Atrial Fibrillation: Management Strategies

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AMERICAN COLLEGE of CARDIOLOGY

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CLINICAL PRACTICE GUIDELINE: FULL TEXT

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 Practice Guidelines and the Heart Rhythm Society

Developed in Collaboration With the Society of Thoracic Surgeons

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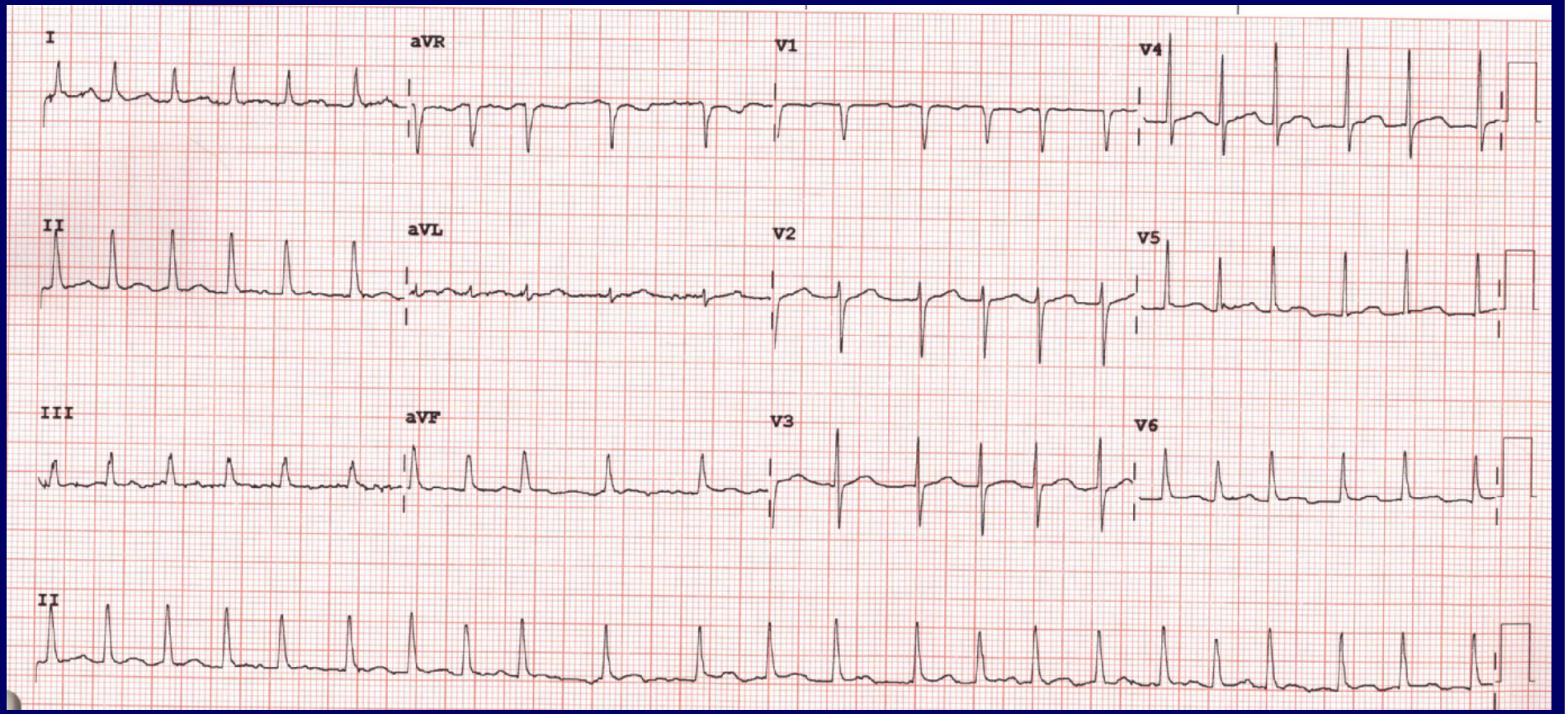
Atrial Fibrillation with Rapid Ventricular Response



Many, but not all, patients with atrial fibrillation have symptoms

- Most commonly fatigue, shortness of breath, exercise intolerance, palpitations
- Symptoms due to:
  - Rapid and irregular ventricular rates
  - Loss of normal AV synchrony
  - Side effects from drugs to treat atrial fibrillation

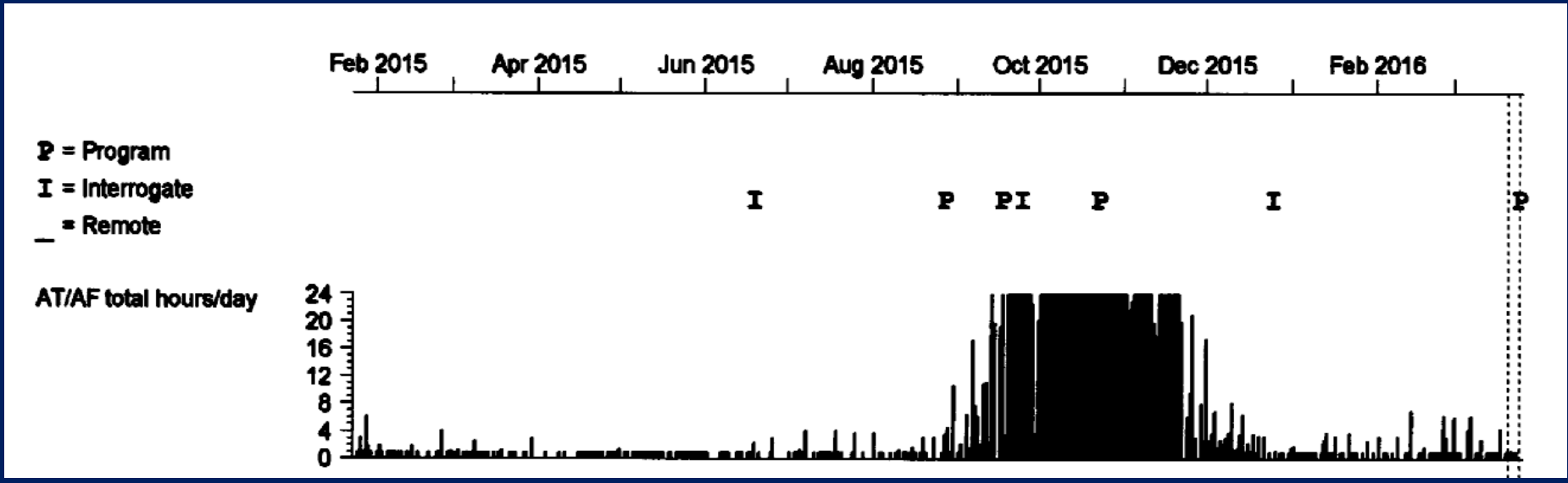
When atrial fibrillation has already developed, treatment of which of the following is helpful in management of the arrhythmia?

1. Hyperthyroidism
2. Congestive heart failure
3. Sleep apnea
4. Hypertension
5. All of the above
6. None of the above

When atrial fibrillation has already developed, treatment of which of the following is helpful in management of the arrhythmia?

1. Hyperthyroidism
2. Congestive heart failure
3. Sleep apnea
4. Hypertension
5. All of the above
6. None of the above

Hyperthyroidism is a Reversible Cause of Atrial Fibrillation

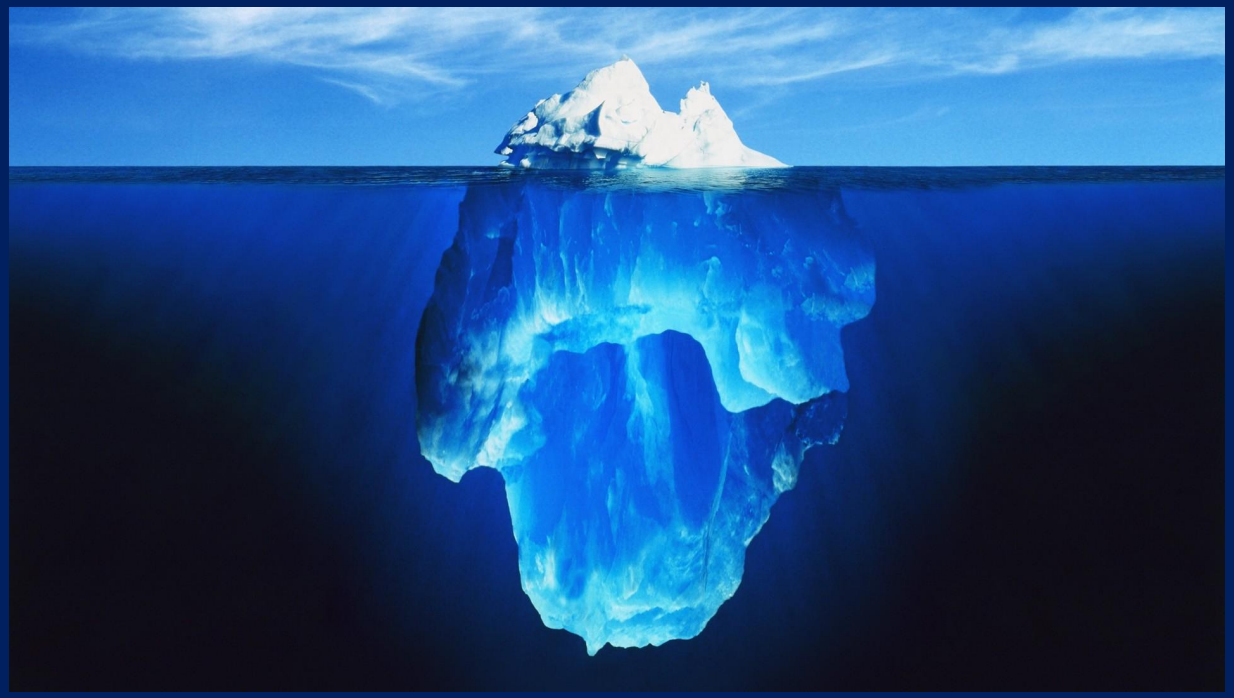


Treatment of hyperthyroidism

Atrial Fibrillation Management

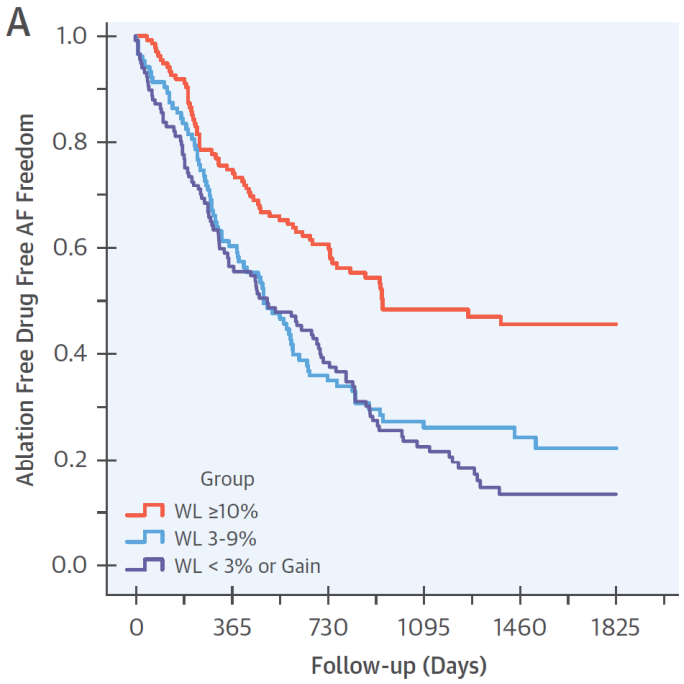
AF drugs and ablation are the tip of the iceberg

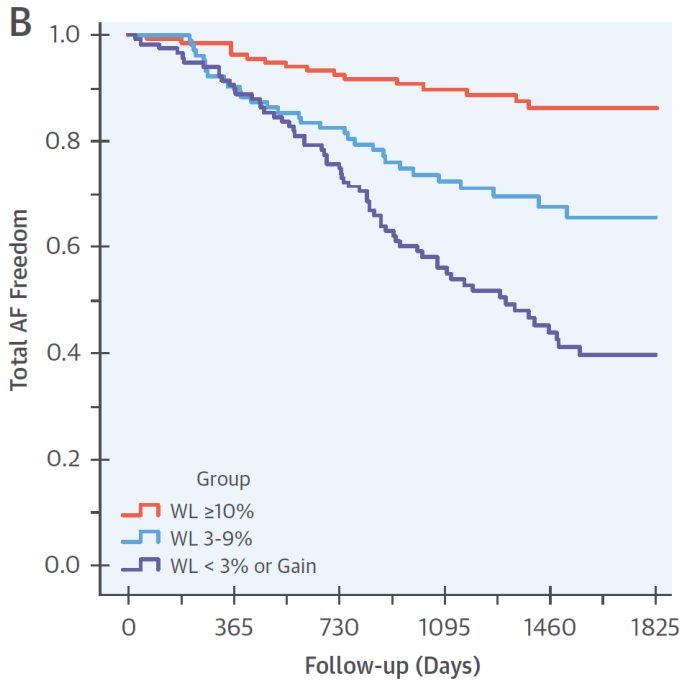
- Obesity
- Sleep apnea
- Hypertension
- CHF
- Diabetes
- Alcohol
- Exercise
- Atrial myopathy
- Genetics



Long-Term Effect of Goal-Directed Weight Management in an Atrial Fibrillation Cohort

FIGURE 2 Atrial Fibrillation Freedom Outcome According to Group





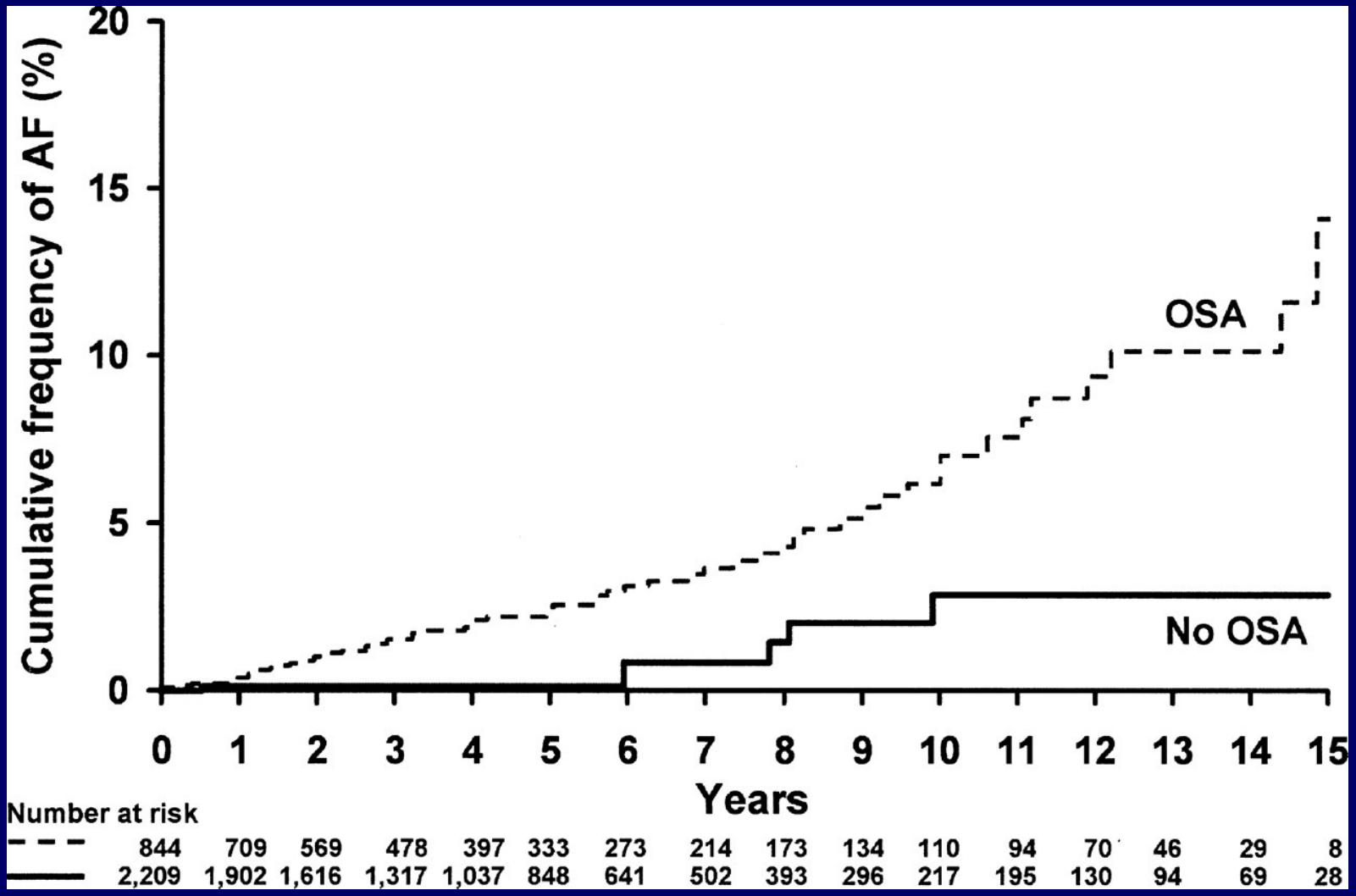
Time (Days)	0	365	730	1095	1460	1825
≥10 WL	135	101	72	42	31	18
3-9% WL	103	62	36	22	13	7
<3% WL or gain	117	66	44	22	11	9

0	365	730	1095	1460	1825
135	130	114	86	67	36
103	93	83	57	35	22
117	105	85	53	32	22

(A) Kaplan-Meier curve for AF-free survival without the use of rhythm control strategies. **(B)** Kaplan-Meier curve for AF-free survival for total AF-free survival (multiple ablation procedures with and without drugs). Abbreviations as in Figure 1.

