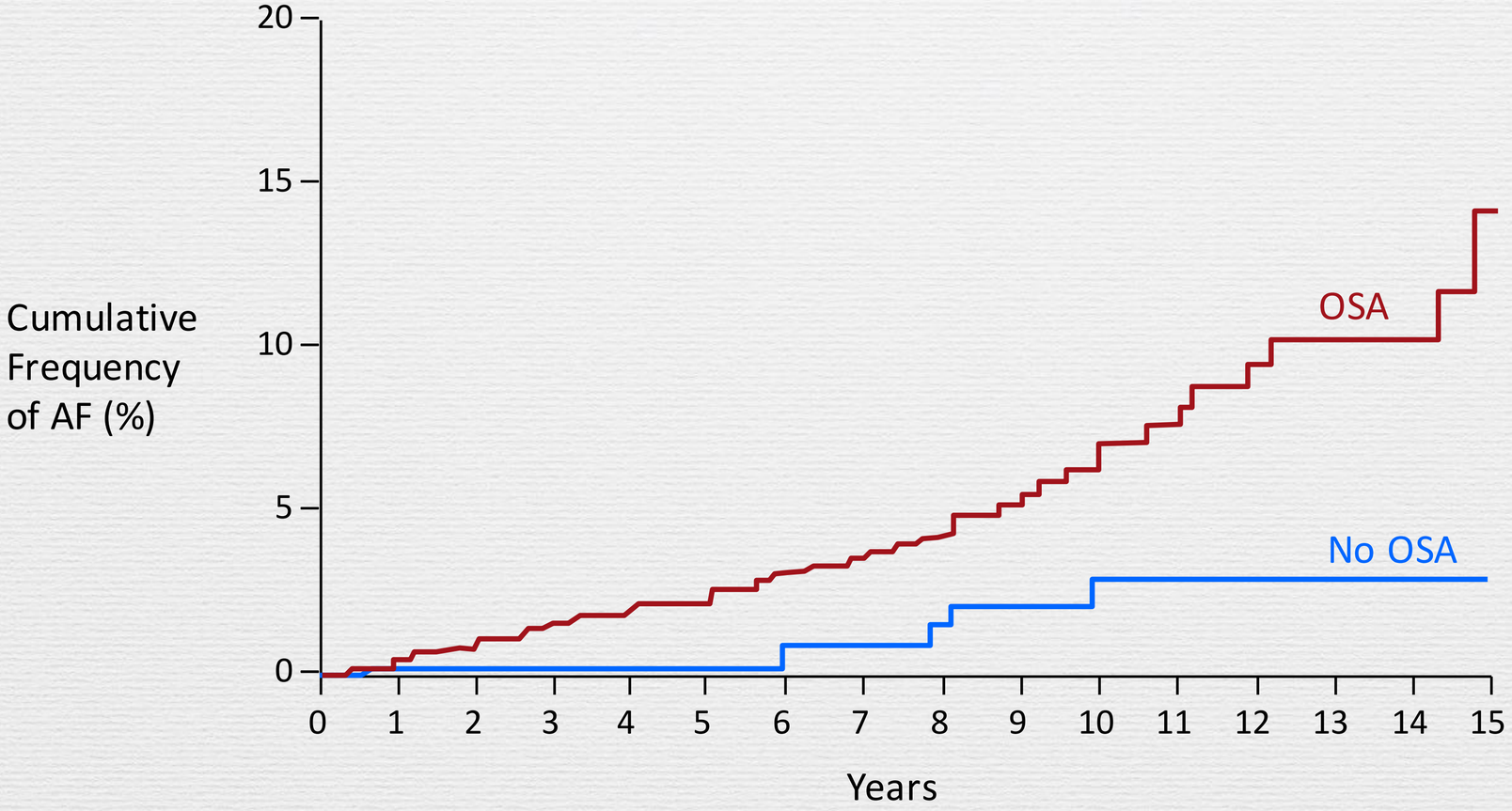
Things that put stress on the heart

- Being alive
- Alcohol
- Obstructive sleep apnea
- Hypertension
- Other comorbidities
- Atrial fibrillation


AFib - Remodeling
127 BPM
Heart Can Change Shape


1985
1995
2005
2014
> 35% obesity
> 30%
> 25%
> 20%
> 15%
> 10%
0-10%

Incidence of AF Based on Presence or Absence of OSA



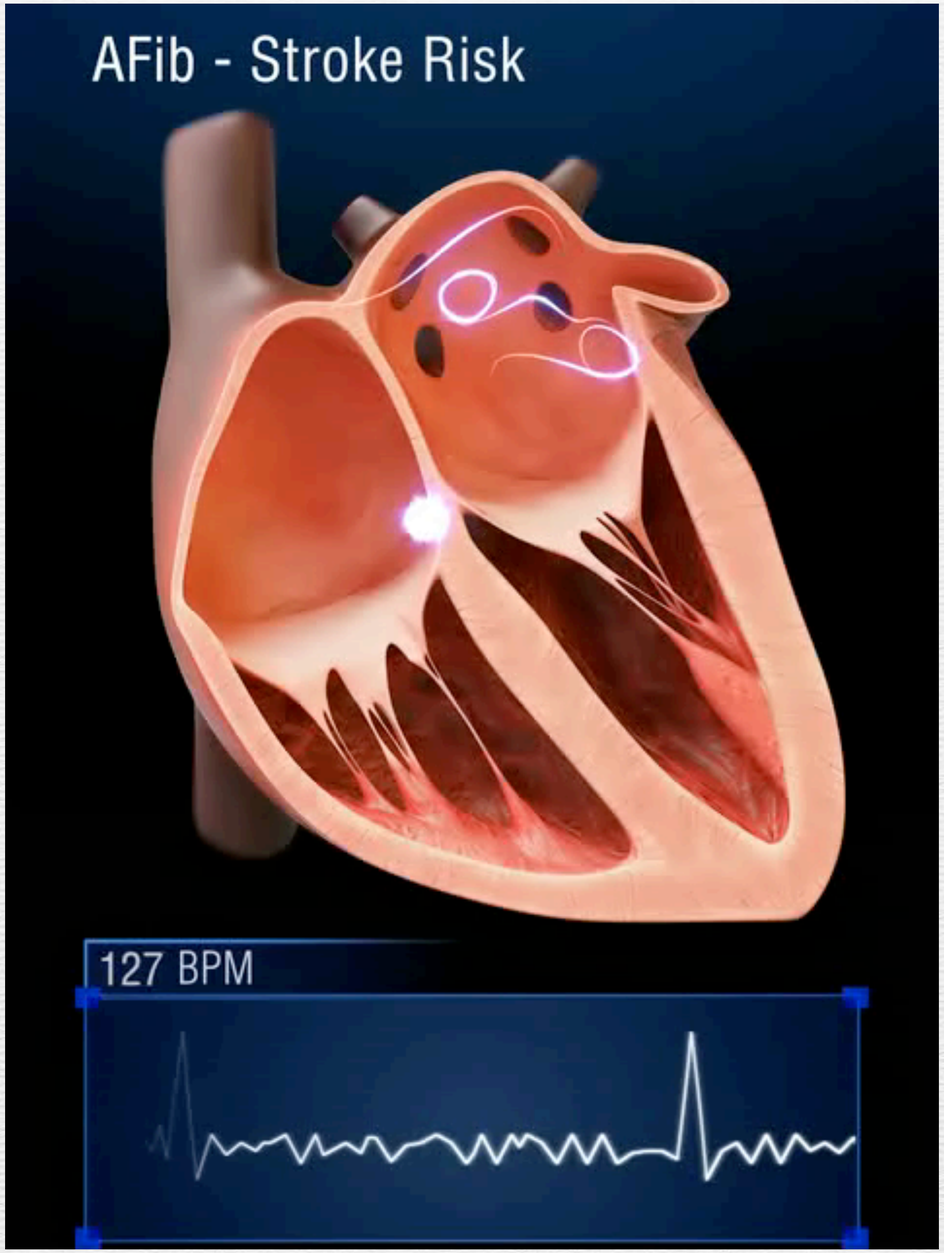
Number at Risk																
OSA	844	709	569	478	397	333	273	214	173	134	110	94	70	46	29	8
No OSA	2,209	1,902	1,616	1,317	1,037	848	641	502	393	296	217	195	130	94	69	28

Cumulative frequency curves for incident atrial fibrillation (AF) for subjects < 65 years of age with and without obstructive sleep apnea (OSA) during an average 4.7 years of follow-up. p = 0.002

Gami, et al. *JACC* 2007;49:565-71

Risk Control

- Risk of stroke
- Risk of tachycardia-induced cardiomyopathy


AFib - Stroke Risk
127 BPM

How to Prevent Stroke

$CHADS_2$ -> CHA_2DS_2VASc

CHADS2 Risk	Score
CHF	1
Hypertension	1
Age > 75	1
Diabetes	1
Stroke or TIA	2

CHA2DS2-VASc Risk	Score
CHF or LVEF ≤ 40%	1
Hypertension	1
Age ≥75	2
Diabetes	1
Stroke/TIA/ Thromboembolism	2
Vascular Disease	1
Age 65 - 74	1
Female	1

From ESC AF Guidelines
http://escardio.org/guidelines-surveys/esc-guidelines/GuidelinesDocuments/guidelines-afib-FT.pdf

How to Prevent Stroke

$CHADS_2$ -> CHA_2DS_2VASc

CHADS2 score	Patients (*n* = 1733)	Adjusted stroke rate %/ year
0	120	1.9
1	463	2.8
2	523	4.0
3	337	5.9
4	220	8.5
5	65	12.5
6	5	18.2

From ESC AF Guidelines http://www.escardio.org/guidelines-surveys/esc-guidelines/GuidelinesDocuments/guidelines-afib-FT.pdf

CHA2DS2-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

Pharmacotherapy

- Aspirin (SPAF trial)
- NOAC / DOAC
- Warfarin

NOACs (dabigatran, rivaroxaban, apixaban, and edoxaban) are recommended over warfarin in NOAC-eligible patients with AF (except with moderate-to-severe mitral stenosis or a mechanical heart valve) (S4.1.1-8-S4.1.1-11).