Pathak et al. JACC 2015;65:2159

Incidence of AF Based on Presence or Absence of Obstructive Sleep Apnea



Gami, A. S. et al. J Am Coll Cardiol 2007;49:565-571

Predictors of Recurrence in Patients Undergoing Cryoballoon Ablation for Treatment of Atrial Fibrillation:

The Independent Role of Sleep-Disordered Breathing

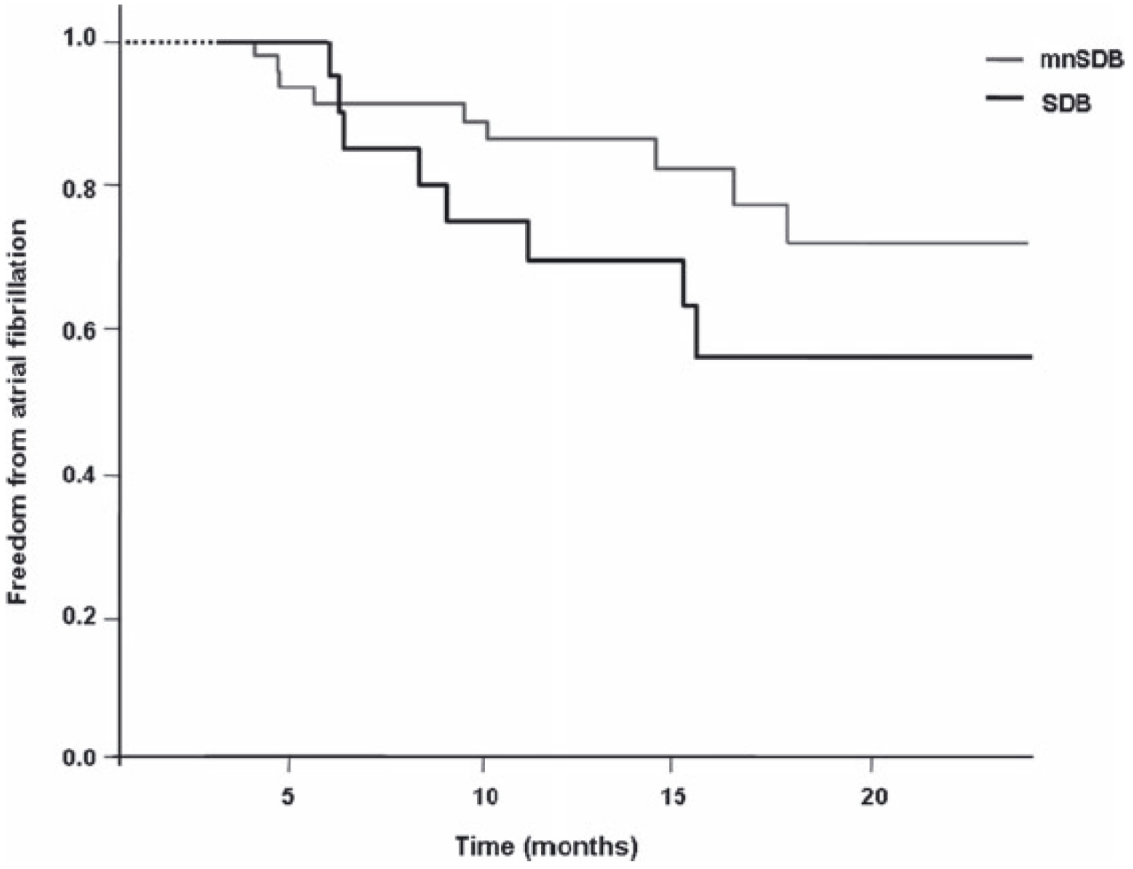
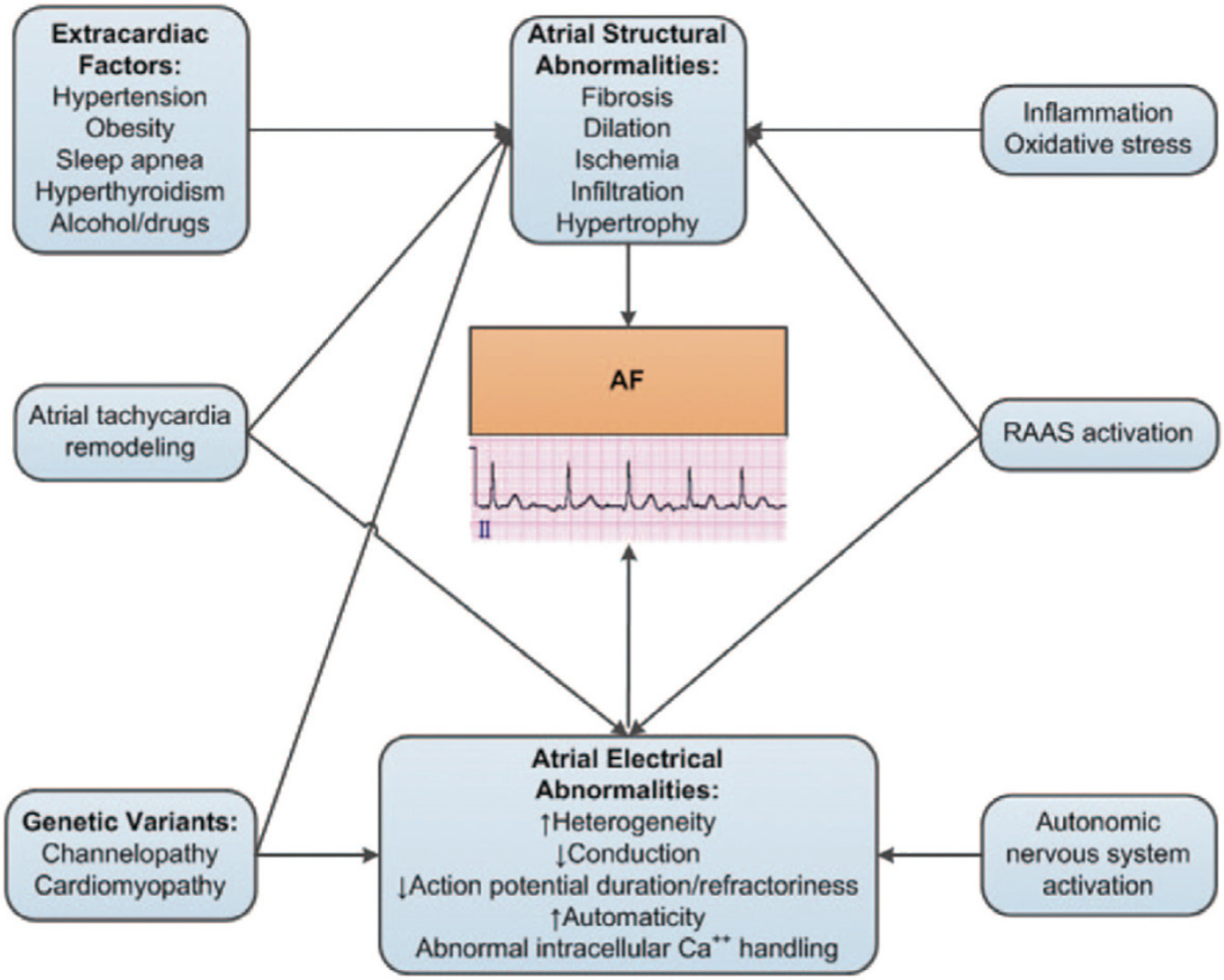


Figure 1. *Kaplan–Meier plot on event-free survival to first ECG documented atrial fibrillation period postpulmonary vein isolation, arranged according to moderate to severe sleep disordered breathing (SDB) versus mild or no sleep disordered breathing (mnSDB).*

Bitter et al. J Cardiovasc Electrophysiol 2012;23:18

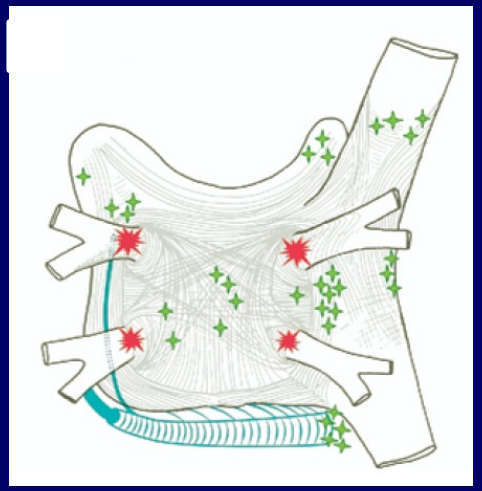
Mechanisms of AF

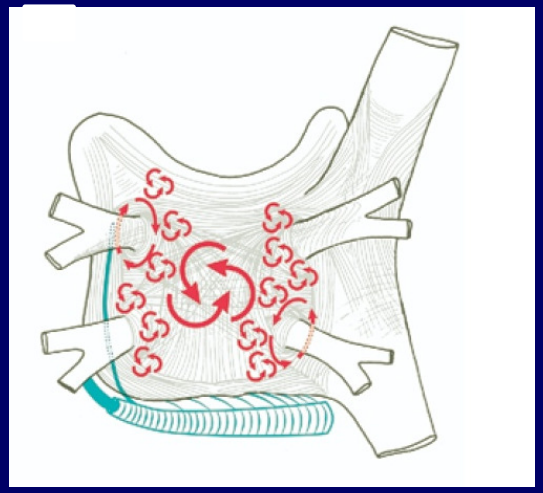


2014 AHA/ACC/HRS Guideline for the Management of Patients With Atrial Fibrillation

Pathophysiology of AF

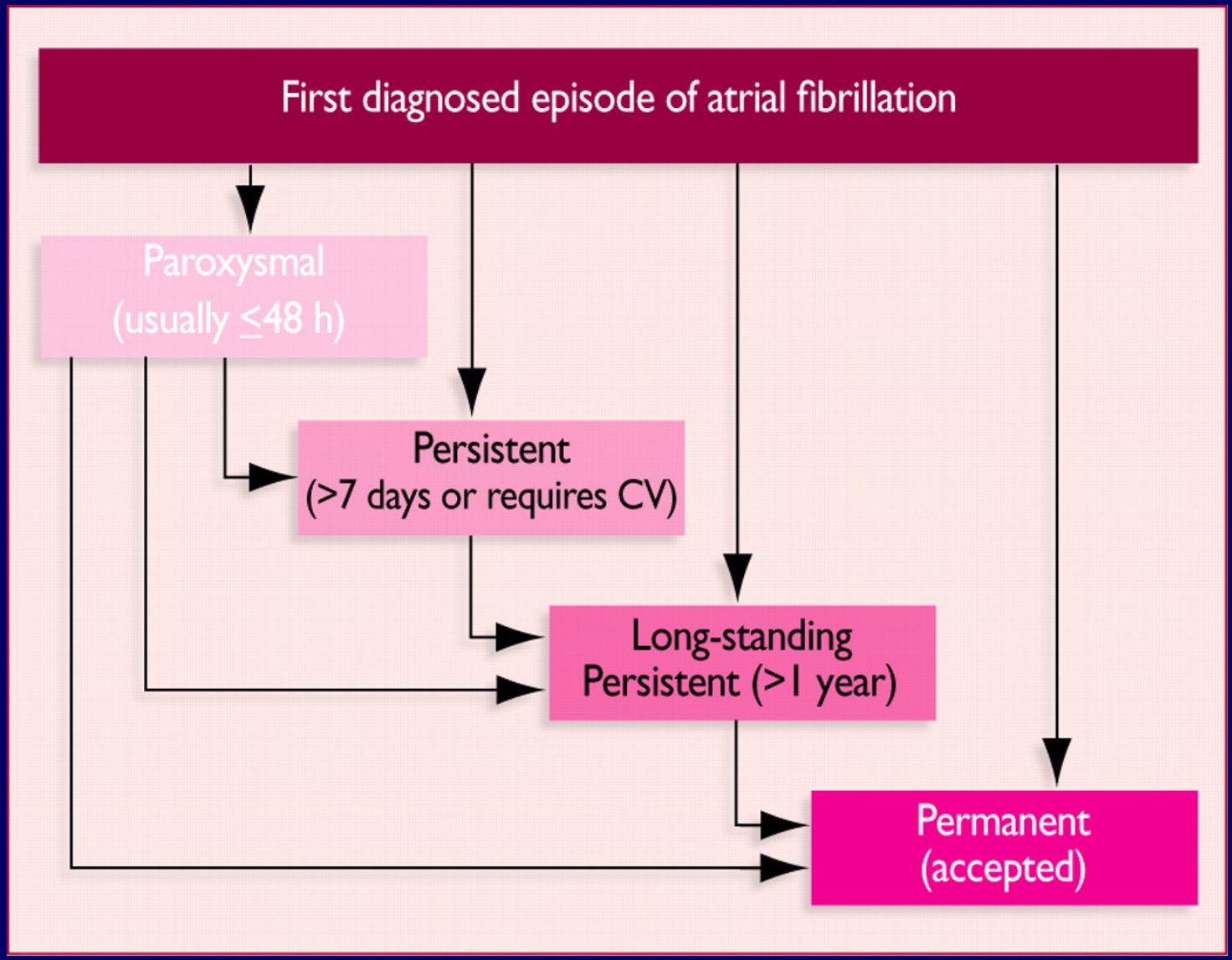
- Triggers
  - *PV/non-PV Triggers*
- Substrate
  - *Electrophysiologic*
  - *Anatomic*





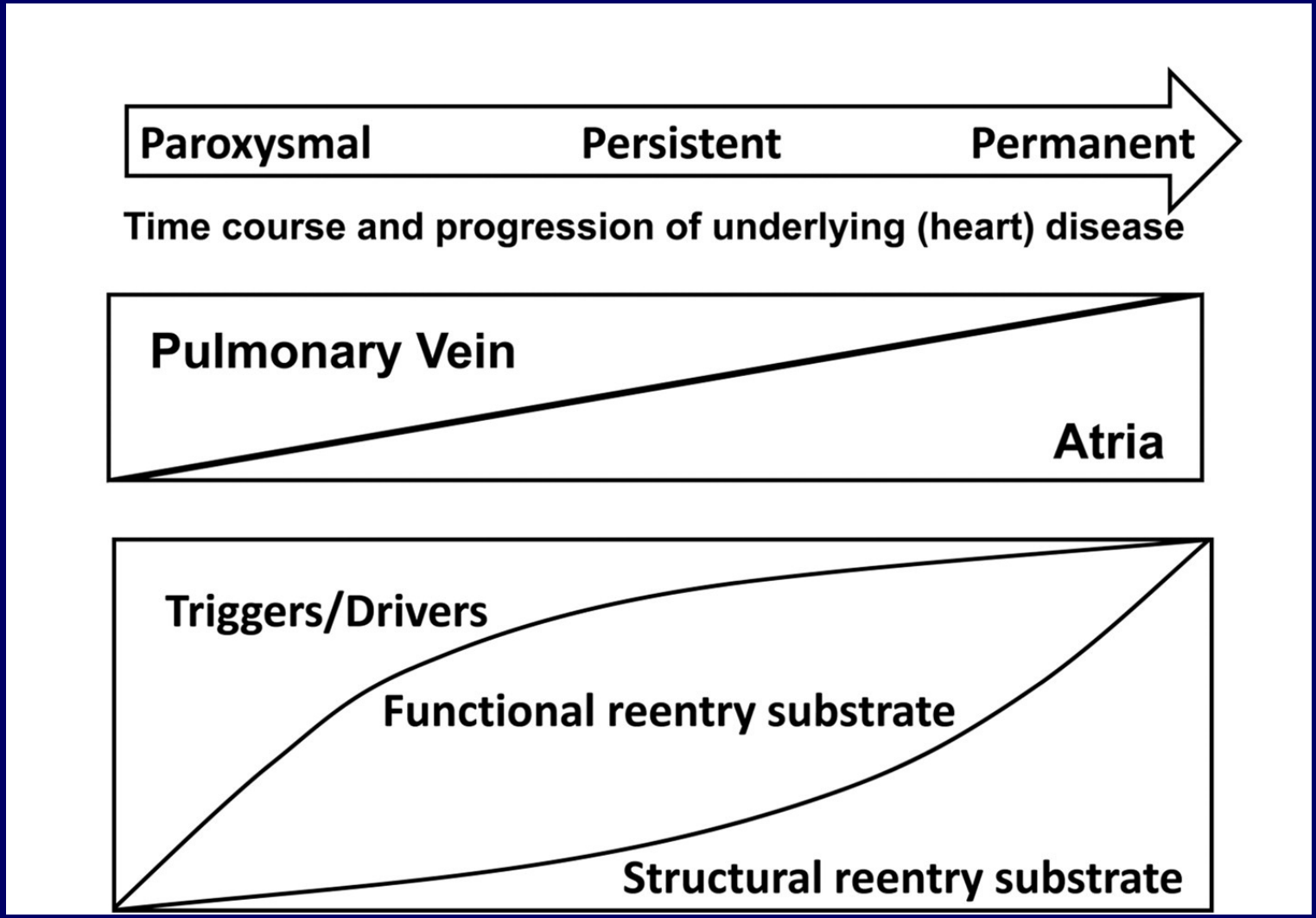
Calkins et al. Heart Rhythm 2007

Different Types of AF



Camm A J et al. Eur Heart J 2010

Relationship of AF Mechanism to Clinical Forms



Iwasaki Y et al. Circulation 2011;124:2264-2274

Evaluation of the Patient With Atrial Fibrillation

- History and physical exam
  - Blood pressure
  - Chest pain, shortness of breath
  - Heart murmur, symptoms/signs of congestive heart failure
  - Symptoms of sleep apnea (snoring, daytime sleepiness)
- Thyroid function studies
- Electrocardiogram/long-term ECG monitoring
- Echocardiogram
  - Heart muscle function
  - Valve function
- Stress test if signs or risk factors for coronary artery disease

Therapeutic Issues to be Addressed in Atrial Fibrillation

1. Prevention of systemic embolization and stroke
2. Slowing of ventricular rate
3. Reversion to sinus rhythm, maintenance of sinus rhythm

A Patient's View of Warfarin

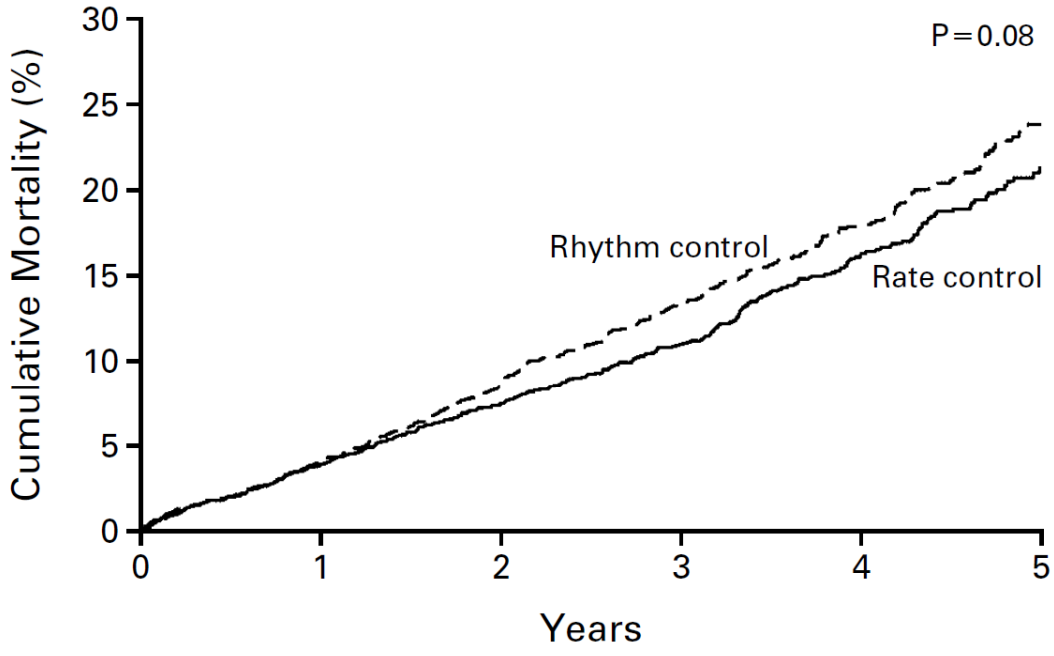
Strategies for Managing Atrial Fibrillation

- ***"Rate control":*** let the patient remain in atrial fibrillation
  - Rate control and anticoagulation
- ***"Rhythm control":*** try to keep the patient in sinus rhythm
  - Medicines
    - Success rate ~50%
    - Side effects
  - Non-pharmacologic
    - Catheter ablation
    - Minimally invasive surgical ablation

Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) Trial

Wyse et al. N Engl J Med 2002;347:1825-1833

4,060 AF patients with high risk for stroke and death were randomized to either rhythm control or rate control