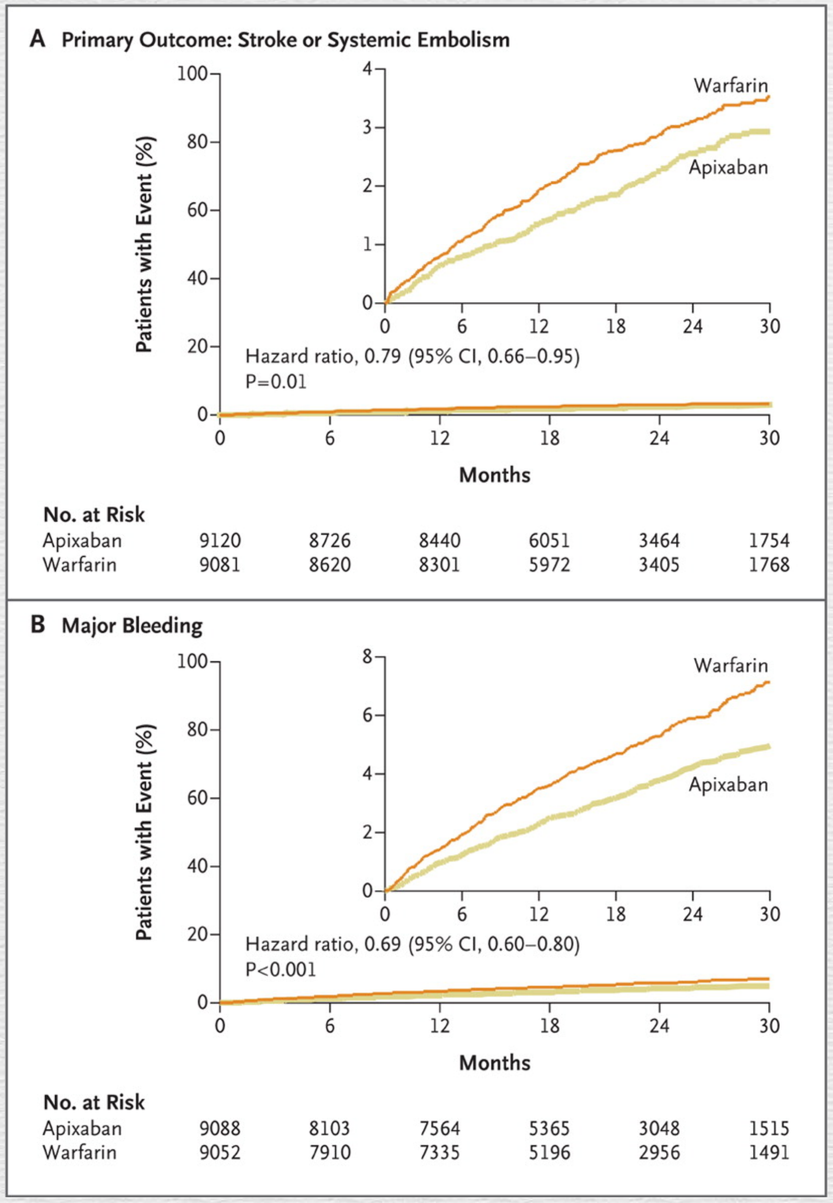
Class I

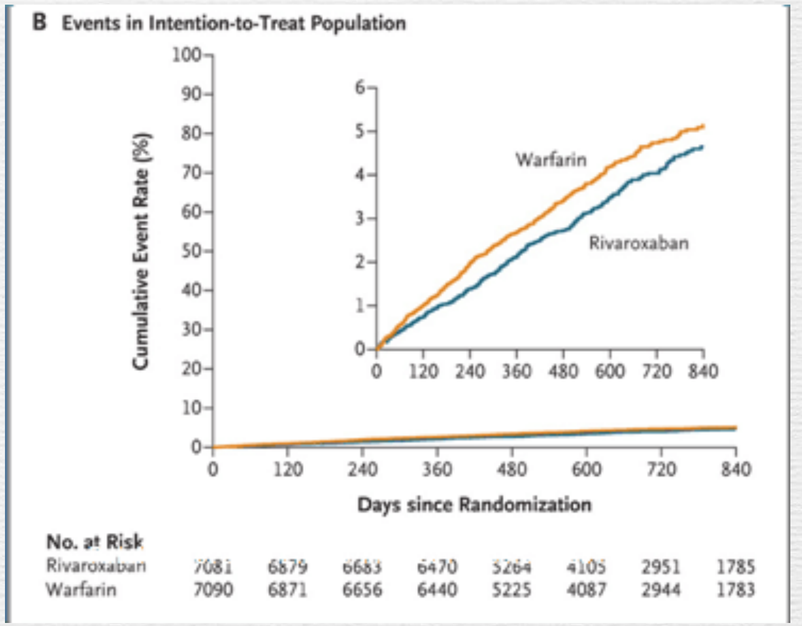
1. **In patients with AF, antithrombotic therapy should be individualized based on shared decision-making after discussion of the absolute and RRs of stroke and bleeding, and the patient's values and preferences.** ***(Level of Evidence: C)***

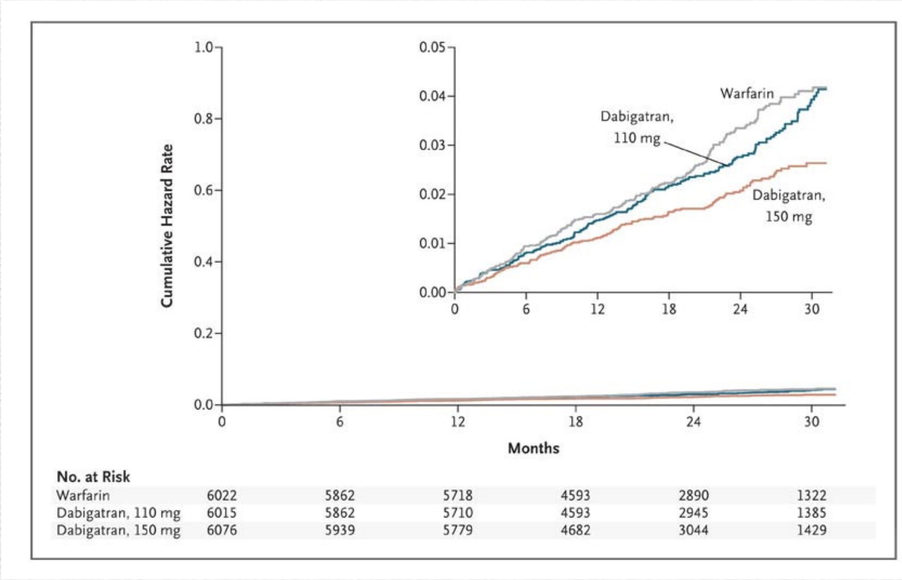
DOACs

- Dabigatran <-> Idarucizumab
- Rivaroxaban <-> Andexanet alfa
- Apixaban <-> Andexanet alfa
- Edoxaban

NOACs (dabigatran, rivaroxaban, apixaban, and edoxaban) are recommended over warfarin in NOAC-eligible patients with AF (except with moderate-to-severe mitral stenosis or a mechanical heart valve) (S4.1.1-8-S4.1.1-11).

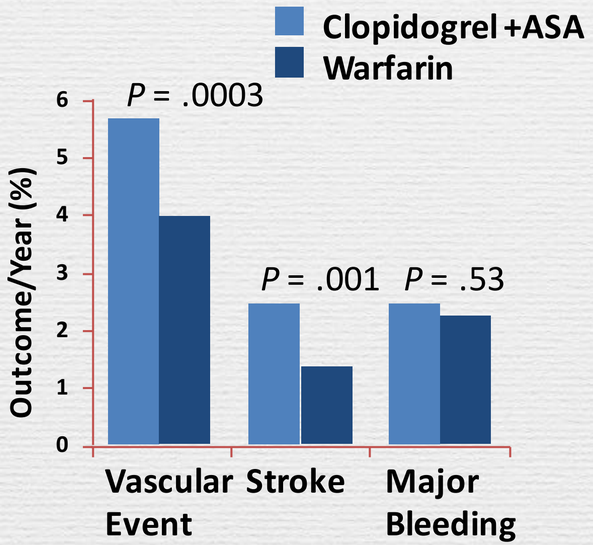

A Primary Outcome: Stroke or Systemic Embolism
Patients with Event (%)
Warfarin
Apixaban
Hazard ratio, 0.79 (95% CI, 0.66–0.95)
P=0.01
Months
No. at Risk
Apixaban 9120 8726 8440 6051 3464 1754
Warfarin 9081 8620 8301 5972 3405 1768
B Major Bleeding
Patients with Event (%)
Warfarin
Apixaban
Hazard ratio, 0.69 (95% CI, 0.60–0.80)
P<0.001
Months
No. at Risk
Apixaban 9088 8103 7564 5365 3048 1515
Warfarin 9052 7910 7335 5196 2956 1491


B Events in Intention-to-Treat Population
Cumulative Event Rate (%)
Warfarin
Rivaroxaban
Days since Randomization
No. at Risk
Rivaroxaban 7081 6879 6683 6470 5264 4105 2951 1785
Warfarin 7090 6871 6656 6440 5225 4087 2944 1783

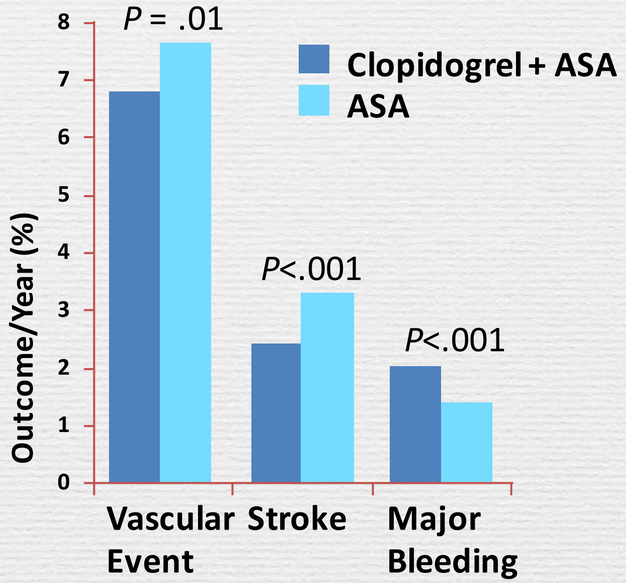

Cumulative Hazard Rate
Warfarin
Dabigatran, 110 mg
Dabigatran, 150 mg
Months
No. at Risk
Warfarin 6022 5862 5718 4593 2890 1322
Dabigatran, 110 mg 6015 5862 5710 4593 2945 1385
Dabigatran, 150 mg 6076 5939 5779 4682 3044 1429

The Role of Clopidogrel

ACTIVE-W:
6706 randomized patients;
trial stopped

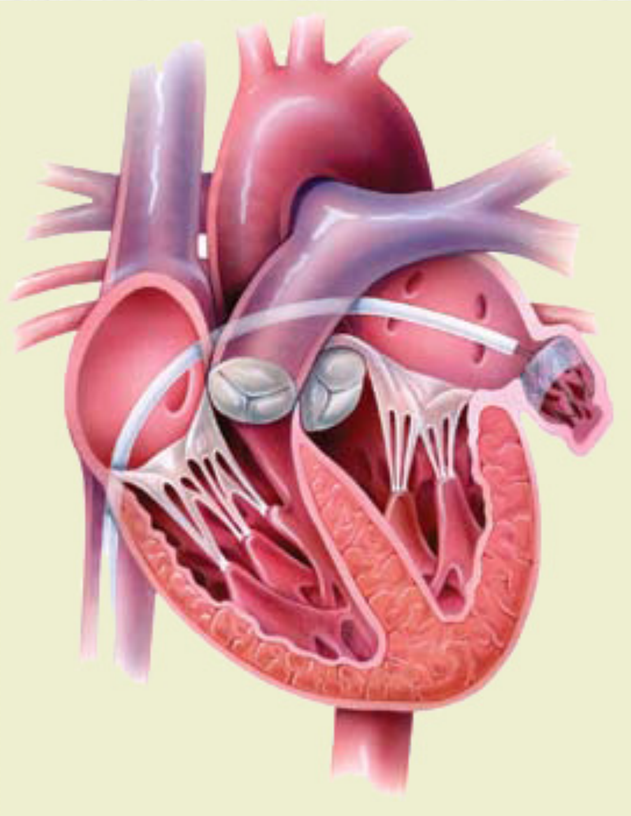


ACTIVE-A:
7554 randomized patients;
median follow-up of 3.6 years



ACTIVE = AF Clopidogrel Trial with Irbesartan for Prevention of Vascular Events. ACTIVE Investigators. *Lancet.* 2006;367:1903-1912. ACTIVE Investigators. *N Engl J Med.* 2009;360(20):2066-2078.

Watchman Device / LAA Closure



Circulation. 2013 Feb 12;127(6):720-9. doi: 10.1161/CIRCULATIONAHA.112.114389. Epub 2013 Jan 16.

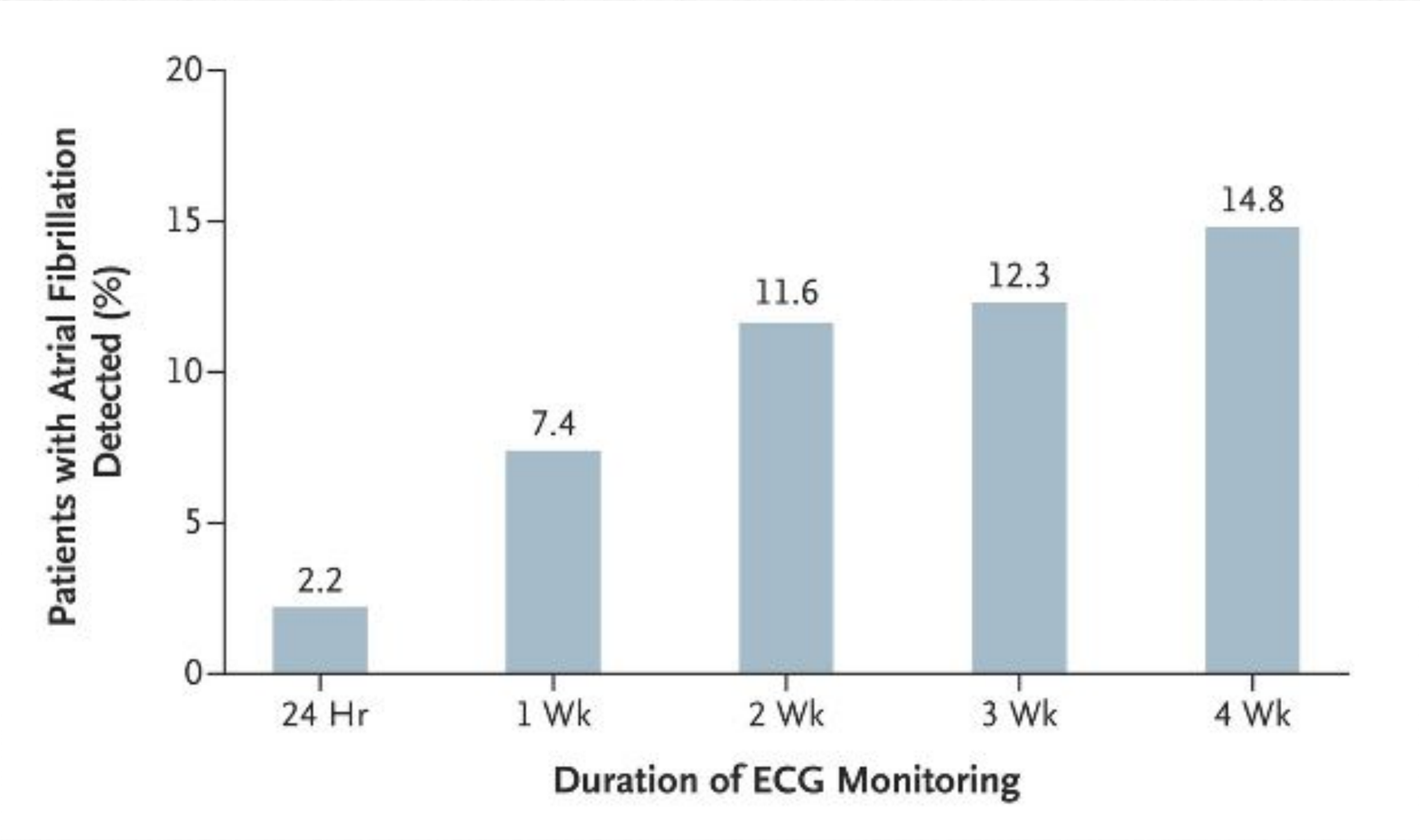
Percutaneous left atrial appendage closure for stroke prophylaxis in patients with atrial fibrillation: 2.3-Year Follow-up of the PROTECT AF (Watchman Left Atrial Appendage System for Embolic Protection in Patients with Atrial Fibrillation) Trial.

Reddy VY[1], Doshi SK, Sievert H, Buchbinder M, Neuzil P, Huber K, Halperin JL, Holmes D; PROTECT AF Investigators.

CONCLUSIONS: The "local" strategy of left atrial appendage closure is noninferior to "systemic" anticoagulation with warfarin. PROTECT AF has, for the first time, implicated the left atrial appendage in the pathogenesis of stroke in atrial fibrillation.

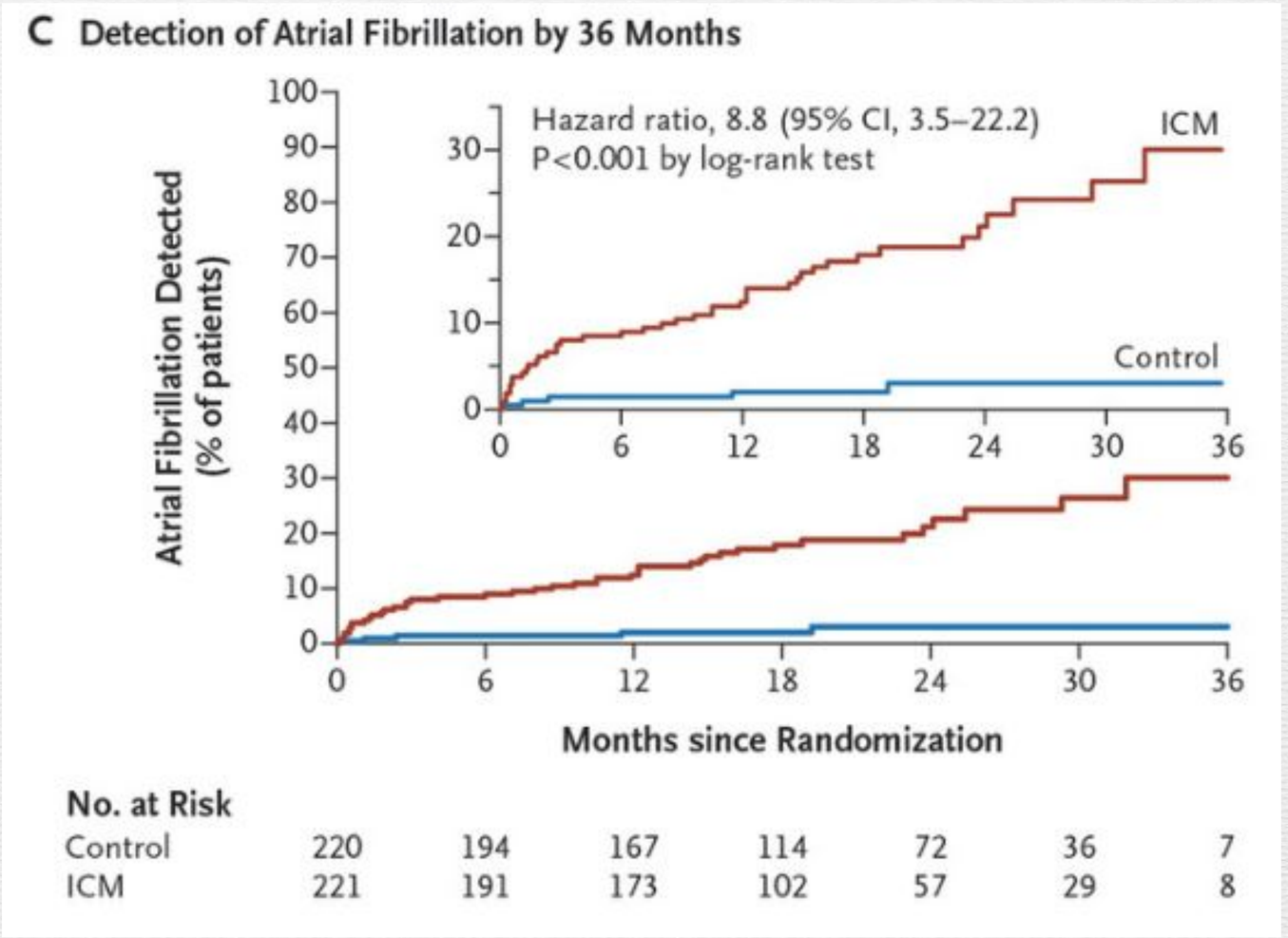
Percutaneous LAA occlusion may be considered in patients with AF at increased risk of stroke who have contraindications to long-term anticoagulation (S4.4.1-1-S4.4.1-5).