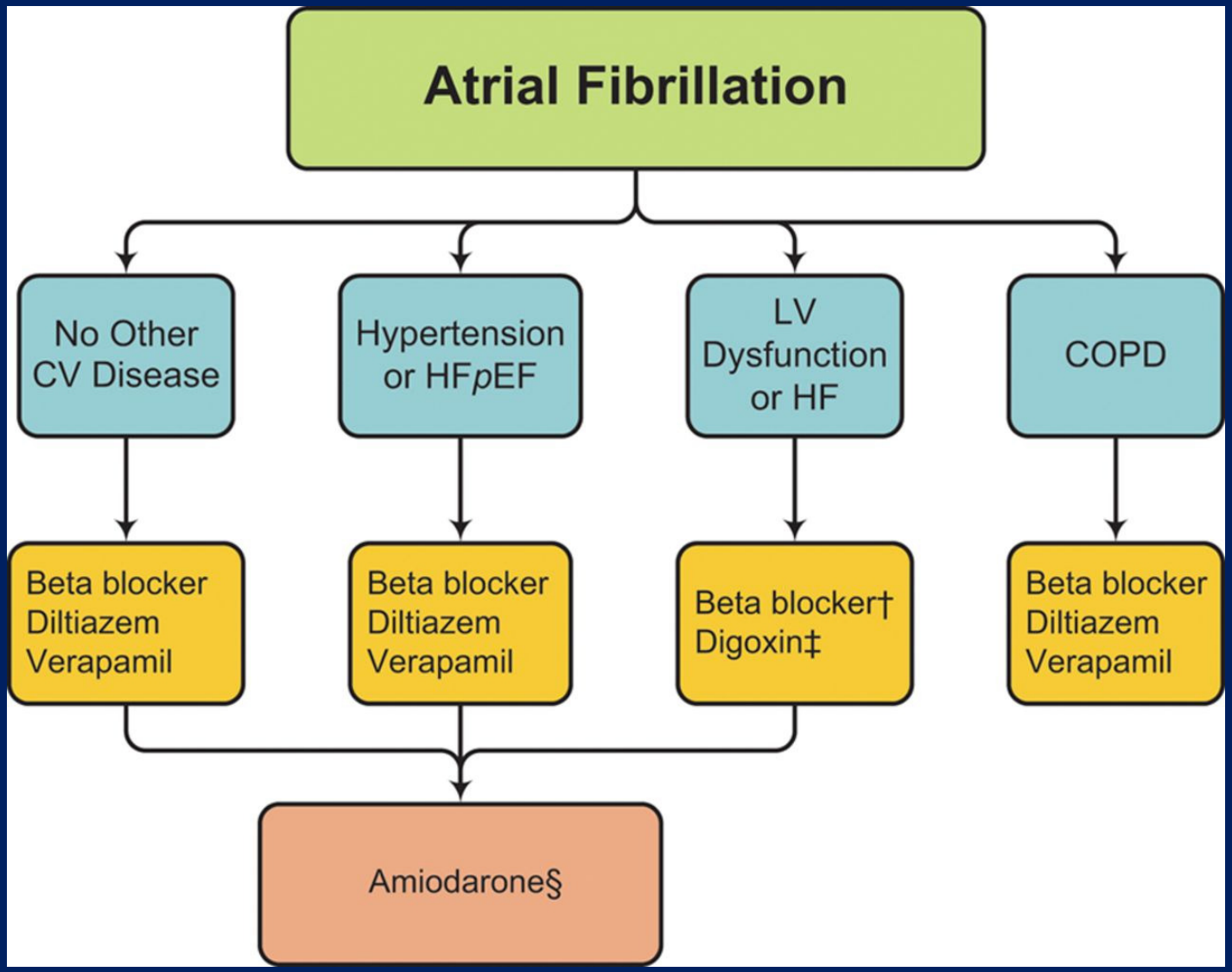


No. of Deaths		number (percent)				
Rhythm control	0	80 (4)	175 (9)	257 (13)	314 (18)	352 (24)
Rate control	0	78 (4)	148 (7)	210 (11)	275 (16)	306 (21)

Therapeutic Issues to be Addressed in Atrial Fibrillation

1. Prevention of systemic embolization and stroke
2. Slowing of ventricular rate
3. Reversion to sinus rhythm, maintenance of sinus rhythm

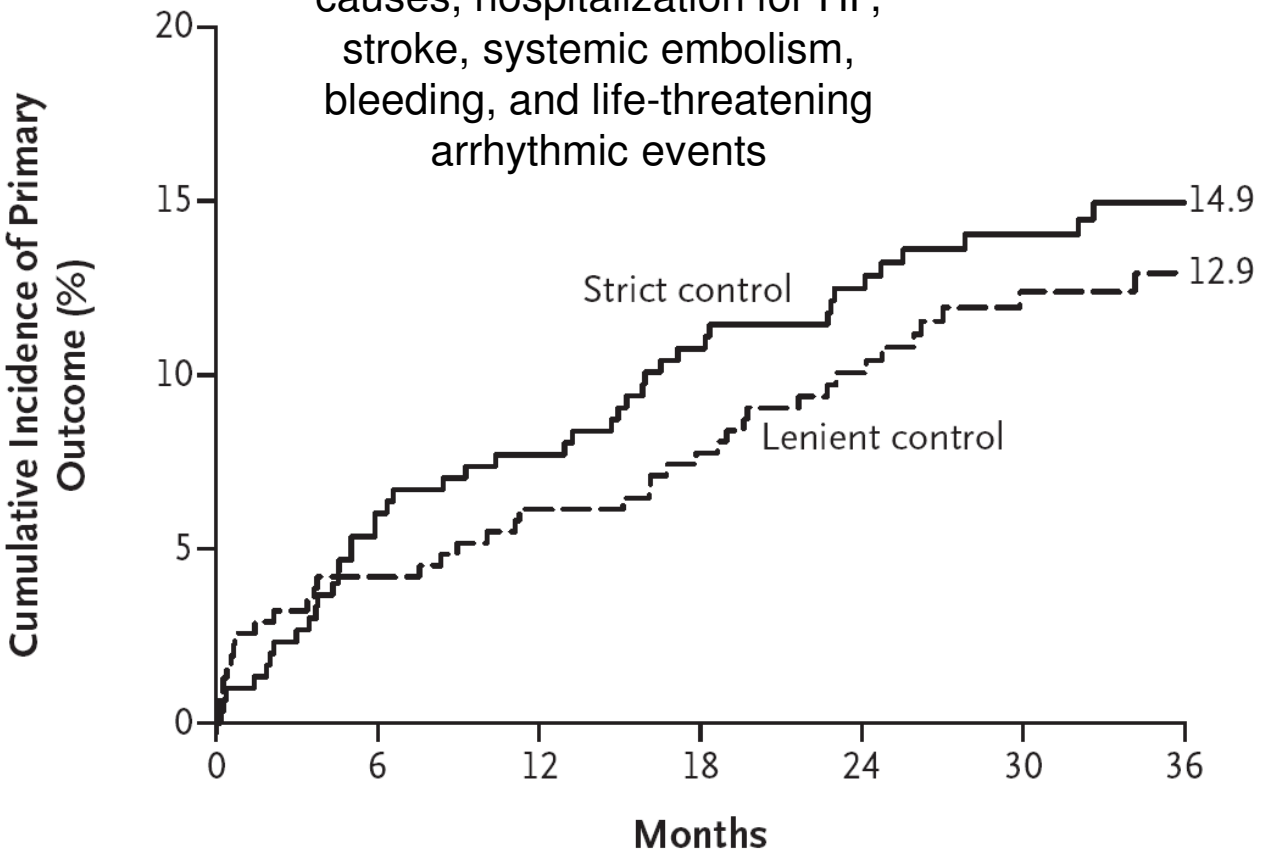
Drug Therapy for Ventricular Rate Control



2014 AHA/ACC/HRS AF Guidelines

Lenient versus Strict Rate Control in Patients with Atrial Fibrillation (RACE II)

Primary endpoint: death from CV causes, hospitalization for HF, stroke, systemic embolism, bleeding, and life-threatening arrhythmic events



No. at Risk

Strict control	303	282	273	262	246	212	131
Lenient control	311	298	290	285	255	218	138

Van Gelder et al. NEJM 2010;362:1363

Recommendations for Rate Control

- A heart rate control (resting HR <80 bpm) strategy is reasonable for symptomatic treatment of AF (IIA)
- Lenient rate control strategy (resting HR <110 bpm) may be reasonable with asymptomatic patients and preserved LV systolic function (IIB)

2014 AHA/ACC/HRS AF Guidelines

Therapeutic Issues to be Addressed in Atrial Fibrillation

1. Prevention of systemic embolization and stroke
2. Slowing of ventricular rate
3. Reversion to sinus rhythm, maintenance of sinus rhythm

Patients Not Represented in the AFFIRM Study

- Patients with symptomatic AF
- Patients with LV dysfunction related to AF
- Younger patients facing many years of AF

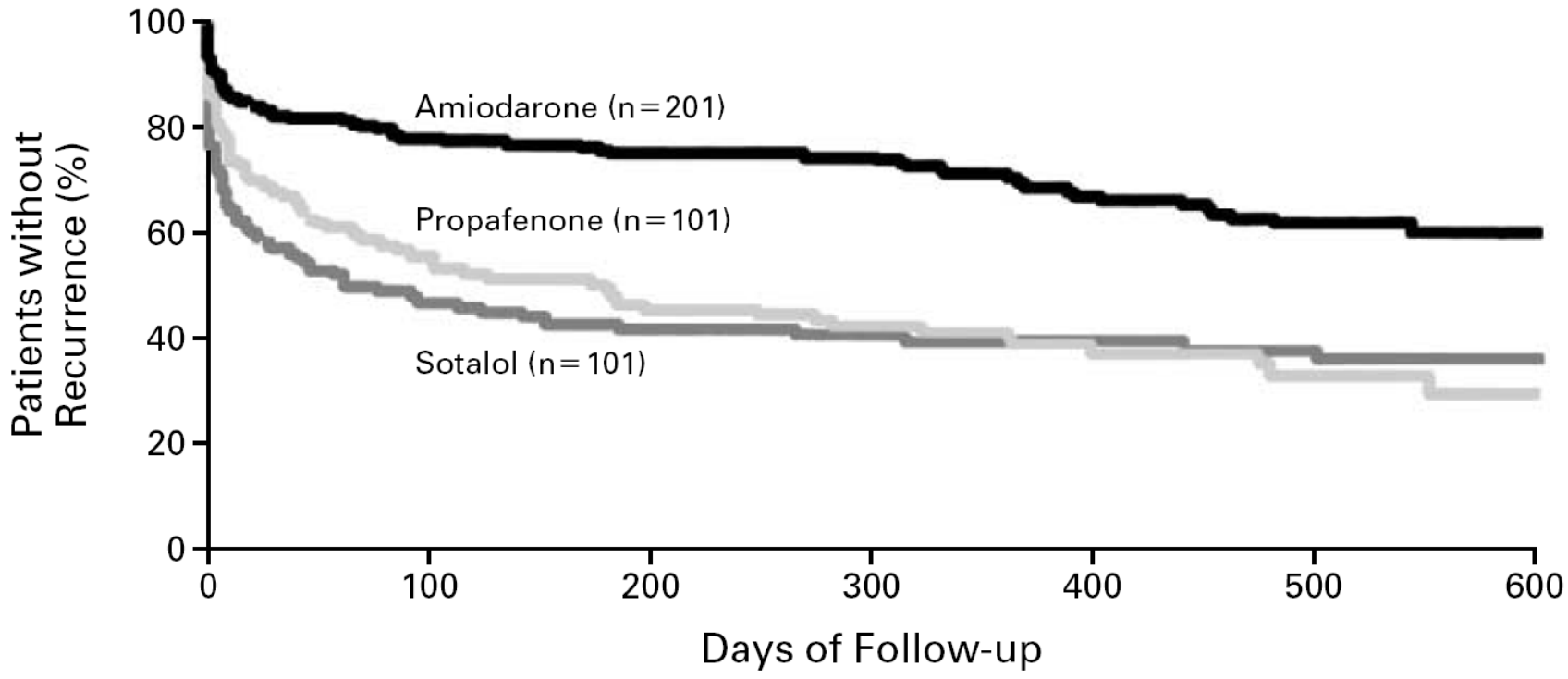
Potential Benefits of Sinus Rhythm

- Elimination of symptoms
  - Restoration of AV synchrony
  - Appropriate resting and exercise heart rate
  - Regularization of heart rate
- Unproven long-term benefits:
  - Lower risk of thromboembolism
  - Lower risk of CHF
  - Lower risk of progression to permanent AF
  - Improved survival

Oral Drugs Used to Maintain Sinus Rhythm

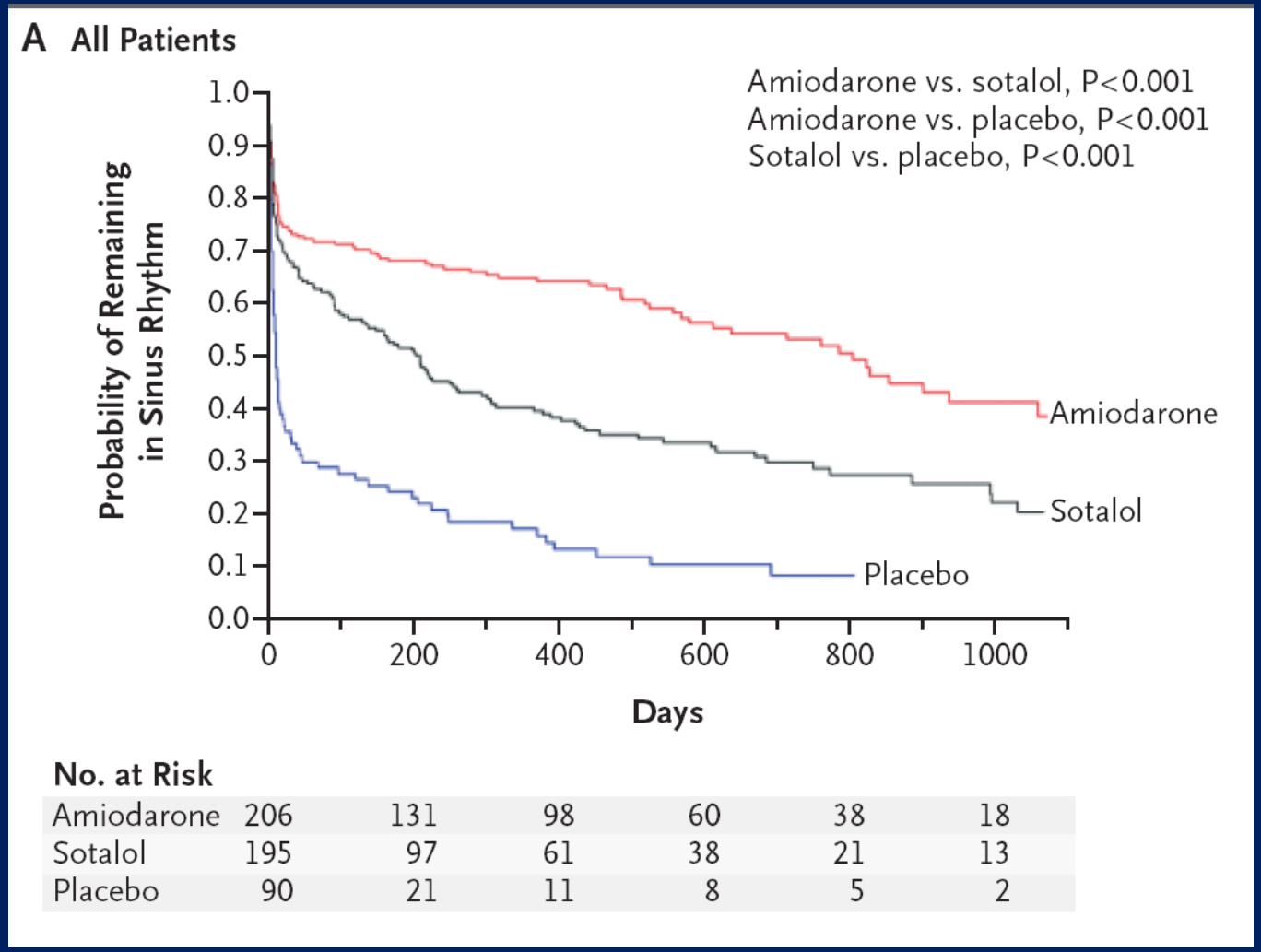
– Quinidine		Type IA
– Disopyramide	*Norpace*	Type IA
– Flecainide	*Tambocor*	Type IC
– Propafenone	*Rythmol*	Type IC
– Sotalol	*Betapace*	Type III
– Dofetilide	*Tikosyn*	Type III
– Amiodarone	*Cordarone, Pacerone*	Type III
– Dronedarone	*Multaq*	Type III

Drug Therapy for Prevention of Recurrent Atrial Fibrillation



Roy et al. NEJM 2000;342:913.

Amiodarone versus Sotalol for Atrial Fibrillation

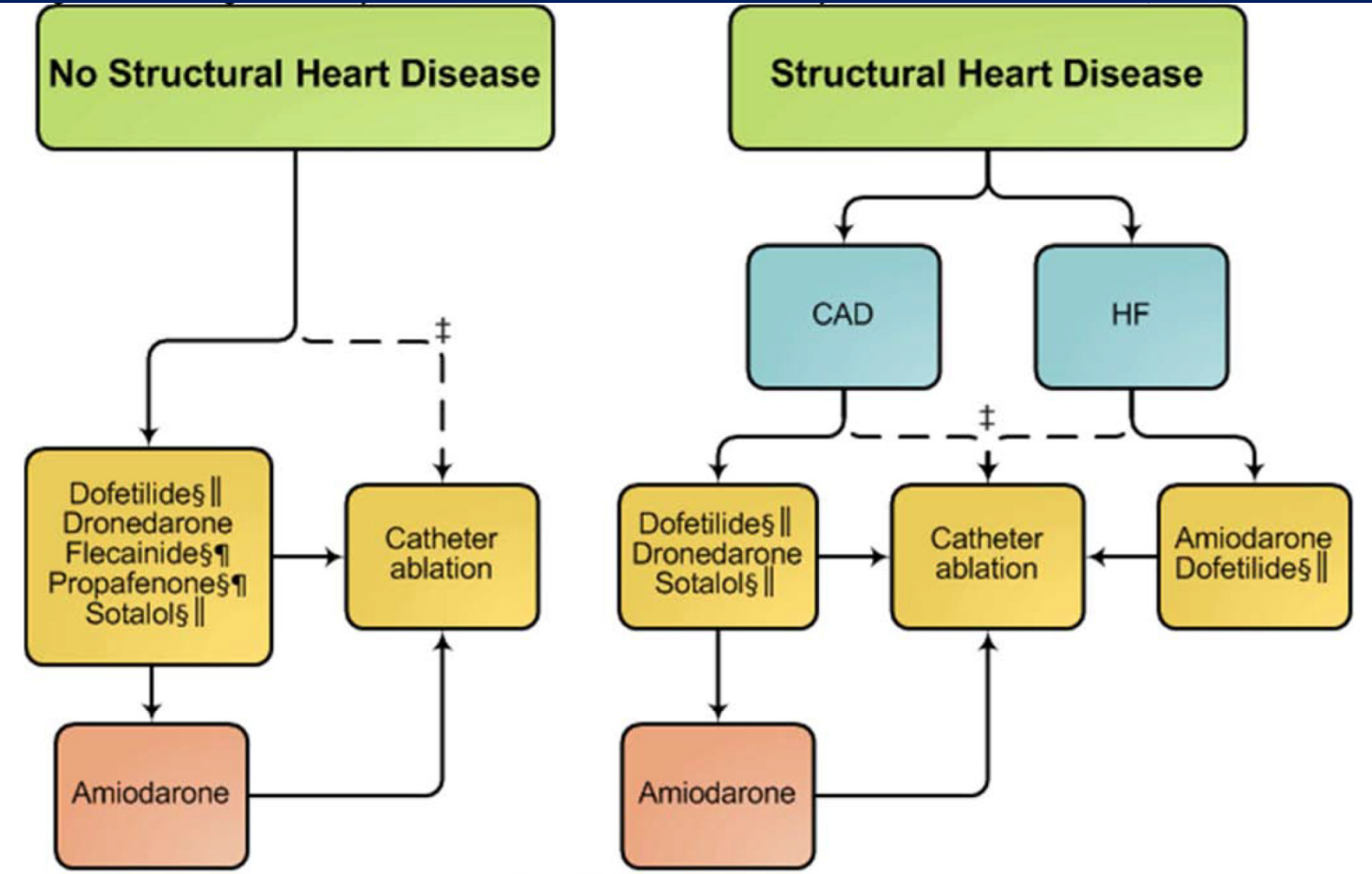


No. at Risk

Amiodarone	206	131	98	60	38	18
Sotalol	195	97	61	38	21	13
Placebo	90	21	11	8	5	2

Singh et al. NEJM 2005;352:1861

Strategies for Rhythm Control in Patients With Paroxysmal and Persistent AF



*Catheter ablation is only recommended as first-line therapy for patients with paroxysmal AF (Class IIa recommendation).
†Drugs are listed alphabetically.
‡Depending on patient preference when performed in experienced centers.
§Not recommended with severe LVH (wall thickness >1.5 cm).
‖Should be used with caution in patients at risk for torsades de pointes ventricular tachycardia.
¶Should be combined with AV nodal blocking agents.