Cryptogenic Stroke

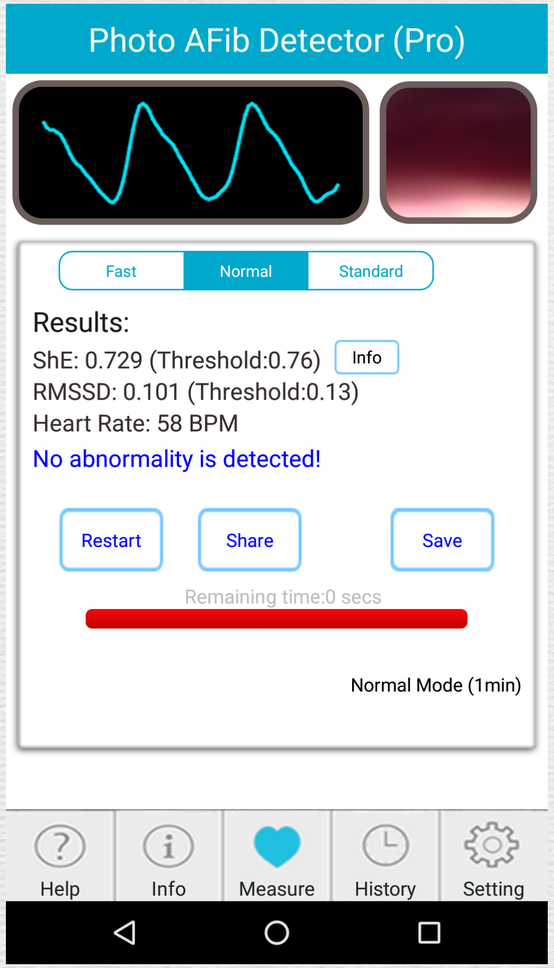


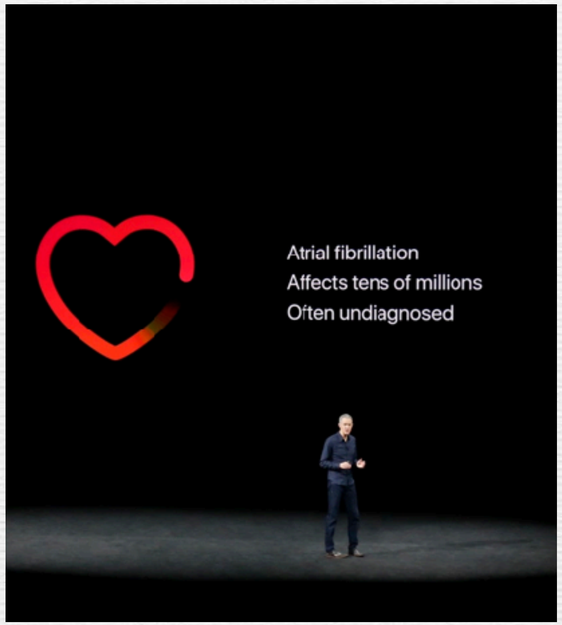
EMBRACE Trial

CRYSTAL-AF Trial

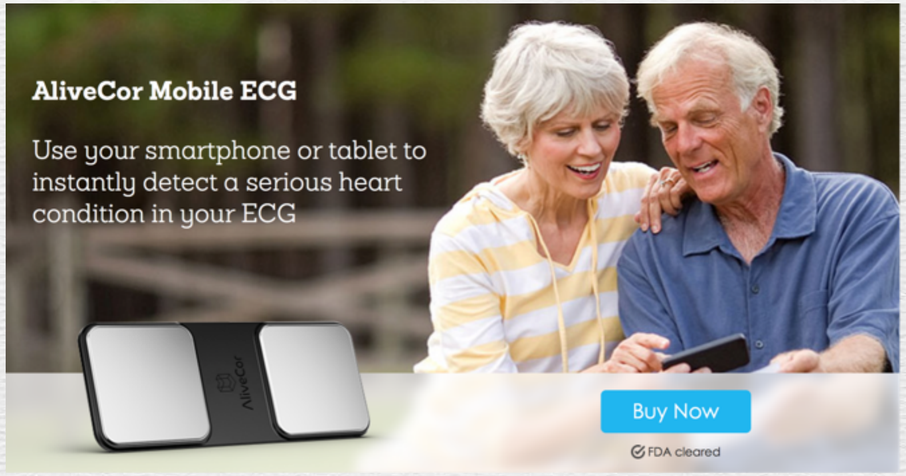


AF Detection





Apple Heart Study



HAS-Bled Score

- Hypertension
- Renal Disease
- Liver Disease
- Stroke History
- Prior major bleeding
- Labile INR
- Age > 65
- Medications
- Alcohol use


HELP
I'VE FALLEN AND CANT GET UP
MEMES & FUNNY PICS
FRABZ.COM

Granny Falls

ABSTRACT

PURPOSE: Patients at high risk for falls are presumed to be at increased risk for intracranial hemorrhage, and high risk for falls is cited as a contraindication to antithrombotic therapy. Data substantiating this concern are lacking.

METHODS: Quality improvement organizations identified 1245 Medicare beneficiaries who were documented in the medical record to be at high risk of falls and 18 261 other patients with atrial fibrillation. The patients were elderly (mean 80 years), and 48% were prescribed warfarin at hospital discharge. The primary endpoint was subsequent hospitalization for an intracranial hemorrhage, based on ICD-9 codes.

RESULTS: Rates (95% confidence interval [CI]) of intracranial hemorrhage per 100 patient-years were 2.8 (1.9–4.1) in patients at high risk for falls and 1.1 (1.0–1.3) in other patients. Rates (95% CI) of traumatic intracranial hemorrhage were 2.0 (1.3–3.1) in patients at high risk for falls and 0.34 (0.27–0.45) in other patients. Hazard ratios (95% CI) of other independent risk factors for intracranial hemorrhage were 1.4 (1.0–3.1) for neuropsychiatric disease, 2.1 (1.6–2.7) for prior stroke, and 1.9 (1.4–2.4) for prior major bleeding. Warfarin prescription was associated with intracranial hemorrhage mortality but not with intracranial hemorrhage occurrence. Ischemic stroke rates per 100 patient-years were 13.7 in patients at high risk for falls and 6.9 in other patients. Warfarin prescription in patients prone to fall who had atrial fibrillation and multiple additional stroke risk factors appeared to protect against a composite endpoint of stroke, intracranial hemorrhage, myocardial infarction, and death.

CONCLUSION: Patients at high risk for falls with atrial fibrillation are at substantially increased risk of intracranial hemorrhage, especially traumatic intracranial hemorrhage. However, because of their high stroke rate, they appear to benefit from anticoagulant therapy if they have multiple stroke risk factors.

Incidence of intracranial hemorrhage in patients with atrial fibrillation who are prone to fall. The American Journal of Medicine (2005) 118, 612–617

“Prescription of warfarin or aspirin at baseline did not significantly affect risk of intracranial hemorrhage”

“The intracranial hemorrhage 30-day mortality was 51.8% in patients who had been prescribed warfarin, and 33.6% in patients who had not been prescribed warfarin after the baseline hospitalization (P 0.007)”

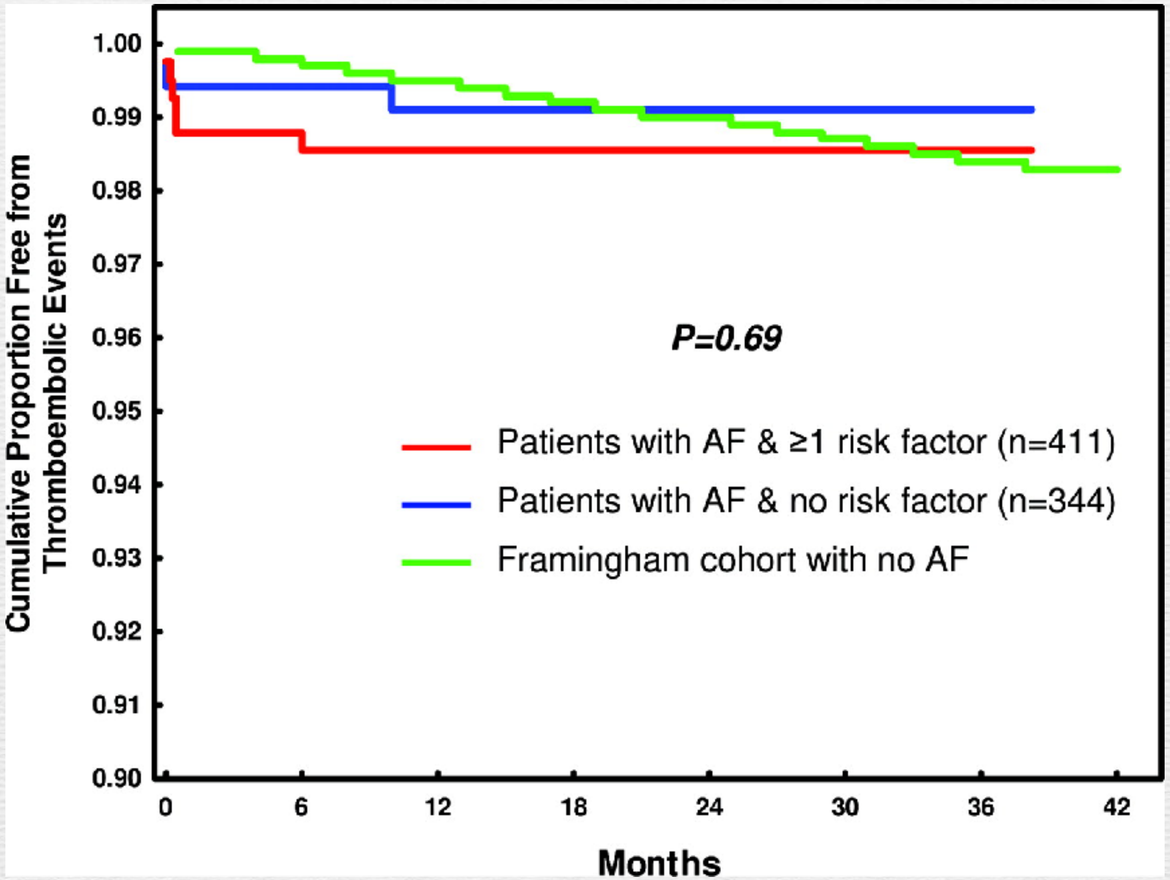
3 Cerebral Bleeds

14 Cerebral Infarcts

“I want to stop my blood thinner”

- Watchman device: if followup TEE confirms seal of appendage
- Surgical Ligation: maybe
- Successful catheter ablation:
  - Oral H, Chugh A, Ozaydin M, et al. Risk of thromboembolic events after percutaneous left atrial radiofrequency ablation of atrial fibrillation. *Circulation* 2006;114(8):759-765 Epub 2006 Aug 14

Catheter Ablation- Outcomes



- Oral H, Chugh A, Ozaydin M, et al. Risk of thromboembolic events after percutaneous left atrial radiofrequency ablation of atrial fibrillation. *Circulation* 2006;114(8):759-765 Epub 2006 Aug 14

Risk Control: TICM

- Tachycardia-induced cardiomyopathy remains poorly understood and is likely under-diagnosed
- Recovery typically takes weeks-months
- Ensuring a resting heart rate < 100 BPM seems adequate (RACE II Trial)

- Ellis, Josephson. Heart Failure and TICM. Current Heart Failure Reports 2013

Rate Control: Combination Therapy

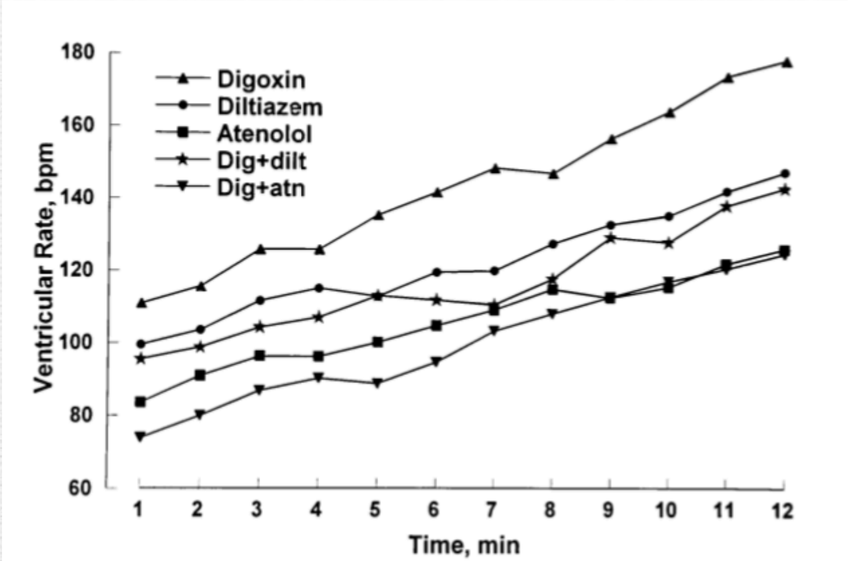


Figure 3. Effect of various pharmacologic regimens on exercise-induced VR in patients with CAF. There was a linear trend in increases in VR on all 5 regimens. The mean VR on digoxin + atenolol treatment was the lowest and was significantly lower than those on digoxin, diltiazem and digoxin + diltiazem. See text for details.

Farshi et al. JACC 33:2, 1999

Rate Control

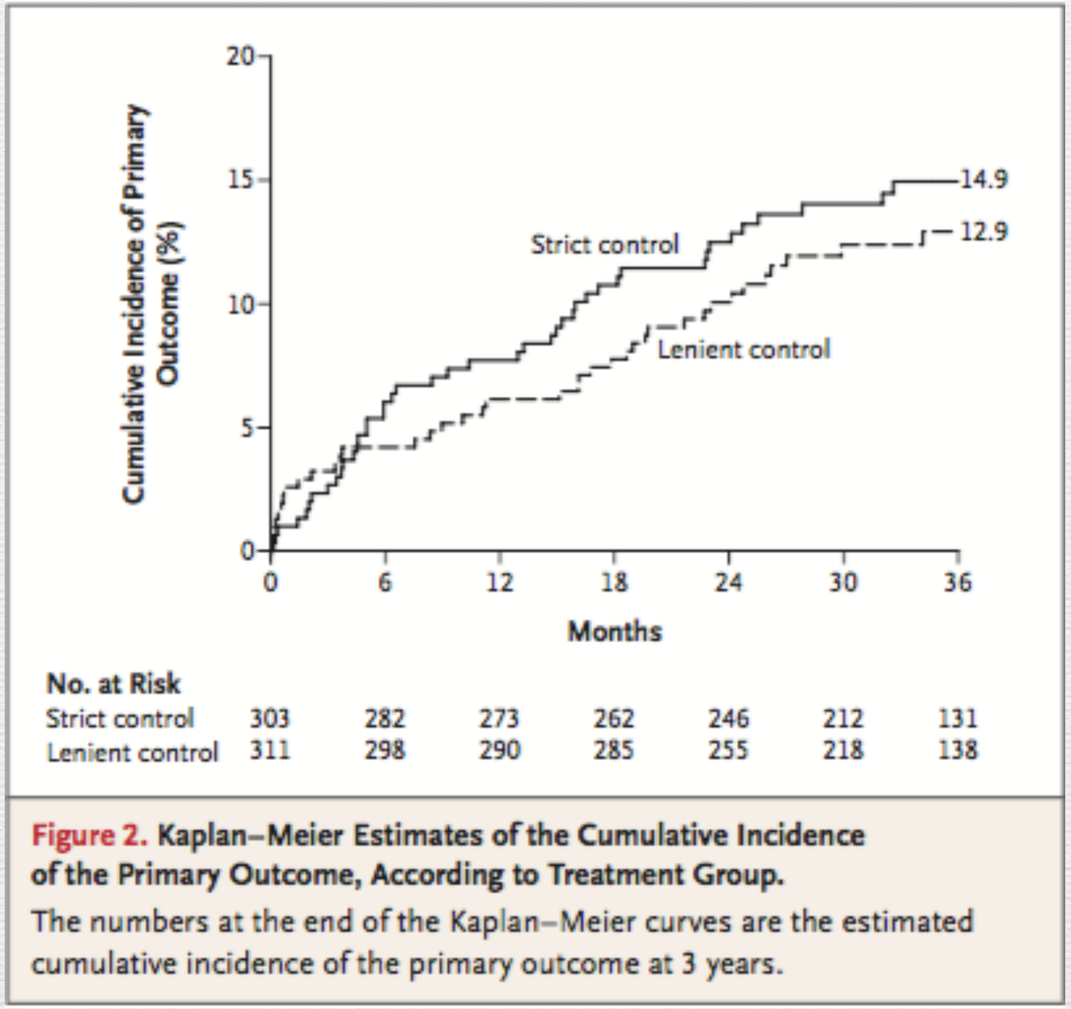


Figure 2. Kaplan–Meier Estimates of the Cumulative Incidence of the Primary Outcome, According to Treatment Group.

The numbers at the end of the Kaplan–Meier curves are the estimated cumulative incidence of the primary outcome at 3 years.