2014 AHA/ACC/HRS AF Guidelines

A patient has had persistent atrial fibrillation with moderately rapid rates for the last 4 months, mild SOB, and the EF on the last echo has decreased to 45%. Assuring adequate anticoagulation, appropriate therapies may include all <u>but</u>:

1. Initiation of strict rate control (resting heart rate <80)
2. Initiation of lenient rate control (resting heart rate <110)
3. Cardioversion
4. Initiation of an antiarrhythmic drug followed by cardioversion
5. Atrial fibrillation ablation

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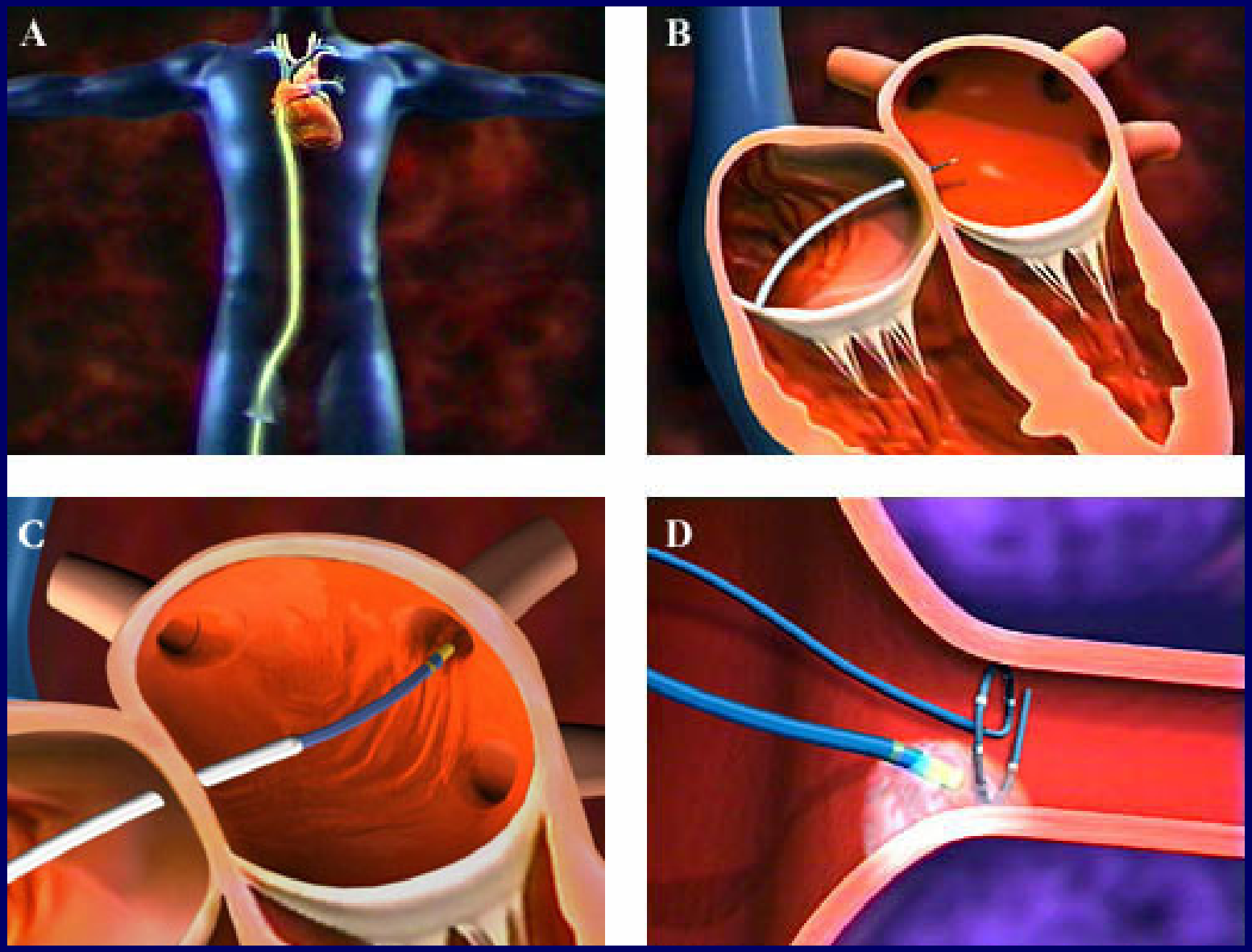
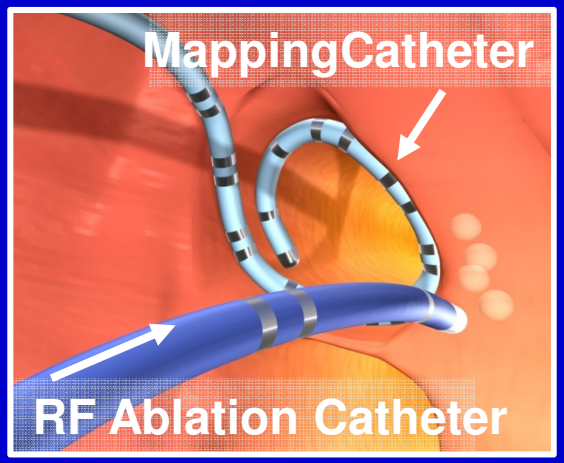
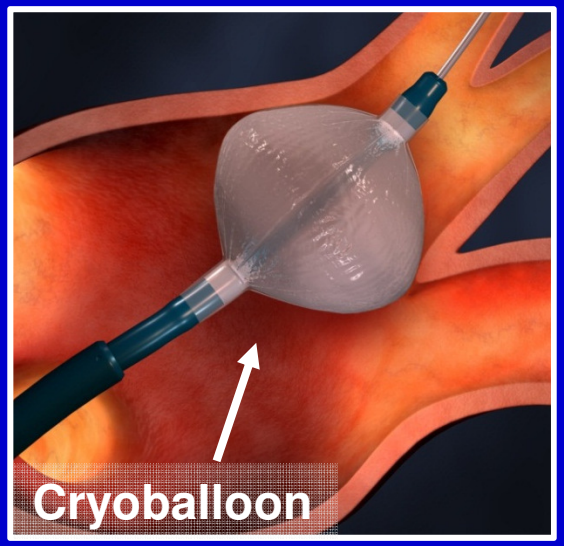
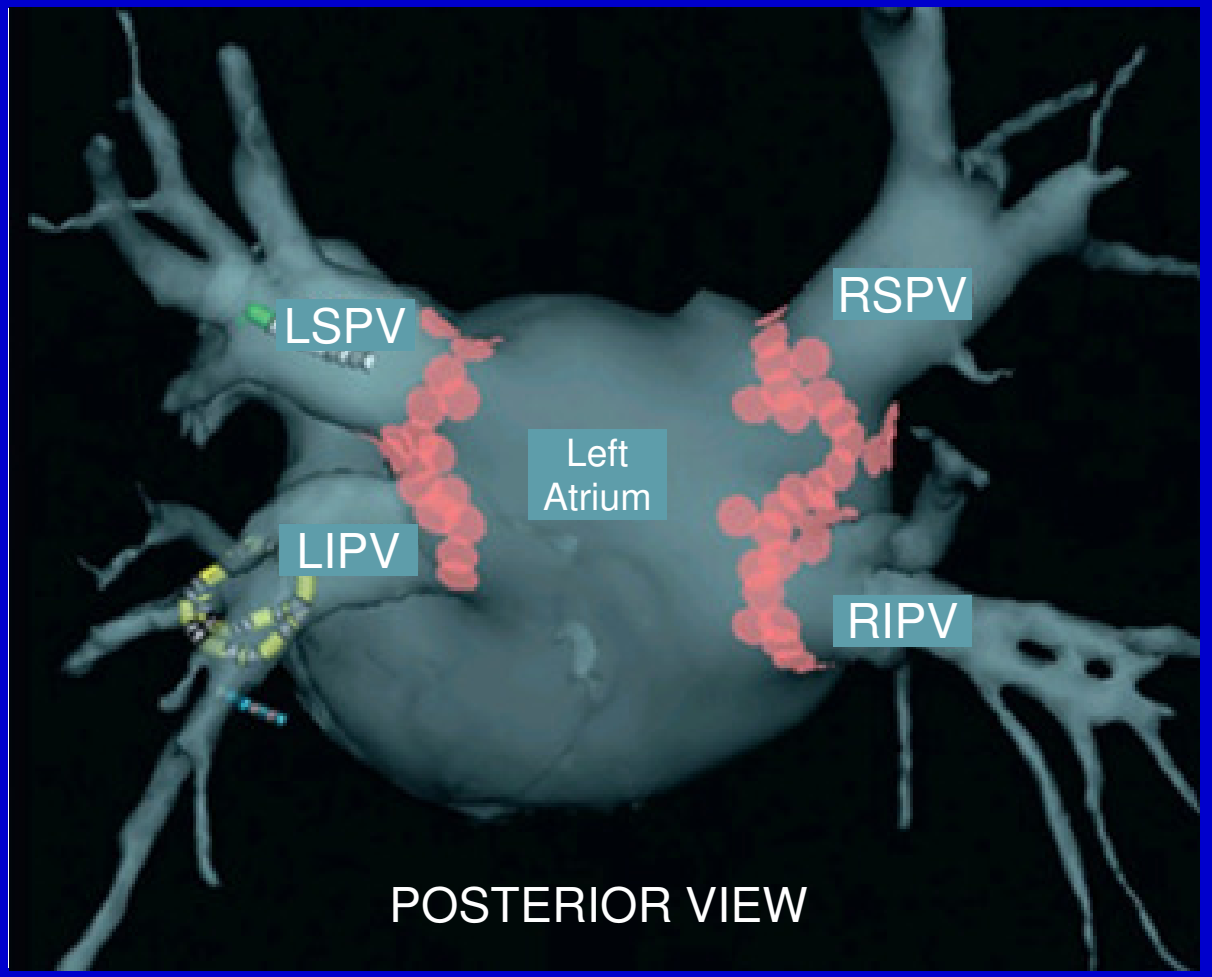
Catheter Ablation of Atrial Fibrillation



Catheter Ablation For Paroxysmal AF







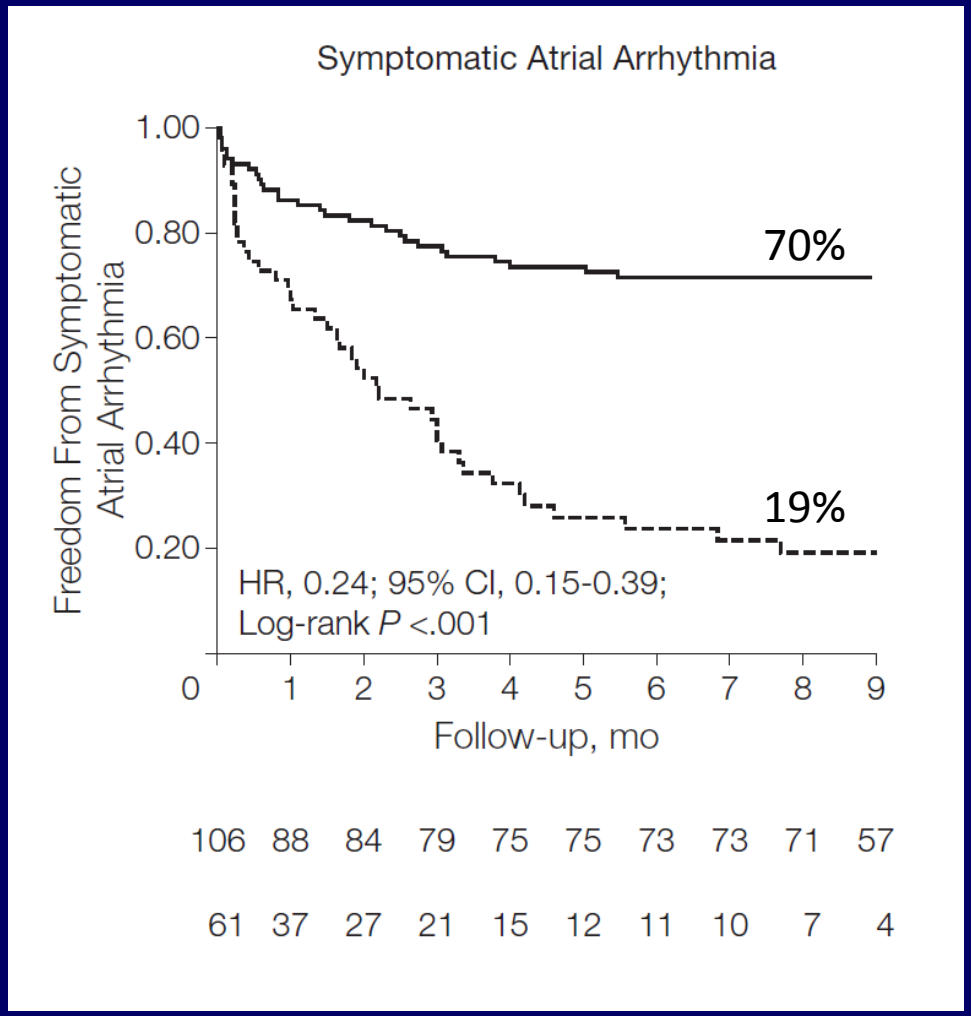
Merino, et al. Rev Esp Cardiol. 2009;62:314

Courtesy Gregory Michaud MD

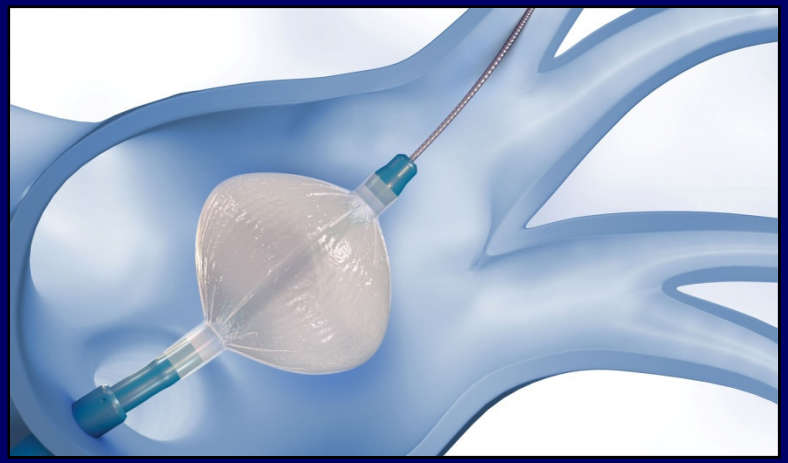
Expectations of AF Ablation

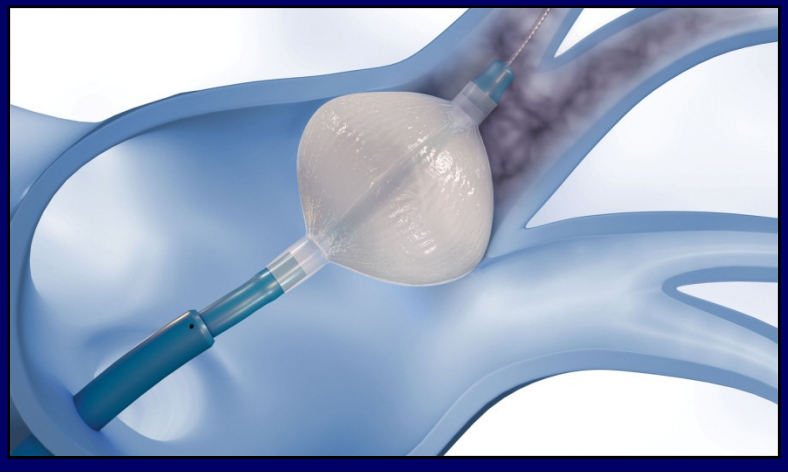
- Reduction of symptoms from AF
- Unproven:
  - Cure of AF
  - Better cardiovascular outcomes (CHF, mortality, etc.)
  - Freedom from stroke and the need for anticoagulation

Comparison of Antiarrhythmic Drug Therapy and RF Catheter Ablation in Patients With Paroxysmal AF: *Thermocool Study*



Wilber, D. J. et al. JAMA 2010;303:333-340.