RACE II Trial

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Increased Mortality Associated With Digoxin in Contemporary Patients With Atrial Fibrillation

Findings From the TREAT-AF Study

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ORIGINAL ARTICLE

The Effect of Digoxin on Mortality and Morbidity in Patients with Heart Failure

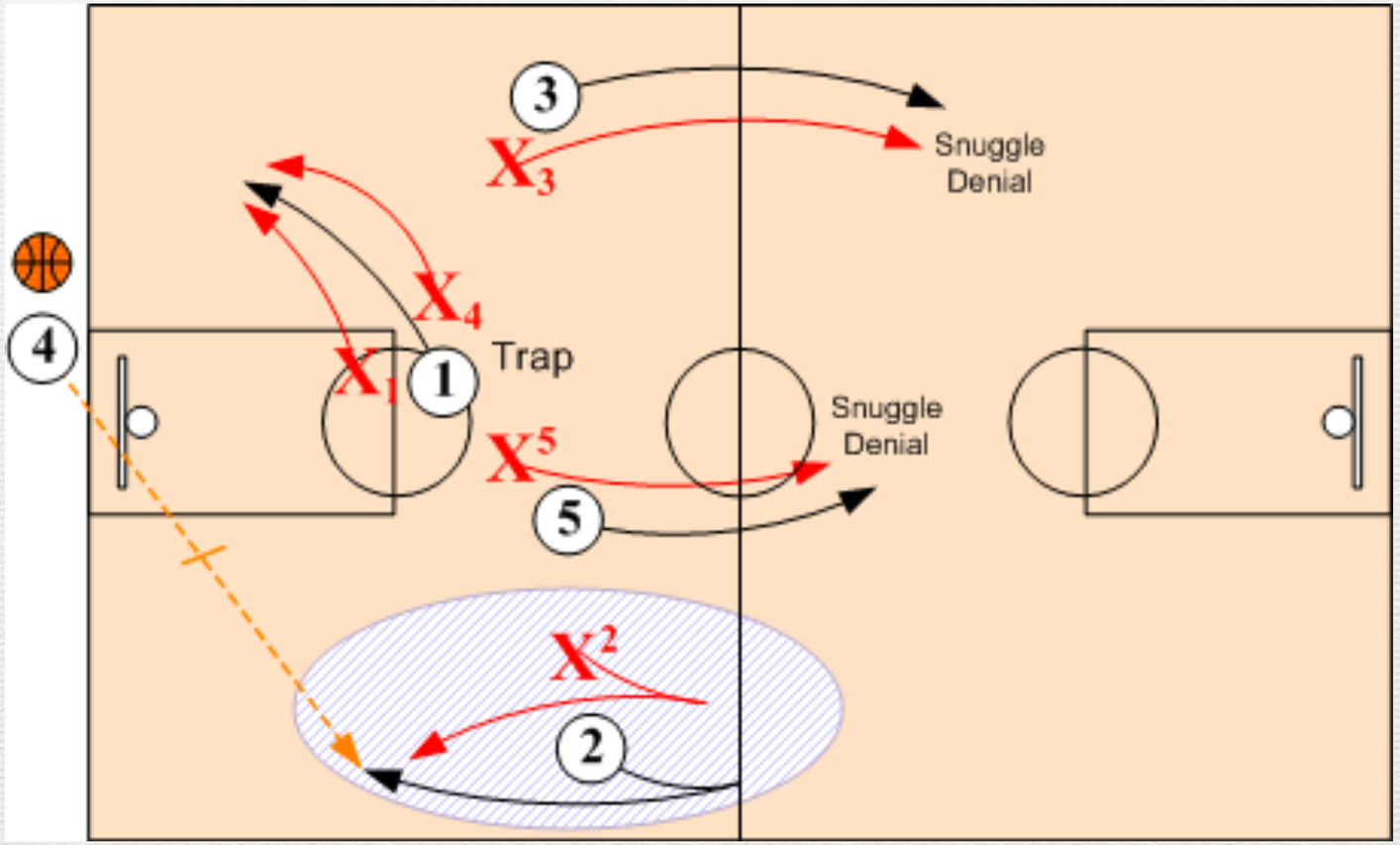
The Digitalis Investigation Group*

N Engl J Med 1997; 336:525-533 | February 20, 1997 | DOI: 10.1056/NEJM199702203360801

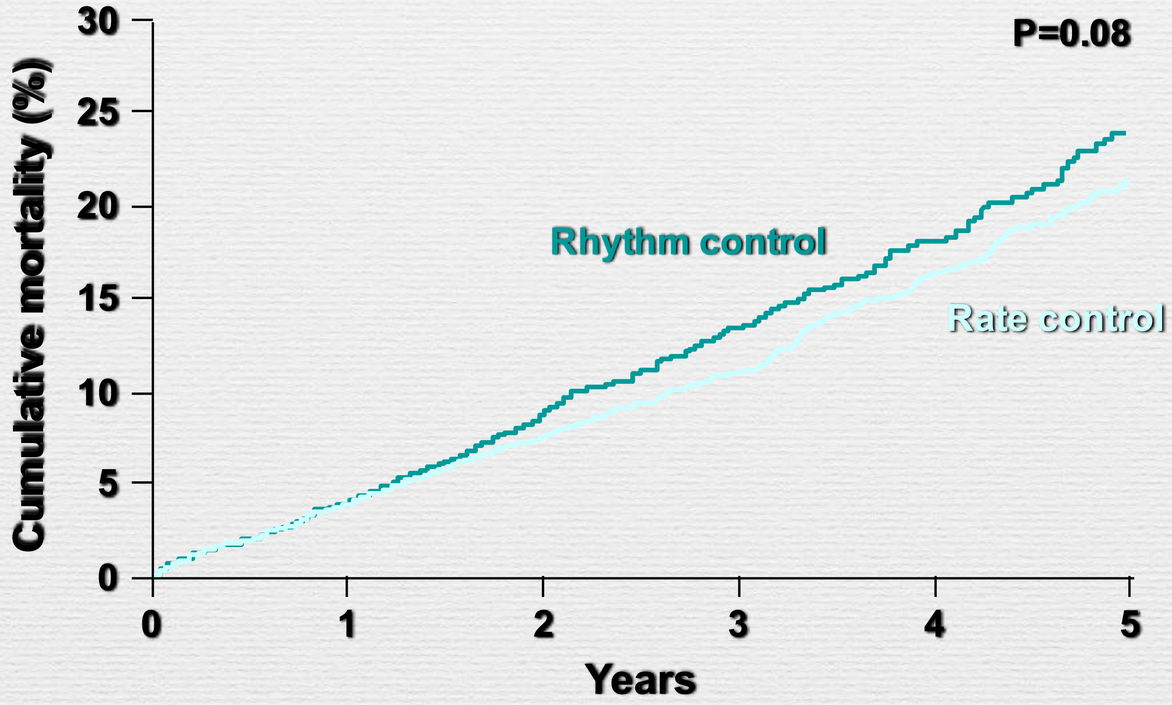
Treatment

Treatment

- Root conditions
- Prevent stroke
- Rate
- Rhythm
- Procedure/Surgery



Rhythm Control- AFFIRM Trial



AFFIRM investigators. *New Engl J Med* 2002;347:1825-1833.

AFFIRM Trial

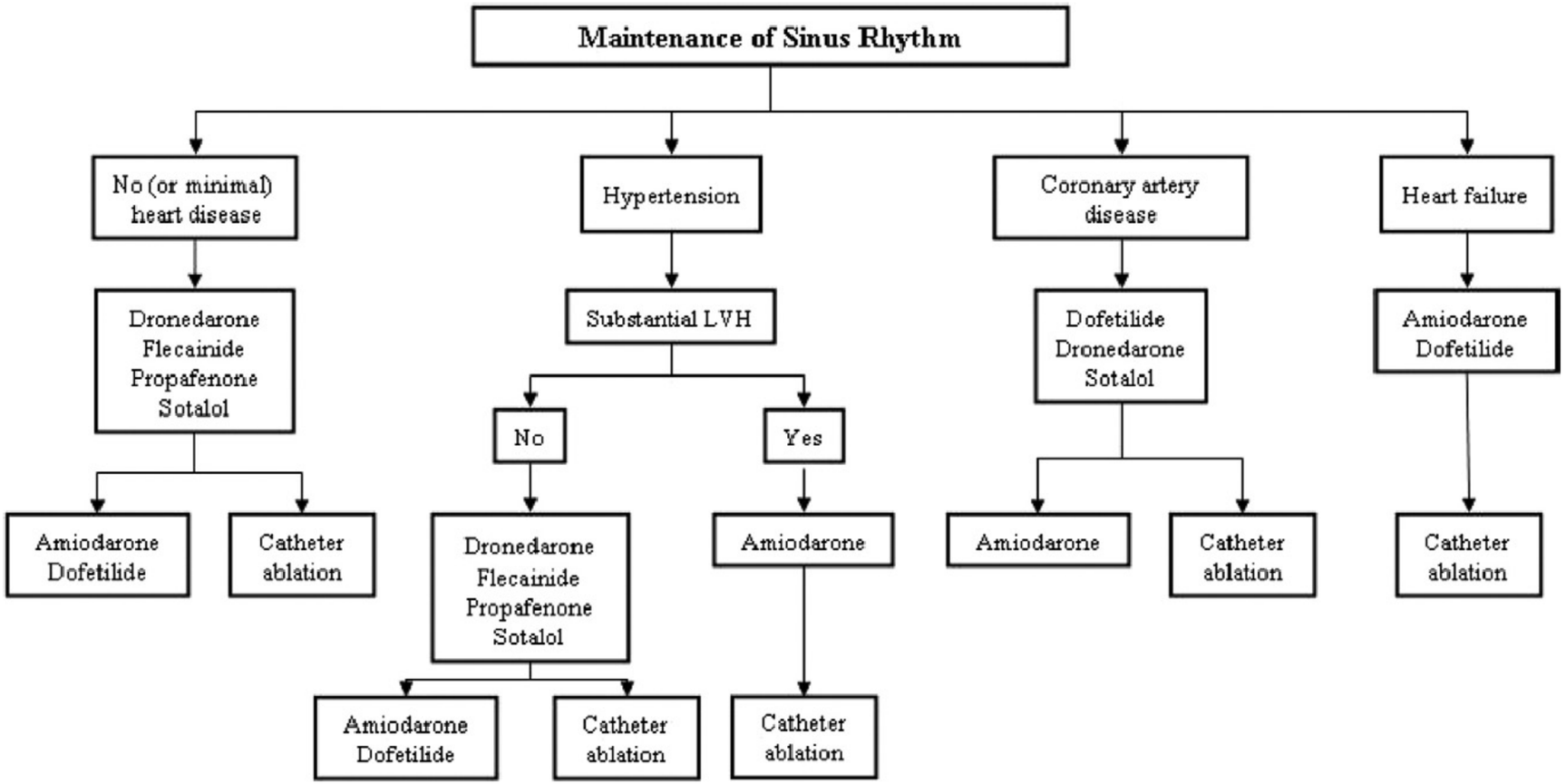
- 4060 patients, all >= 65 years old, all with tolerable symptoms
- No difference in death, stroke, major bleeding, QOL
- More bradycardia, TdP, hospitalizations in AAD group

AFFIRM Trial did not address:

- Patients < 65 years old
- Patients with intolerable symptoms
- Patients undergoing catheter ablation
- Substudy analysis: patients that were able to maintain sinus rhythm did better
- “Rhythm control, if used, may be abandoned early if it is not fully satisfactory”

Rhythm Control- Pharmacology

JACC Vol. 57, No. 2, 2011
January 11, 2011:223–42



Adverse Effects

- Dysrhythmia
  - Prolonged QTc (> 500 msec), TdP
  - Syncope
  - Bradycardia
- New bundle branch block
- Cough (amiodarone)

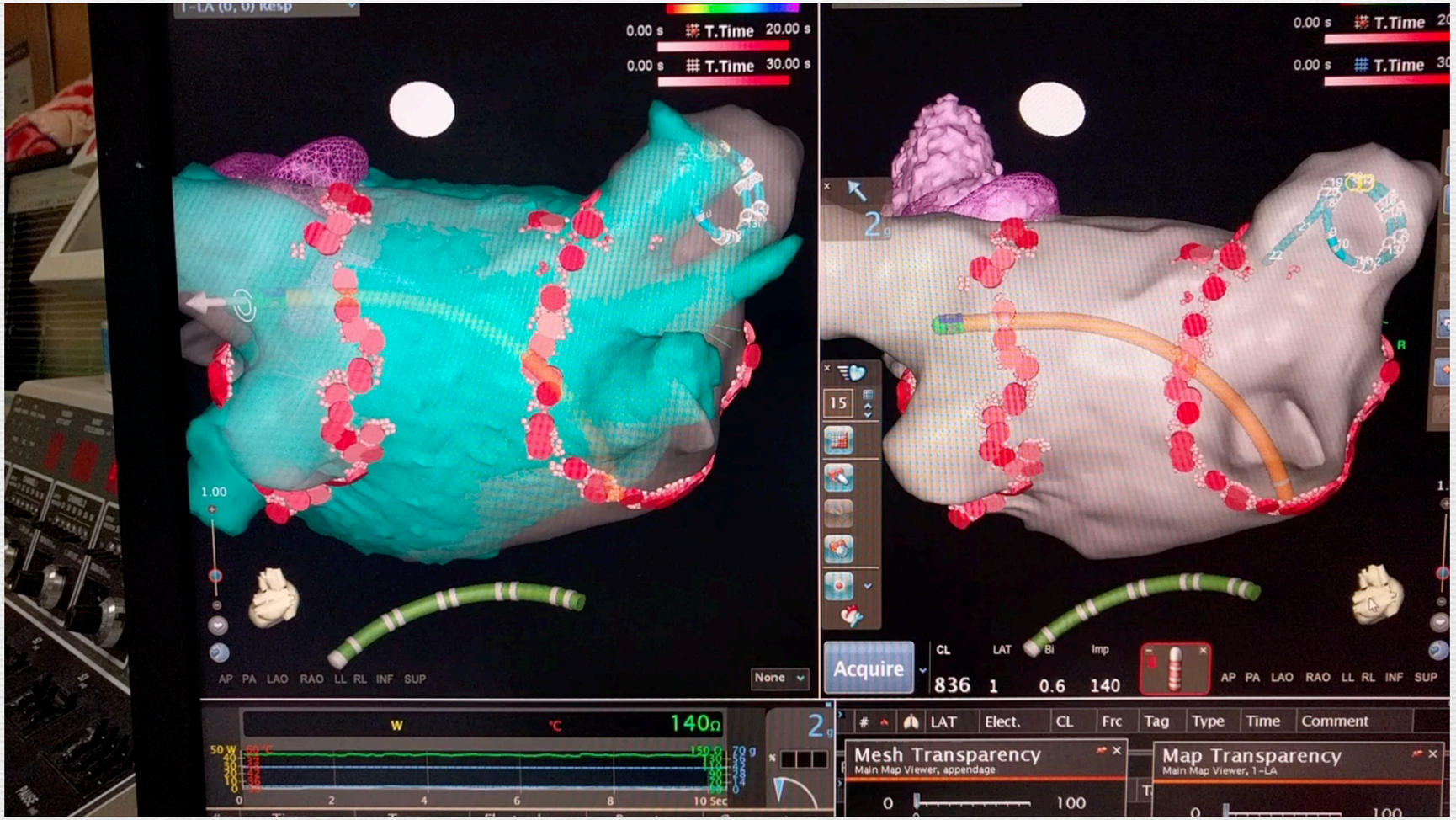
Contraindictions to AAD

- Structural heart disease (flecainide, propafenone, +/- sotalol)
- Renal disease (sotalol)
- Longstanding atrial fibrillation, heart failure (dronedarone)
- CAD/High risk for MI (flecainide, propafenone)
- Pulmonary issues (amiodarone)

Invasive Approaches

- Catheter ablation
- Surgery
- Hybrid approach / “Convergent” Procedure
- Pacemaker/AV Node ablation
  - Beneficial only when adequate rate control has not been achieved via other therapies

Catheter Ablation for Atrial Fibrillation



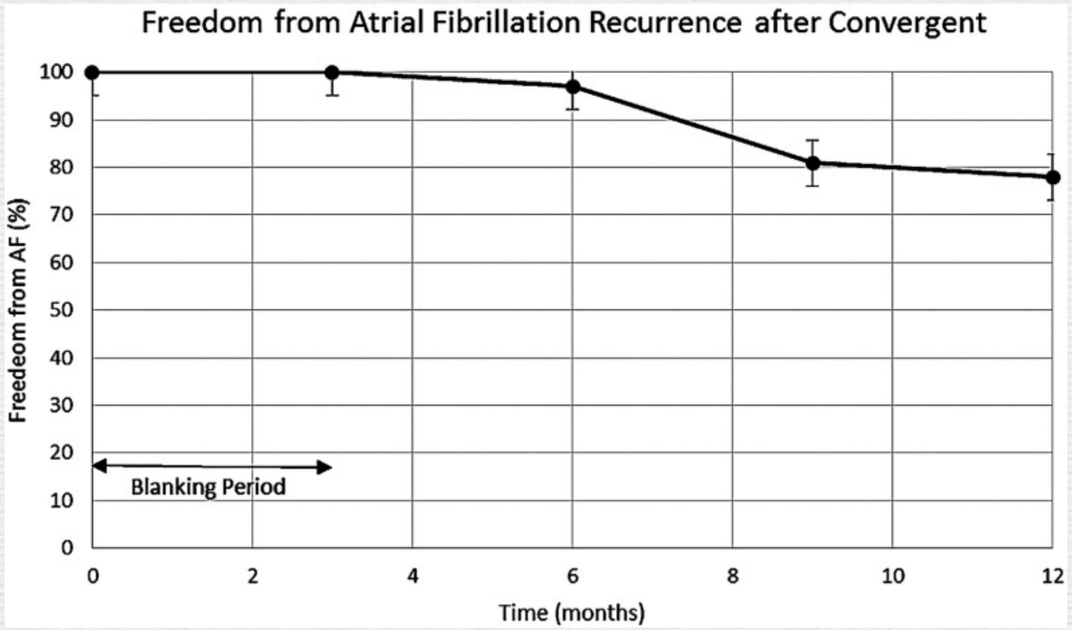
Catheter Ablation for Atrial Fibrillation

- Indications: symptomatic paroxysmal or persistent atrial fibrillation, failed at least one class I or class III antidysrhythmic medication
- Typically overnight hospital stay, recovery period of a few days
- Success rate: 70-80% for paroxysmal AF, 50-60% for persistent AF
- Complication rate: 1% Stroke/death


I
II
V1
V6
Ls 19,20
Ls 17,18
Ls 15,16
Ls 13,14
Ls 11,12
Ls 9,10
Ls 7,8
Ls 5,6
Ls 3,4
Ls 1,2
ABL d
ABL
CS 9,10
CS 7,8
CS 5,6
CS 3,4
CS 1,2
200 ms
11:17:04 AM
11:17:05 AM


I
II
V1
V6
Ls 19,20
Ls 17,18
Ls 15,16
Ls 13,14
Ls 11,12
Ls 9,10
Ls 7,8
Ls 5,6
Ls 3,4
Ls 1,2
ABL d
ABL
CS 9,10
CS 7,8
CS 5,6
CS 3,4
CS 1,2
200 mmHg
P1 ART

Catheter Ablation- outcomes



Short and Intermediate Term Outcomes of the Convergent Procedure: Initial Experience in a Tertiary Referral Center

Robert Tonks [1], Gurion Lantz [2], Jeremy Mahlow [1], Jeffrey Hirsh [1], Lawrence S Lee [2]

Affiliations + expand

PMID: 31495813 PMCID: PMC7046930 DOI: 10.5761/atcs.oa.19-00164

Catheter Ablation- Complications

- Pericardial tamponade
- Atrial-esophageal fistula
- Pulmonary vein stenosis
- Phrenic nerve paralysis
- Stroke
- More minor complications (~5%)

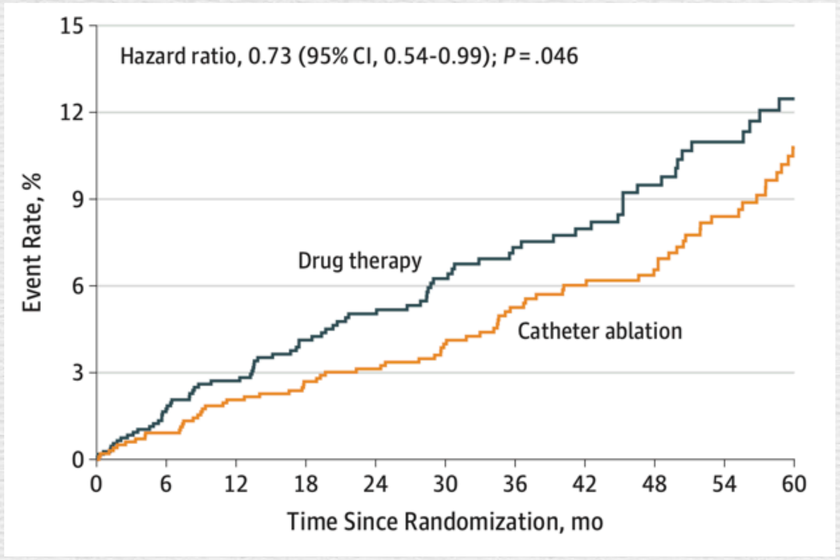
Catheter Ablation of Atrial Fibrillation: An Overview for Clinicians. Adv Ther. 2017; 34(8): 1897–1917.