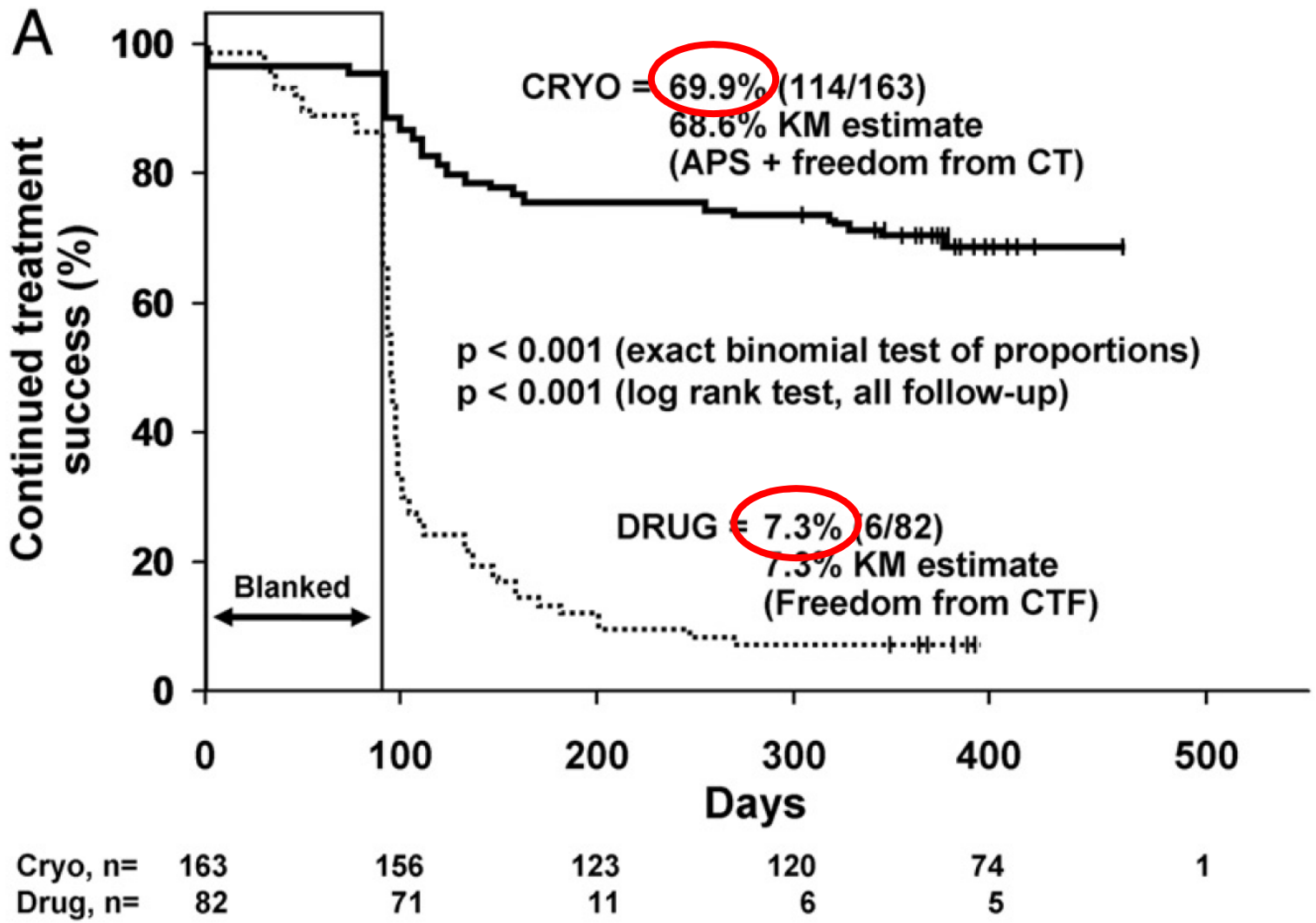




Cryoballoon

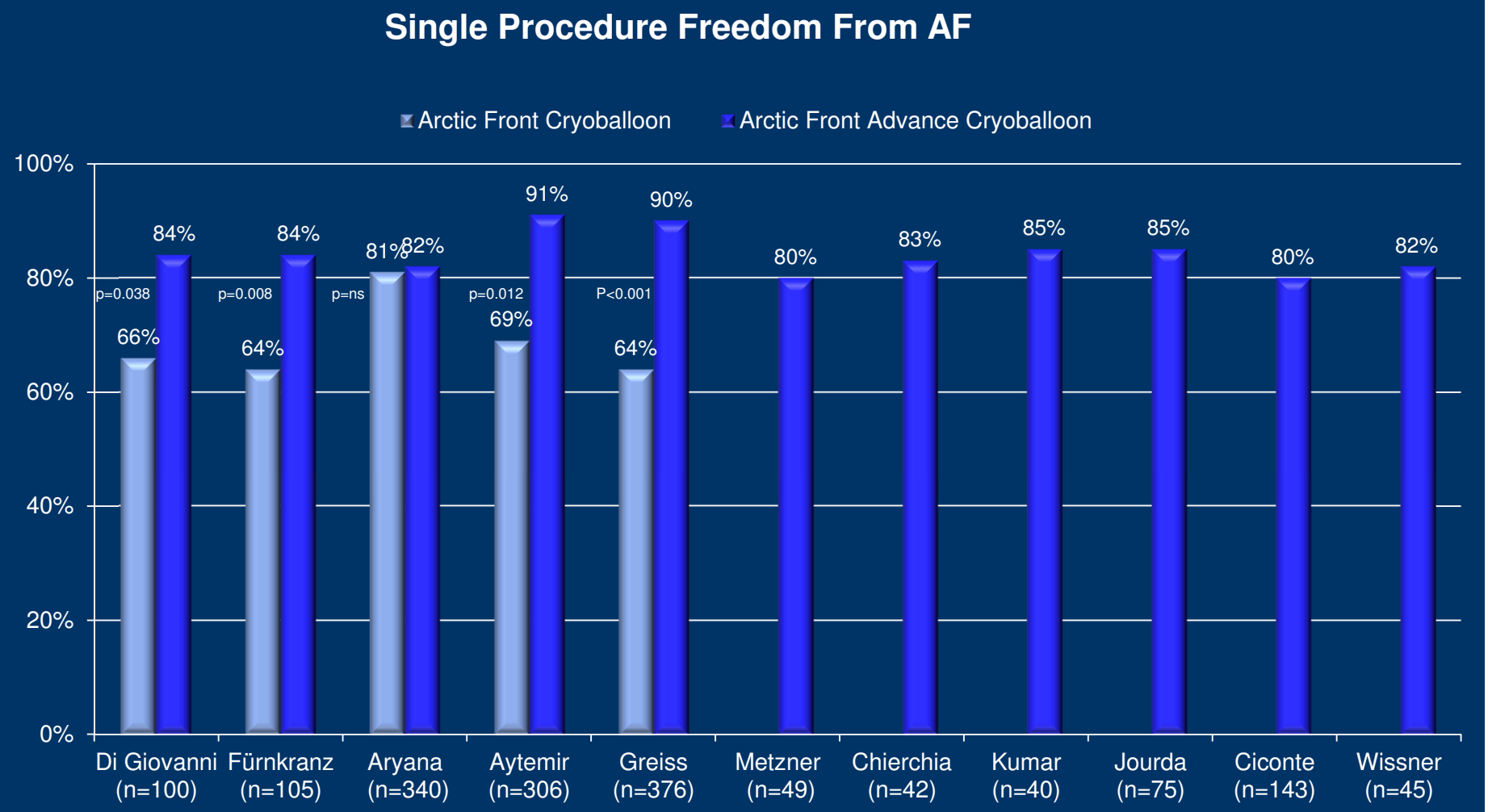
Metzner et al. *Circ Arrhythm Electrophysiol*. 2013;6:769-775

Procedural Success in the STOP AF Trial



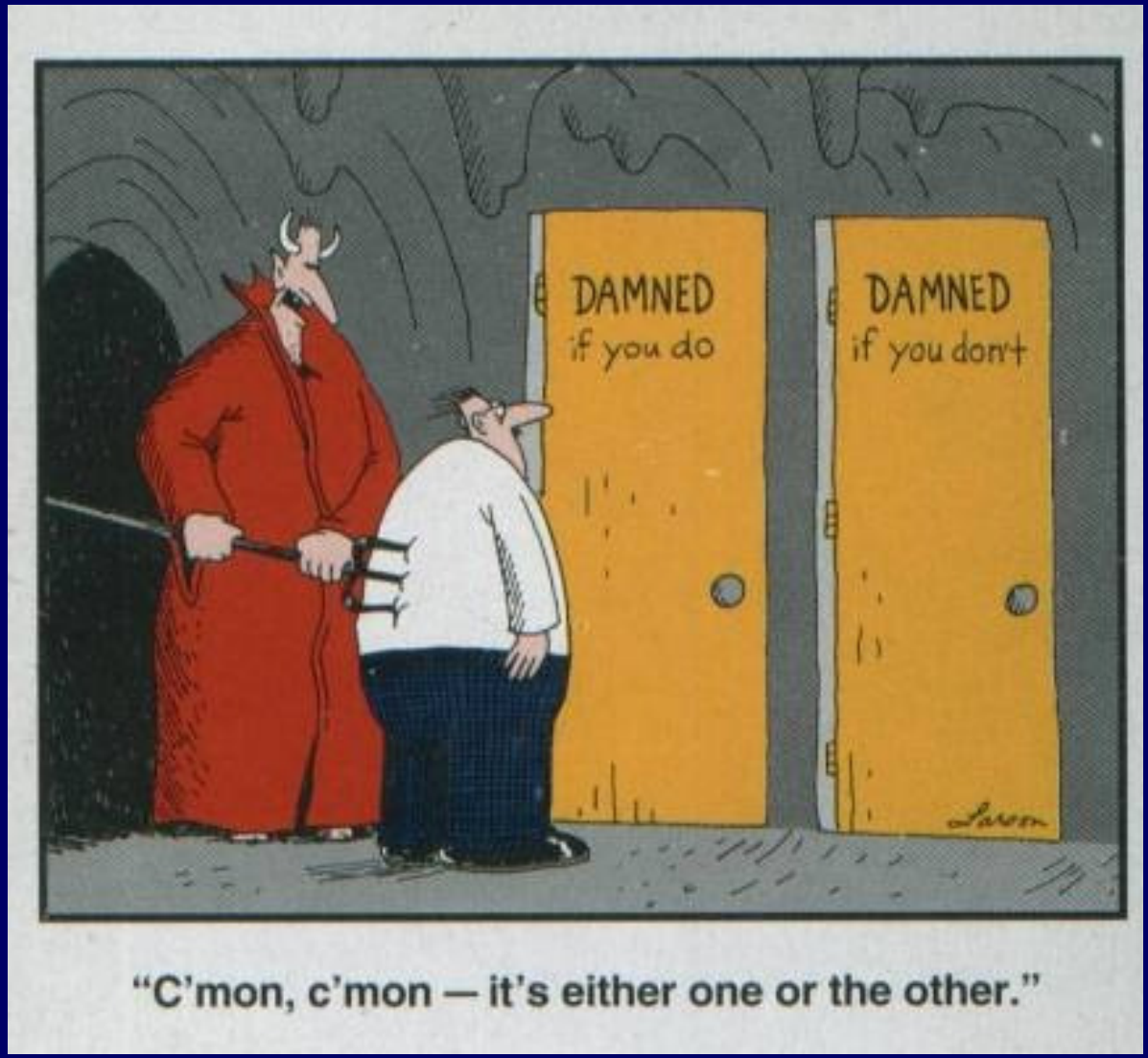
Packer et al. JACC 2013;61:1713

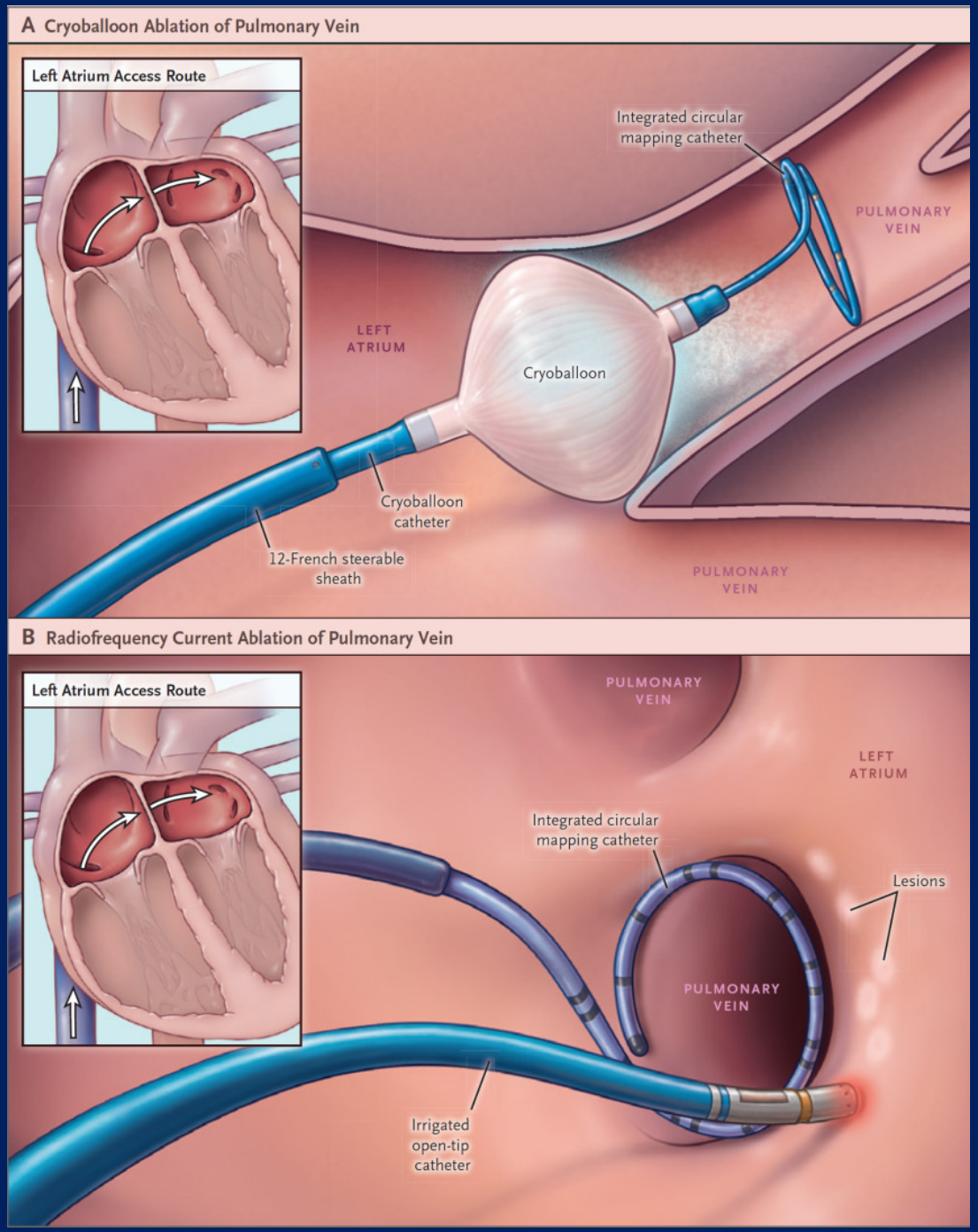
Single Procedure Freedom from AF, AT and AFL
Arctic Front Advance Cryoballoon Single Center Published Studies



Di Giovanni, et al. *J Cardiovasc Electrophysiol.* 2014; 25(8):834-9 , Fürnkranz, et al. *Journal of Cardiovascular Electrophysiology* 2014 ;25(8):840-4, Aryana, et al. *J Interv Card Electrophysiol* 2014;41(2):177-186, Aytemir, et al. *Europace*; 2015;17(3):379-87, Metzner, et al. *Circ Arrhythm Electrophysiol.* 2014; 7(2):288-292 , Chierchia, et al. *Europace* 2014; 16(5):639-644, Kumar et al. *J Interv Card Electrophysiol* 2014;41(1):91-7, Jourda, et al. *Europace* 2015;17(2):225-31, Ciconte, et al. *Heart Rhythm* 2015;12(4):673-80, Wissner, et al. *Europace* 2015, In Press.

Cryoablation vs. RF Ablation

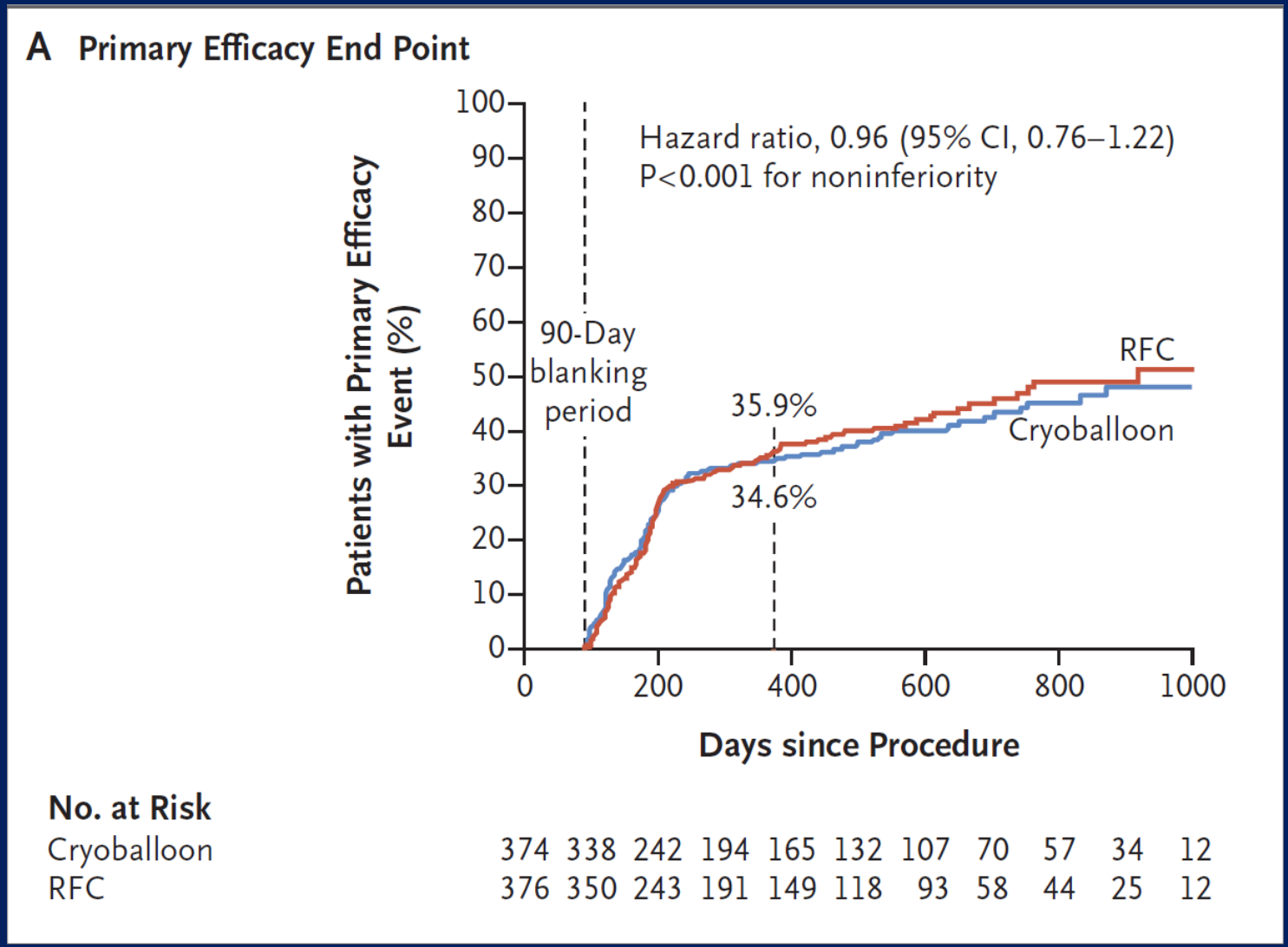




Cryoballoon or Radiofrequency Ablation for Paroxysmal Atrial Fibrillation

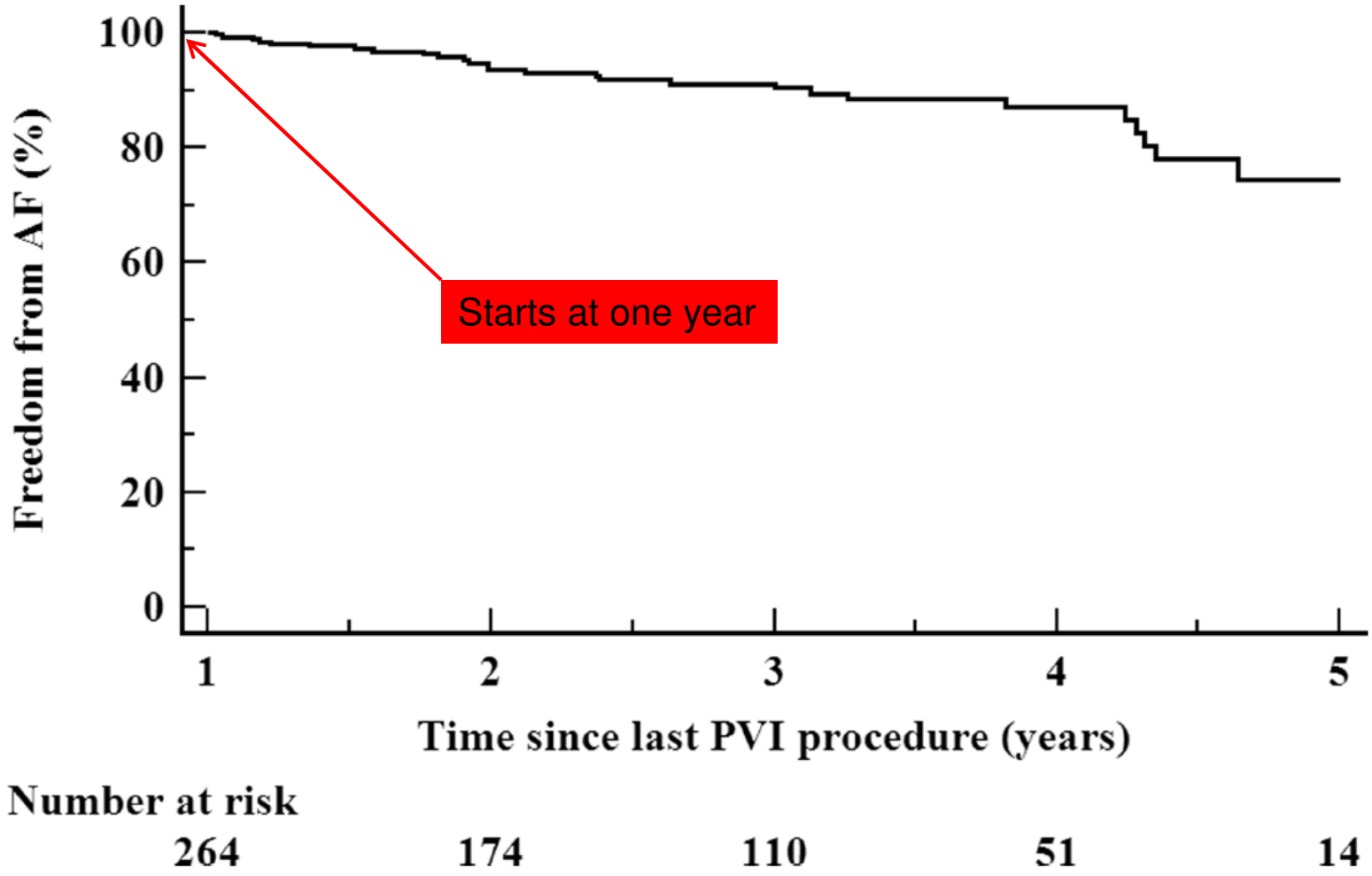
Kuck et al, NEJM 2016

Cryoballoon or Radiofrequency Ablation for Paroxysmal Atrial Fibrillation



Kuck et al, NEJM 2016

Long-Term Outcome Following Successful Pulmonary Vein Isolation: Pattern and Prediction of Very Late Recurrence



Shah et al. J Cardiovasc Electrophysiol 2008;19:661

AF Ablation Efficacy Depends On Patient Population

- Paroxysmal
- Persistent
- Long-standing persistent

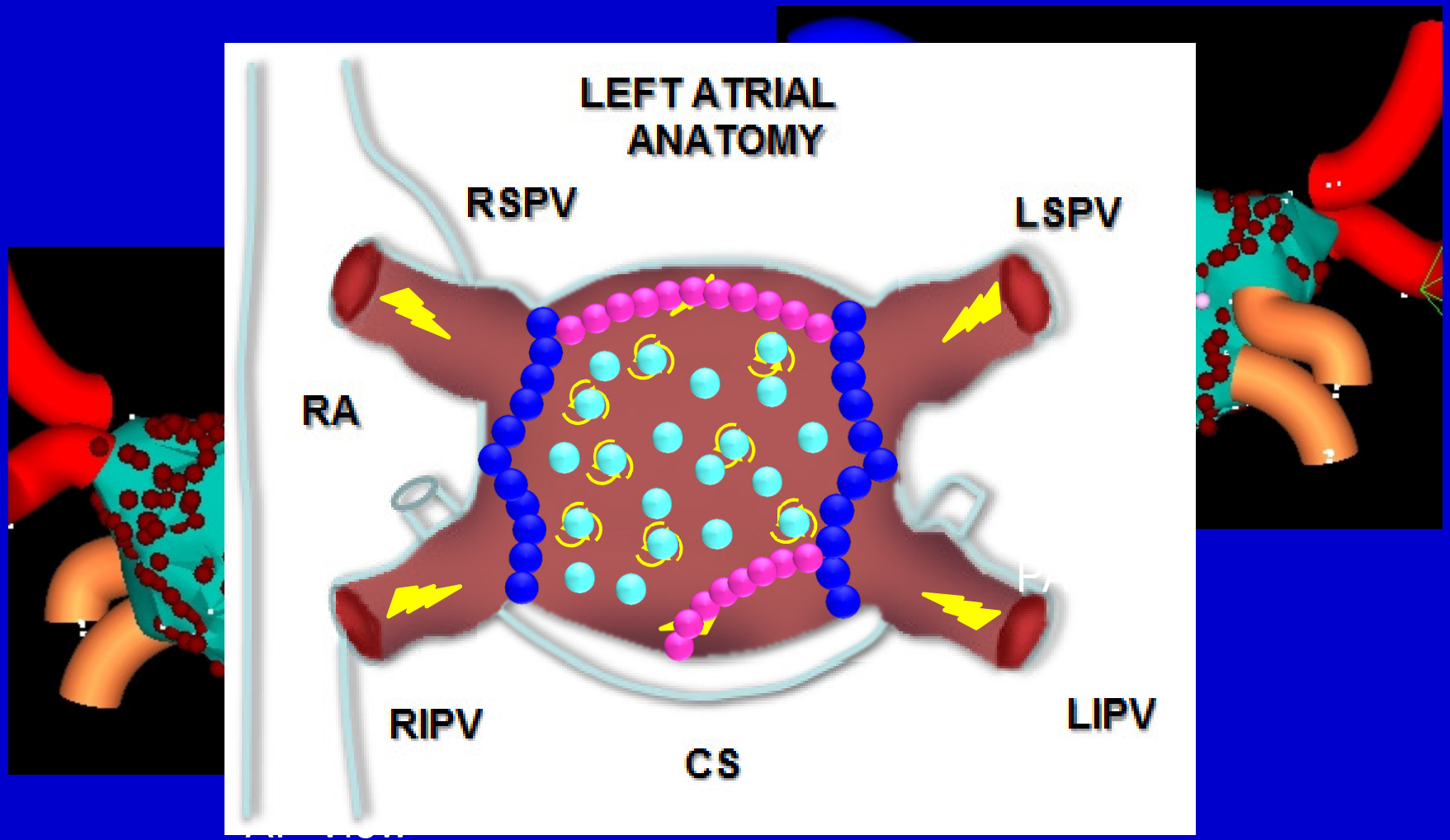
Atrial Remodeling

Ablation Strategies for Persistent or Long-Standing Persistent AF

- PVI
- PVI + linear lesions
- PVI + complex fractionated atrial electrograms (CFAEs)
- PVI + linear lesions + CFAEs
- PVI + ablation of focal sources and rotors
- PVI + isolation of LAA
- PVI + ablation of autonomic ganglia
- PVI + isolation of area of fibrosis
- PVI + ……

Adapted from Karl-Heinz Kuck

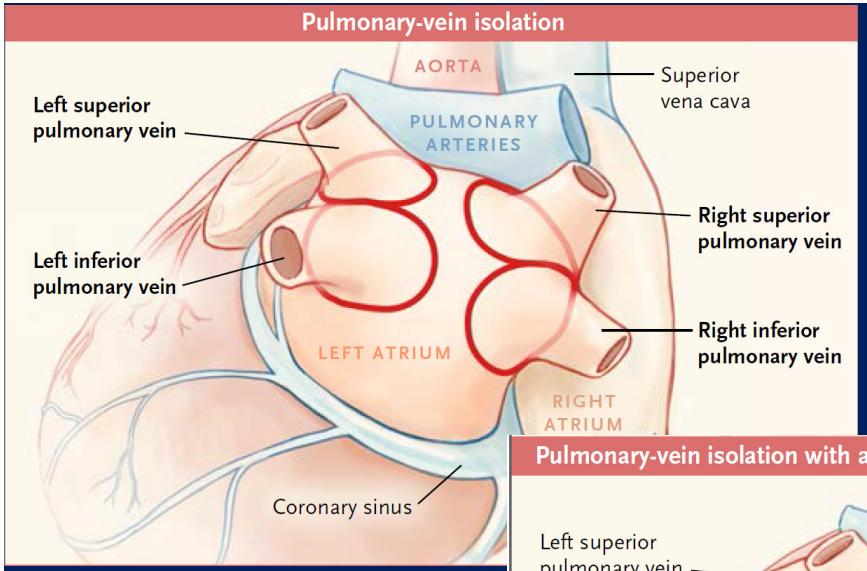
Catheter Ablation for Persistent AF

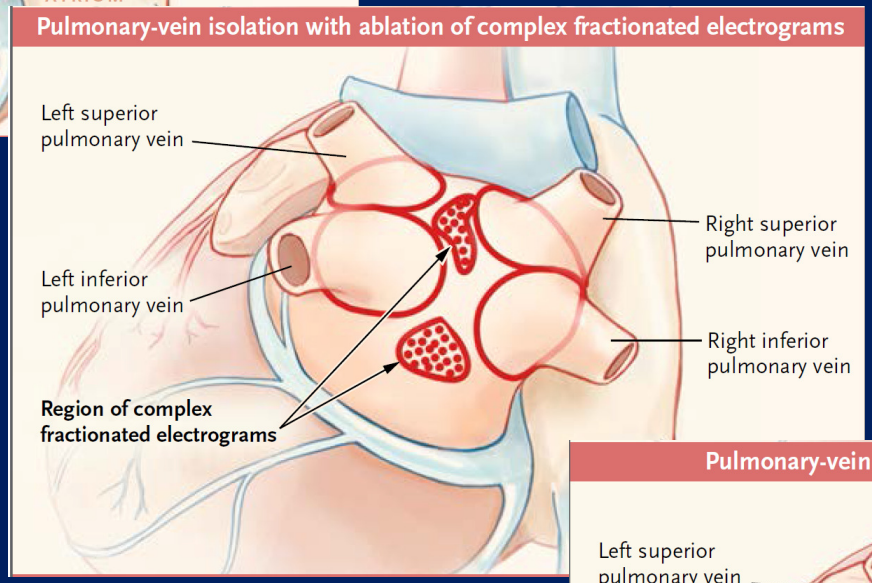


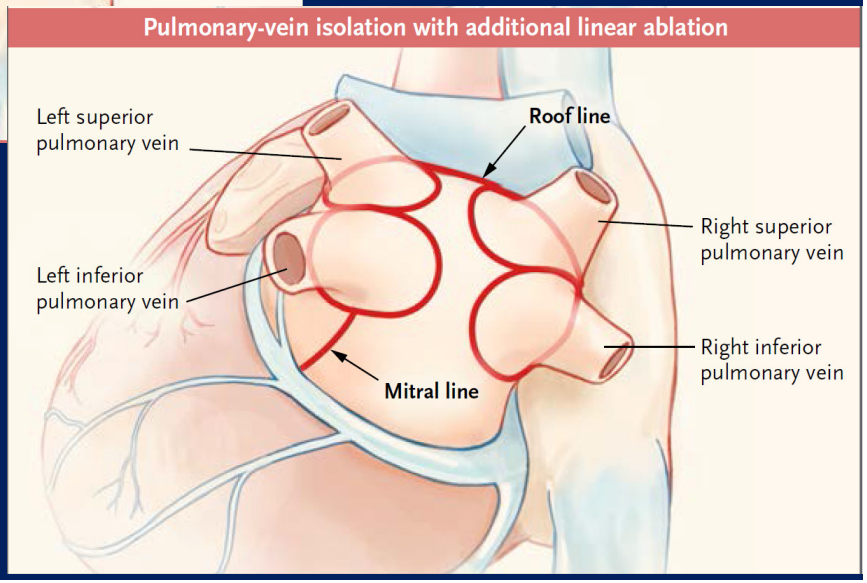
Oral H, et al. J Am Coll Cardiol 2009;53:782–9.

Courtesy Gregory Michaud MD

Approaches to Catheter Ablation for Persistent Atrial Fibrillation (STAR AF II)

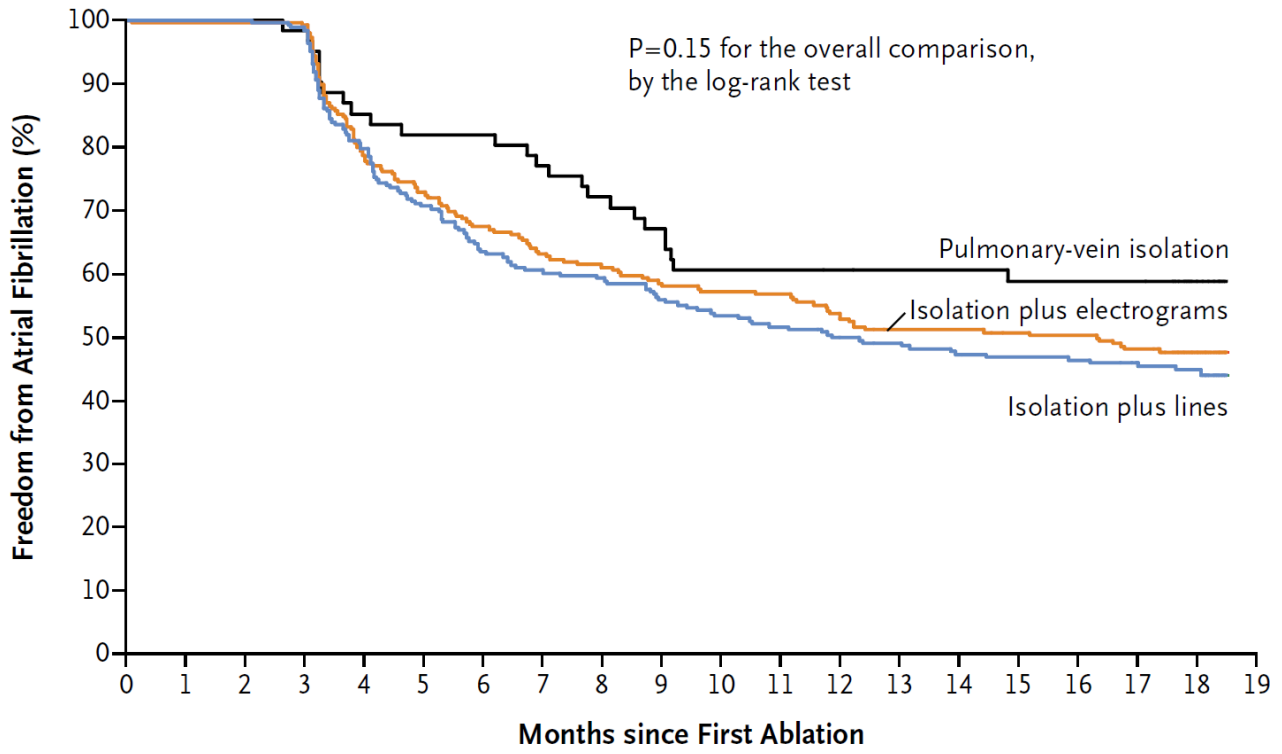






Verma and STAR AF II Investigators. N Engl J Med 2015;372:1812-22

Approaches to Catheter Ablation for Persistent Atrial Fibrillation



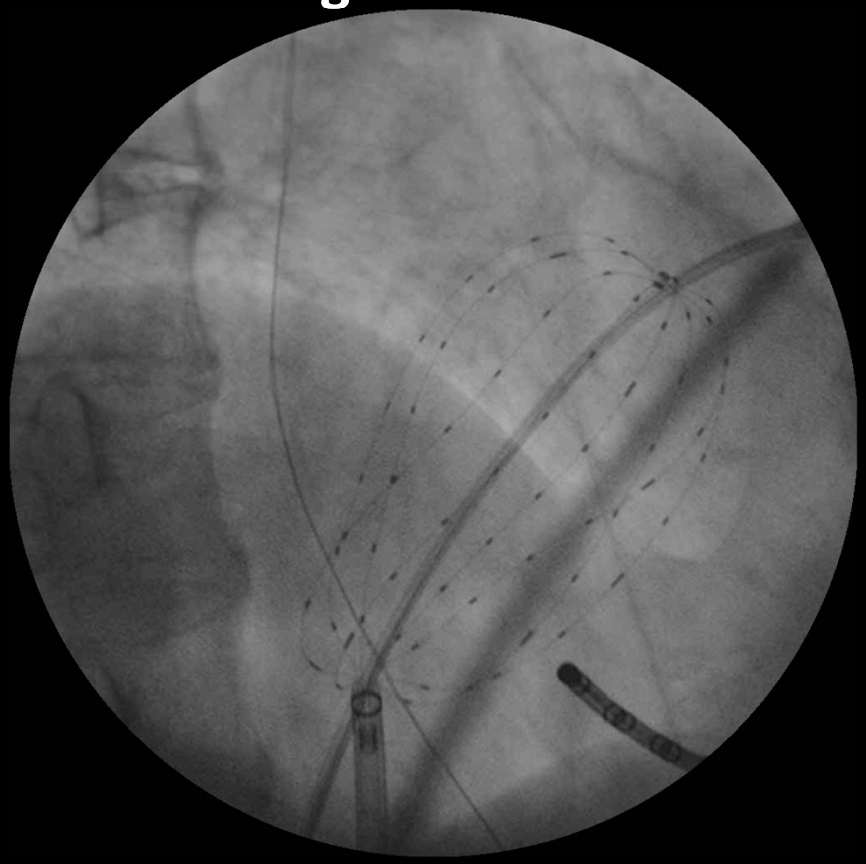
No. at Risk

Pulmonary-vein isolation	61	60	50	41	36	23
Isolation plus electrograms	244	242	161	137	124	72
Isolation plus lines	244	240	152	133	115	57

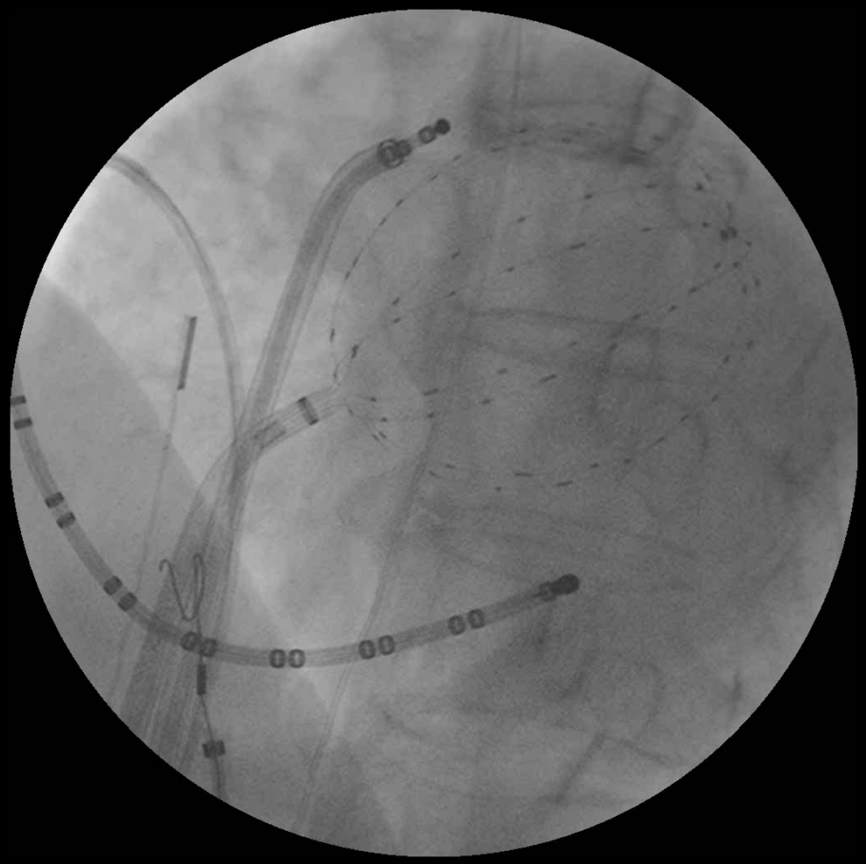
Verma and STAR AF II Investigators. N Engl J Med 2015;372:1812-22