JAMA | Original Investigation

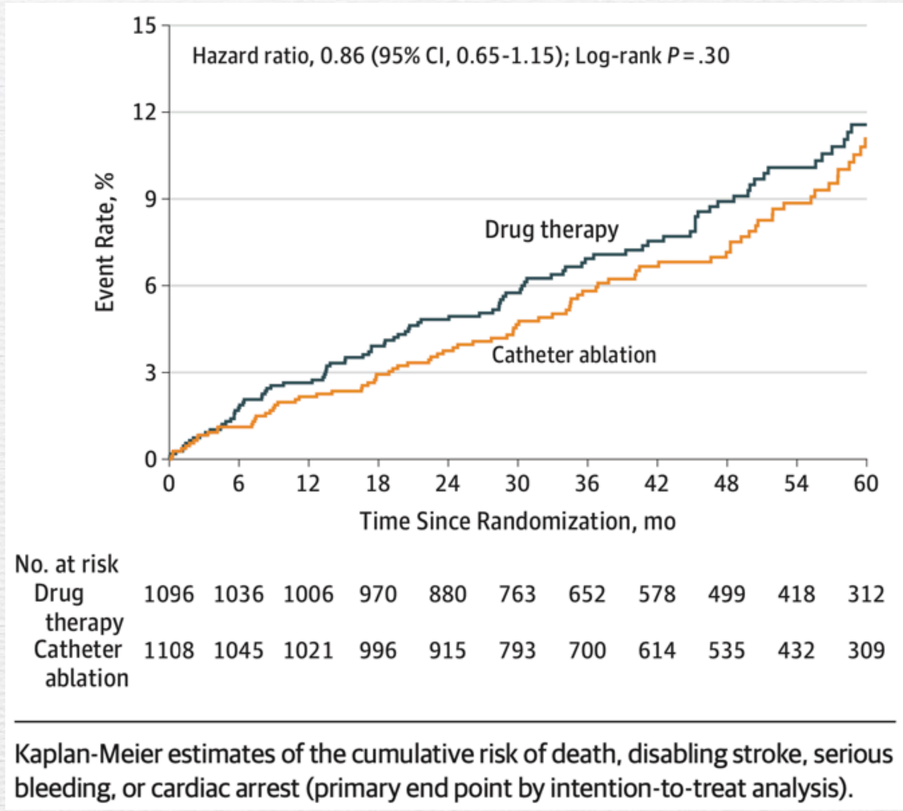
Effect of Catheter Ablation vs Antiarrhythmic Drug Therapy on Mortality, Stroke, Bleeding, and Cardiac Arrest Among Patients With Atrial Fibrillation

The CABANA Randomized Clinical Trial

Douglas L. Packer, MD; Daniel B. Mark, MD, MPH; Richard A. Robb, PhD; Kristi H. Monahan, RN; Tristram D. Bahnson, MD; Jeanne E. Poole, MD; Peter A. Noseworthy, MD; Yves D. Rosenberg, MD, MPH; Neal Jeffries, PhD; L. Brent Mitchell, MD; Greg C. Flaker, MD; Evgeny Pokushalov, MD; Alexander Romanov, MD; T. Jared Bunch, MD; Georg Noelker, MD; Andrey Ardashev, MD; Amiran Revishvili, MD; David J. Wilber, MD; Riccardo Cappato, MD; Karl-Heinz Kuck, MD; Gerhard Hindricks, MD; D. Wyn Davies, MD; Peter R. Kowey, MD; Gerald V. Naccarelli, MD; James A. Reiffel, MD; Jonathan P. Piccini, MD, MHS; Adam P. Silverstein, MS; Hussein R. Al-Khalidi, PhD; Kerry L. Lee, PhD; for the CABANA Investigators



Per-protocol analysis



No. at risk											
Drug therapy	1096	1036	1006	970	880	763	652	578	499	418	312
Catheter ablation	1108	1045	1021	996	915	793	700	614	535	432	309

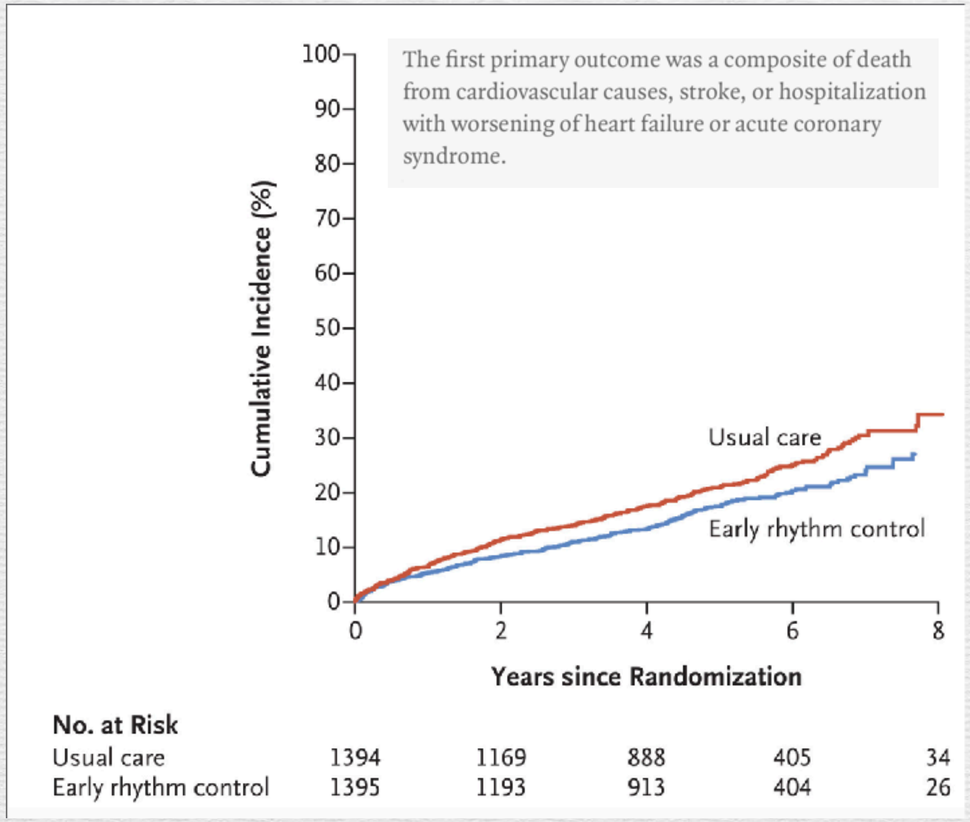
Kaplan-Meier estimates of the cumulative risk of death, disabling stroke, serious bleeding, or cardiac arrest (primary end point by intention-to-treat analysis).

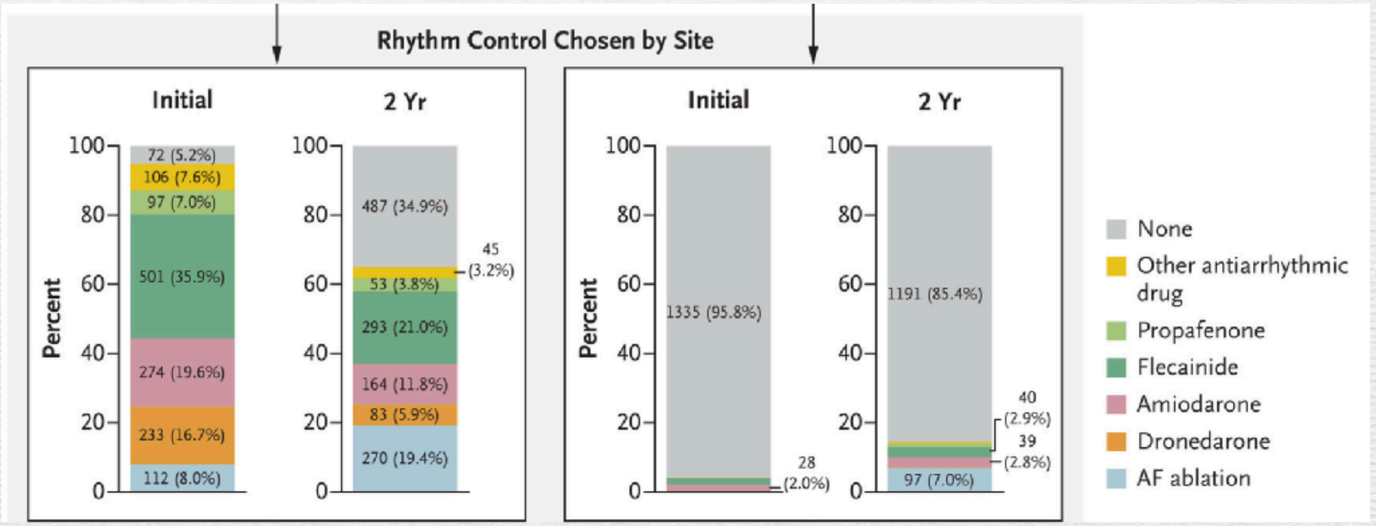
CHF Subgroup analysis:
43% relative reduction in mortality
36% relative reduction in primary endpoint

The NEW ENGLAND JOURNAL of MEDICINE

Early Rhythm-Control Therapy in Patients with Atrial Fibrillation

Paulus Kirchhof, M.D., A. John Camm, M.D., Andreas Goette, M.D., Axel Brandes, M.D., Lars Eckardt, M.D., Arif Elvan, M.D., Thomas Fetsch, M.D., Isabelle C. van Gelder, M.D., Doreen Haase, Ph.D., Laurent M. Haegeli, M.D., Frank Hamann, M.D., Hein Heidbüchel, M.D., Ph.D., et al., for the EAST-AFNET 4 Trial Investigators*





30% were asymptomatic

95% eventually had AF ablation

The End!