FIRM Ablation

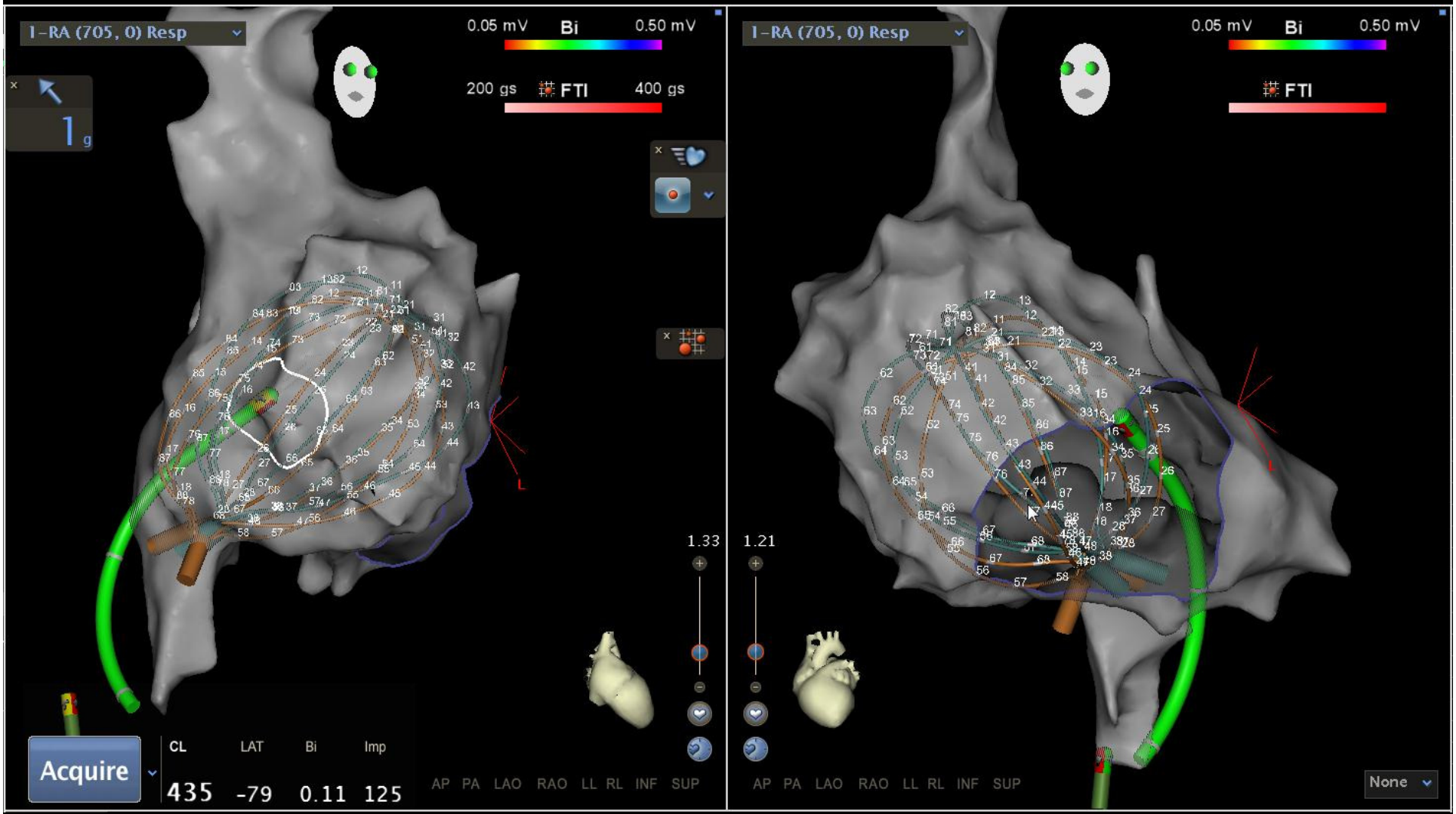
Right Atrium

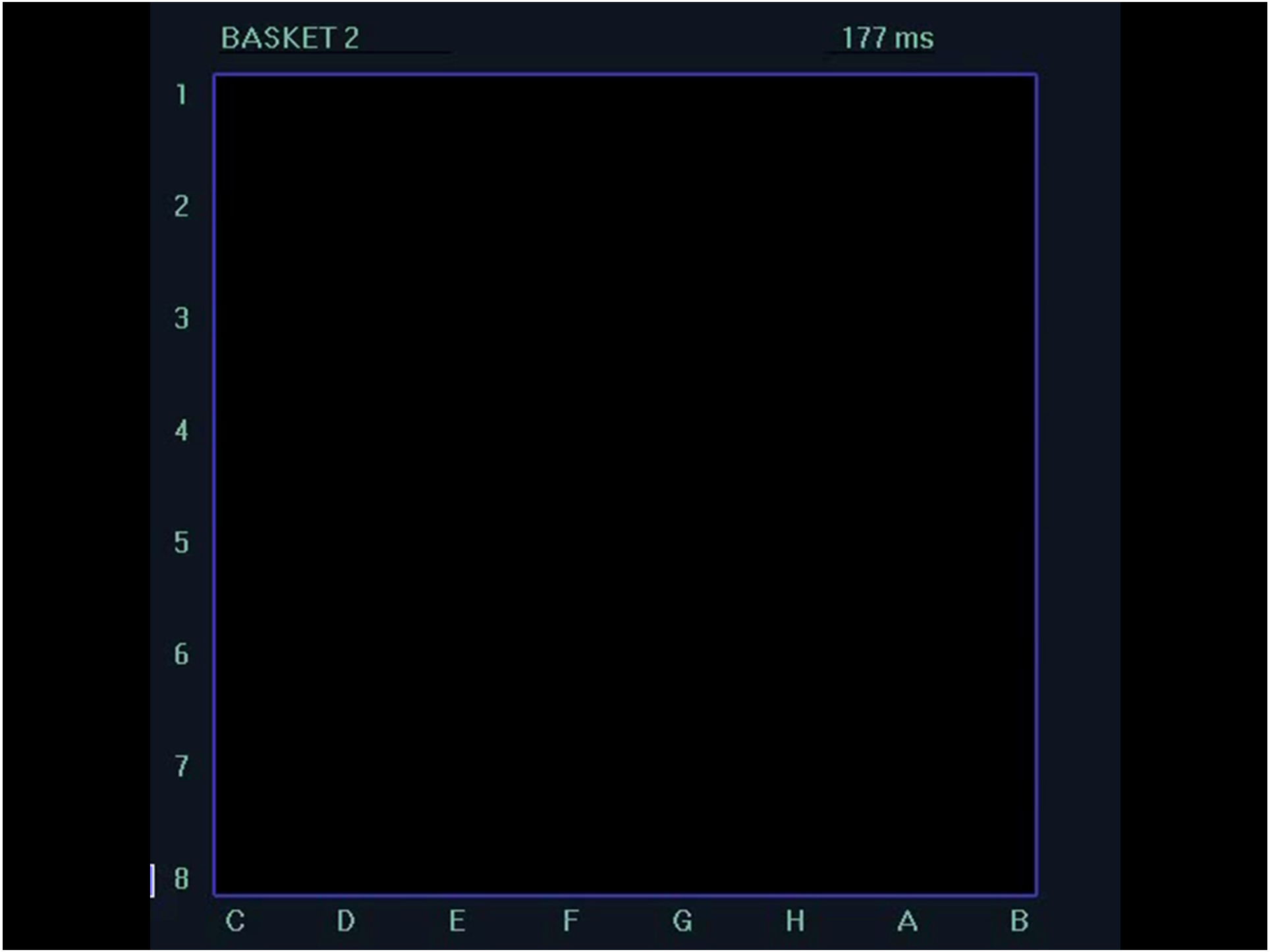


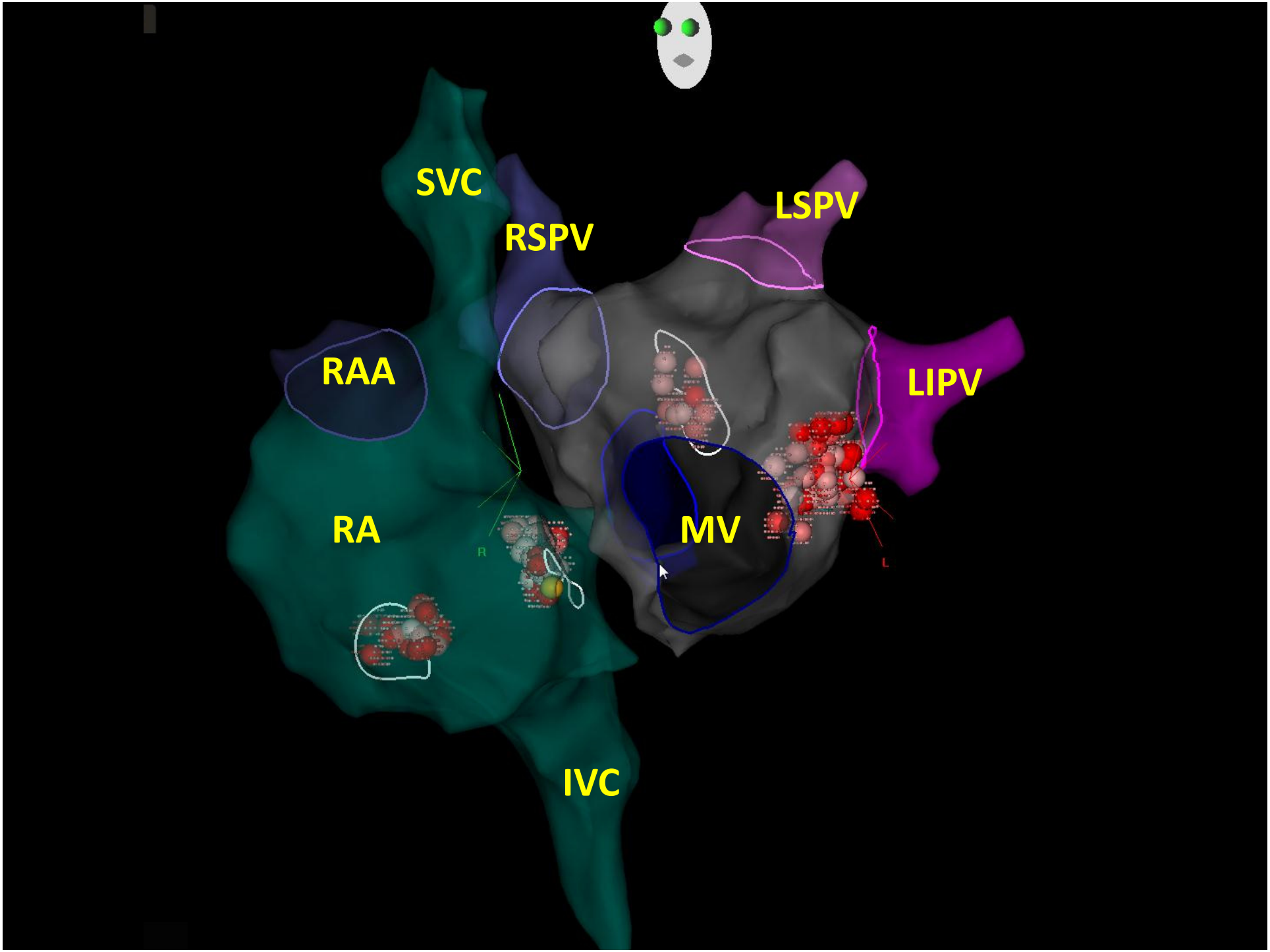
Left Atrium



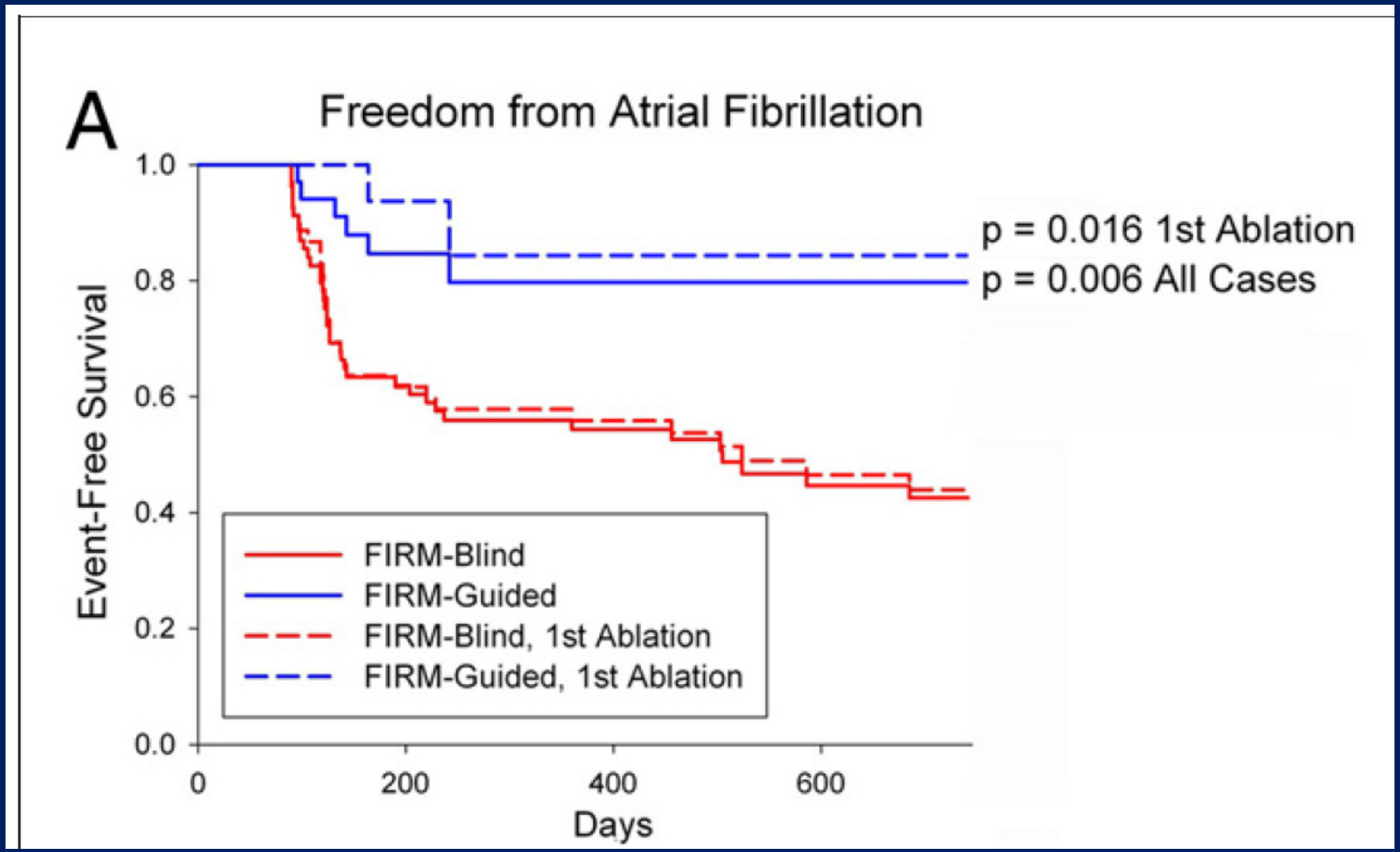
FIRM Ablation




BASKET 2
177 ms
1
2
3
4
5
6
7
8
C
D
E
F
G
H
A
B

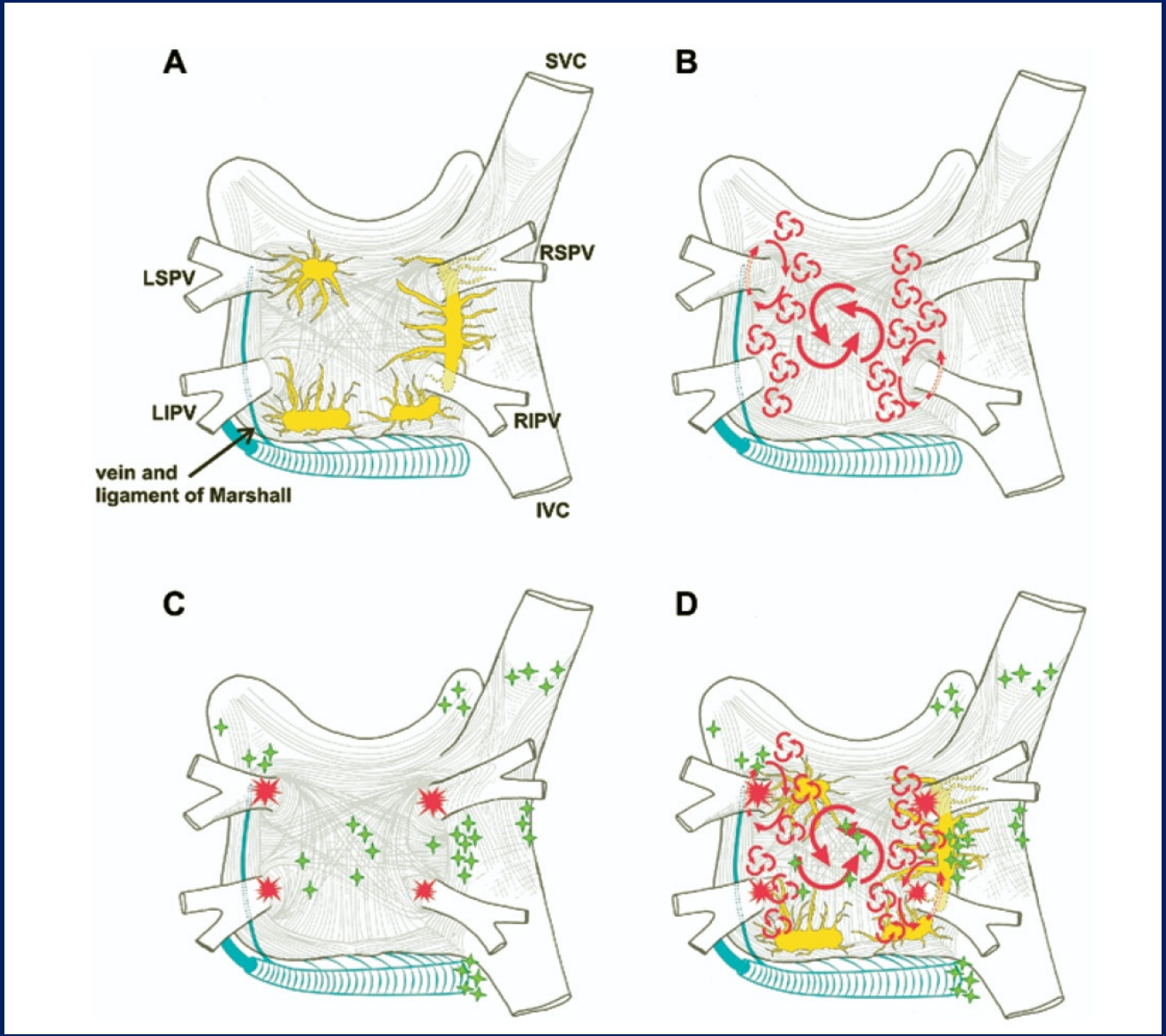

SVC
RSPV
LSPV
RAA
LIPV
RA
MV
IVC

CONFIRM (Conventional Ablation for Atrial Fibrillation With or Without Focal Impulse and Rotor Modulation) Trial



Narayan et al. JACC 2012;60:628

Summary of Complex AF Mechanisms



Calkins et. al. Heart Rhythm 2007;4:816-861

Catheter Ablation for Atrial Fibrillation

Class III: Harm

1. AF catheter ablation should not be performed in patients who cannot be treated with anticoagulant therapy during and following the procedure
2. AF catheter ablation to restore sinus rhythm should not be performed with the sole intent of obviating the need for anticoagulation

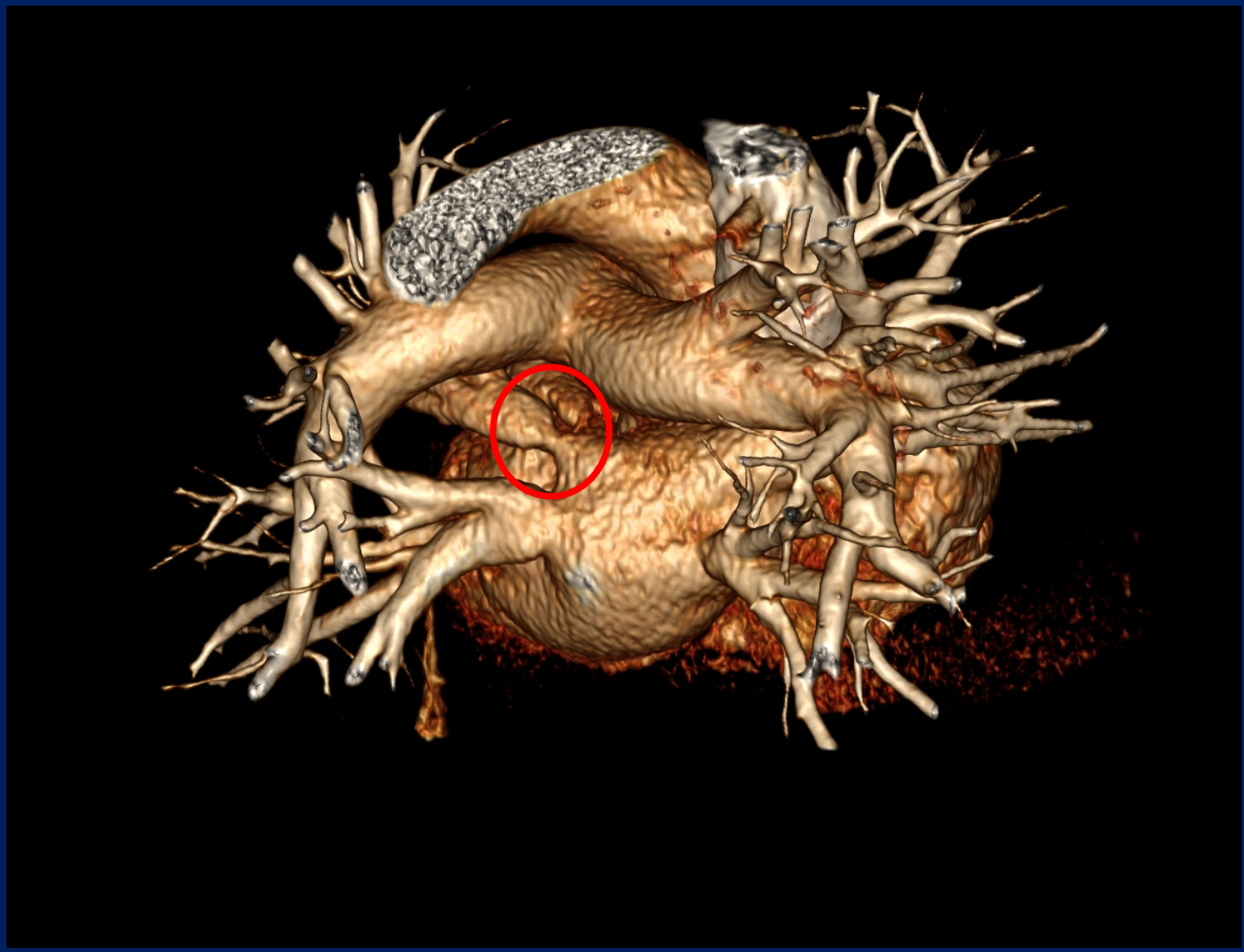
2014 AHA/ACC/HRS AF Guidelines

Complications of AF Ablation

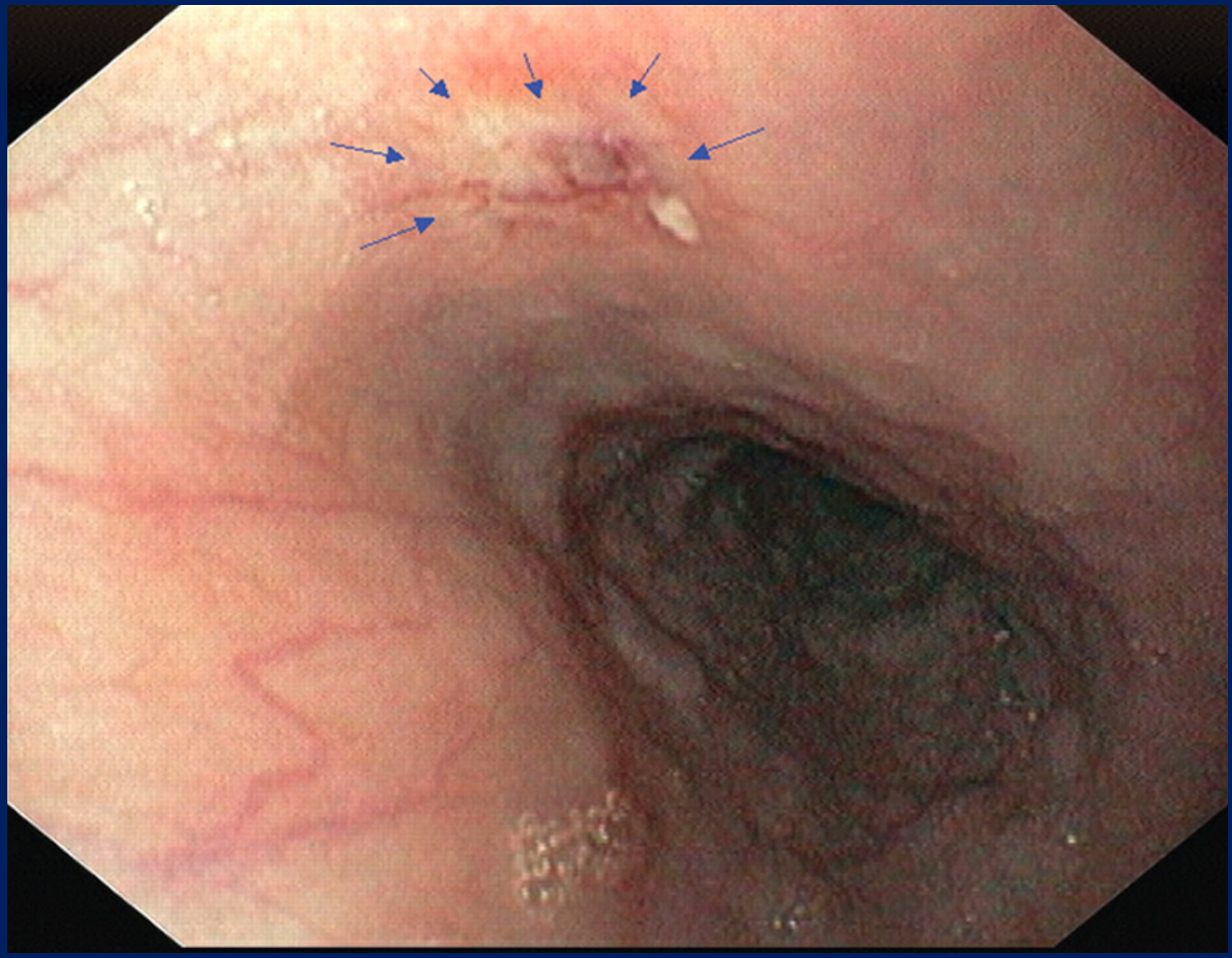
(approx. 5%)

- Thromboembolism/air embolism
- Cardiac tamponade
- Pulmonary vein stenosis
- Atrio-esophageal fistula
- Vascular access-related complications
  - Hematoma, pseudoaneurysm, AV fistula
- Left atrial flutters/atrial tachycardia
- Mitral valve trauma/catheter entrapment
- Phrenic nerve injury
- Radiation exposure/skin burns
- Acute coronary artery occlusion
- Periesophageal vagal injury

LUPV Stenosis

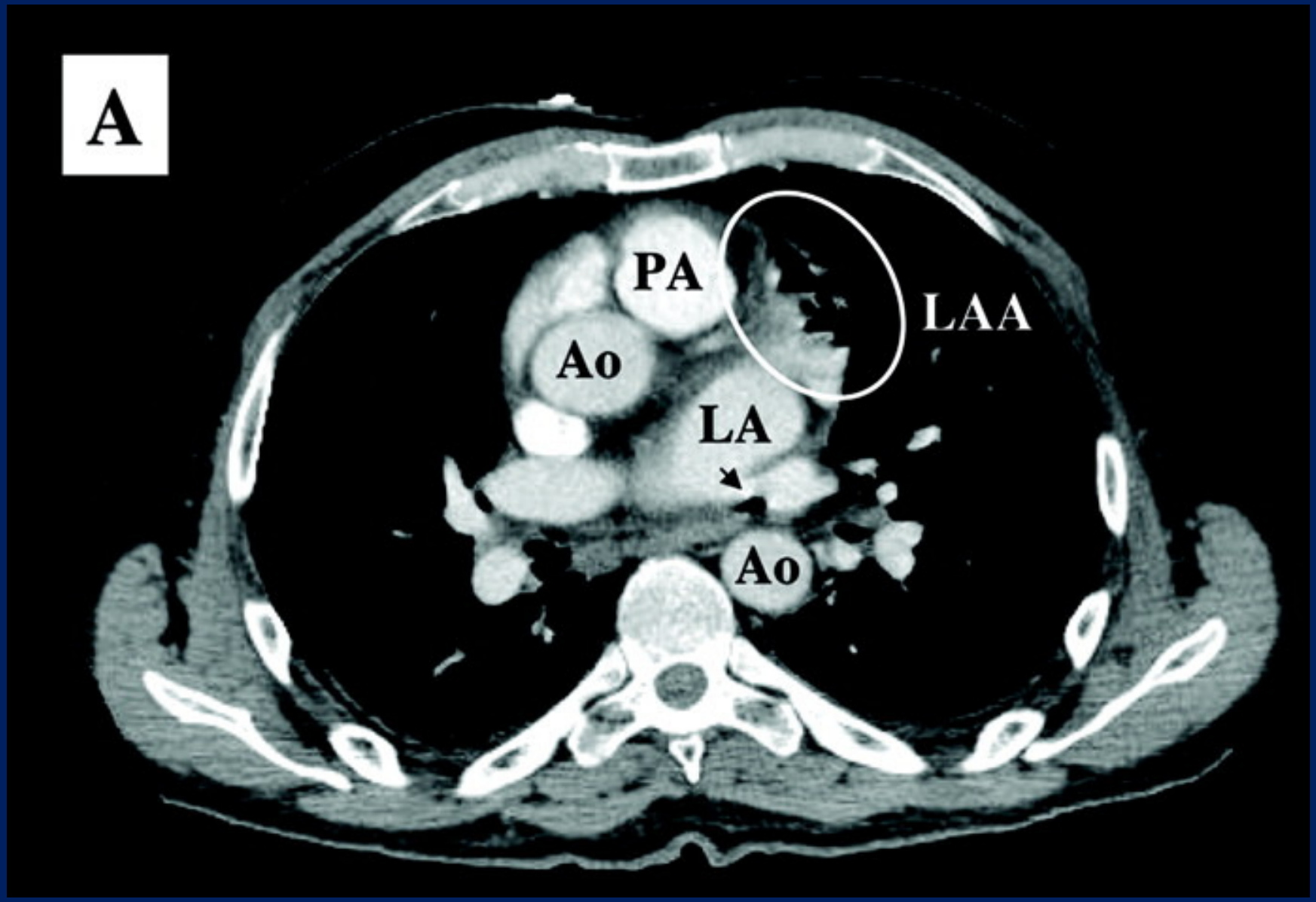


Necrotic ulcer within the anterior wall of the oesophagus in close proximity to the left atrial posterior wall 24 h after PVAI



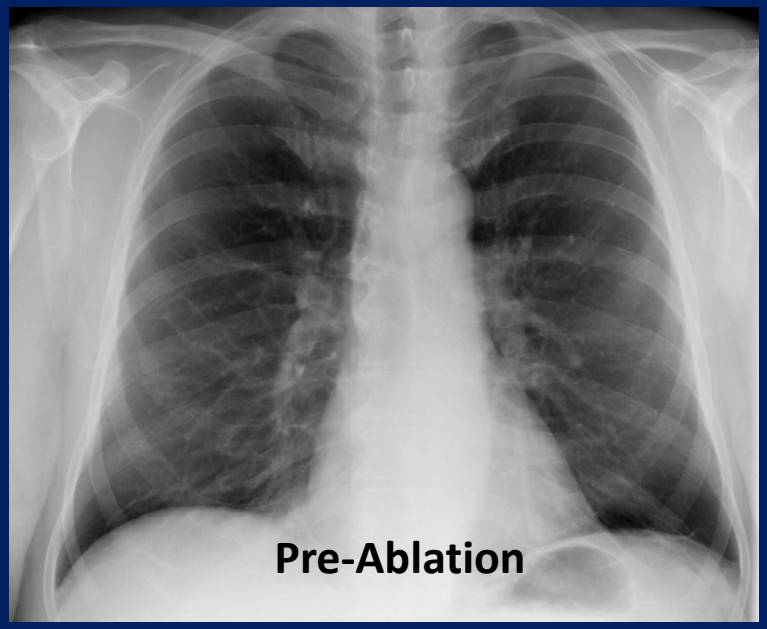
Schmidt, M. et al. Europace 2008 10:205-209

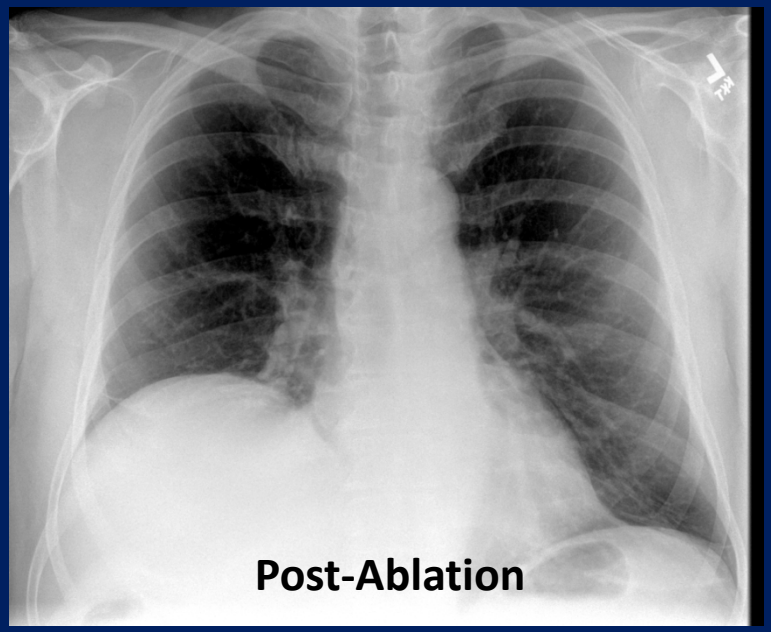
Left Atrial–Esophageal Fistula After Pulmonary Vein Isolation

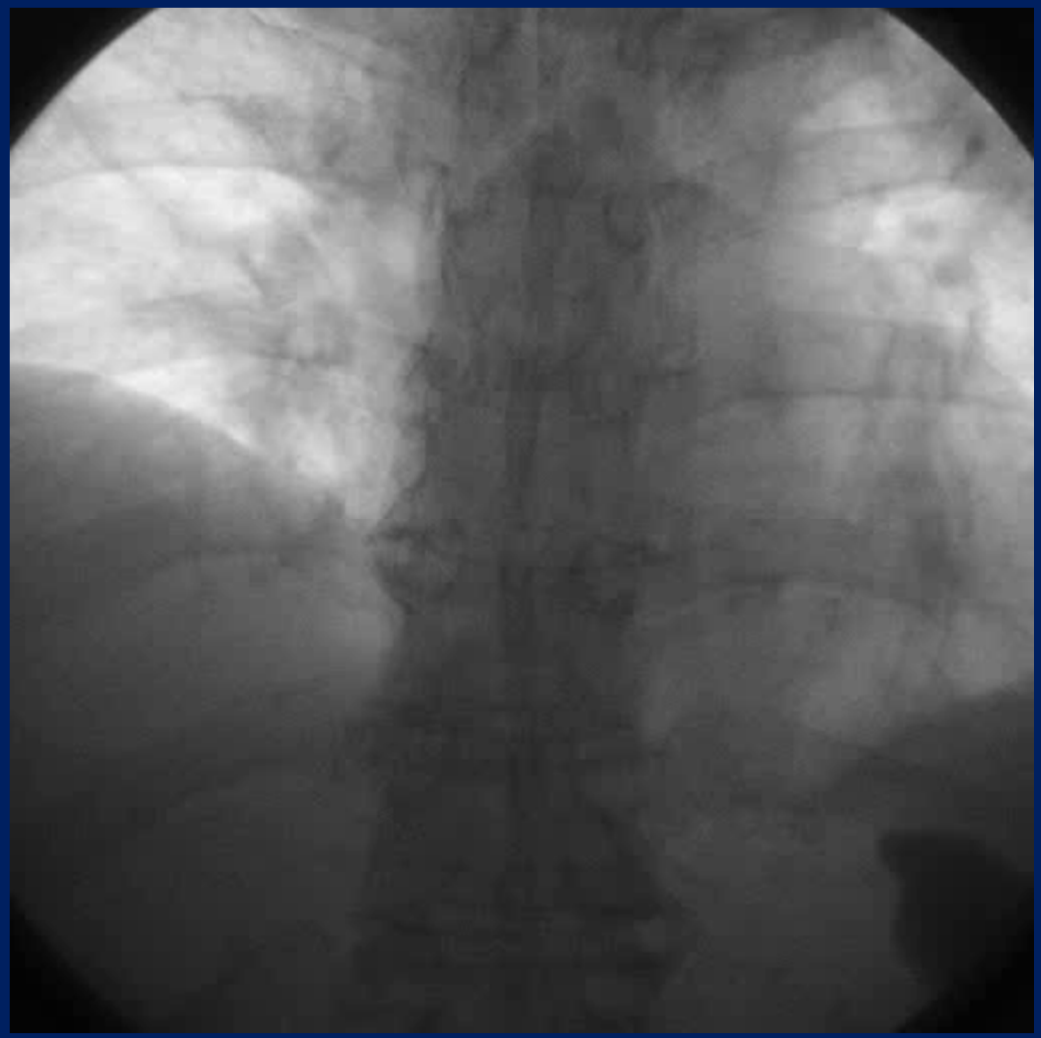


D'Avila, A. et al. Circulation 2007;115:e432-e433

Phrenic Nerve Palsy







Which of the following patients is a good candidate for catheter ablation of atrial fibrillation?

1. 59 y.o. male incidentally found to have asymptomatic AF at a routine physical exam
2. 60 y.o. female with symptomatic paroxysmal AF who cannot take warfarin due to severe gastrointestinal bleeding
3. 55 y.o. male with symptomatic paroxysmal AF recurrent despite flecainide therapy
4. 68 y.o. male CHADS-VASc 3 with minimally symptomatic AF who wishes to discontinue warfarin due to fear of bleeding

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Which of the following decreases the AF recurrence rate after AF ablation?

- Adequate anticoagulation
- Treatment of sleep apnea
- RF rather than cryoballoon pulmonary vein isolation
- Treatment with proton pump inhibitors
- Increased alcohol intake

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Thank You!

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