Hypertrophic Cardiomyopathy And Atrial Fibrillation

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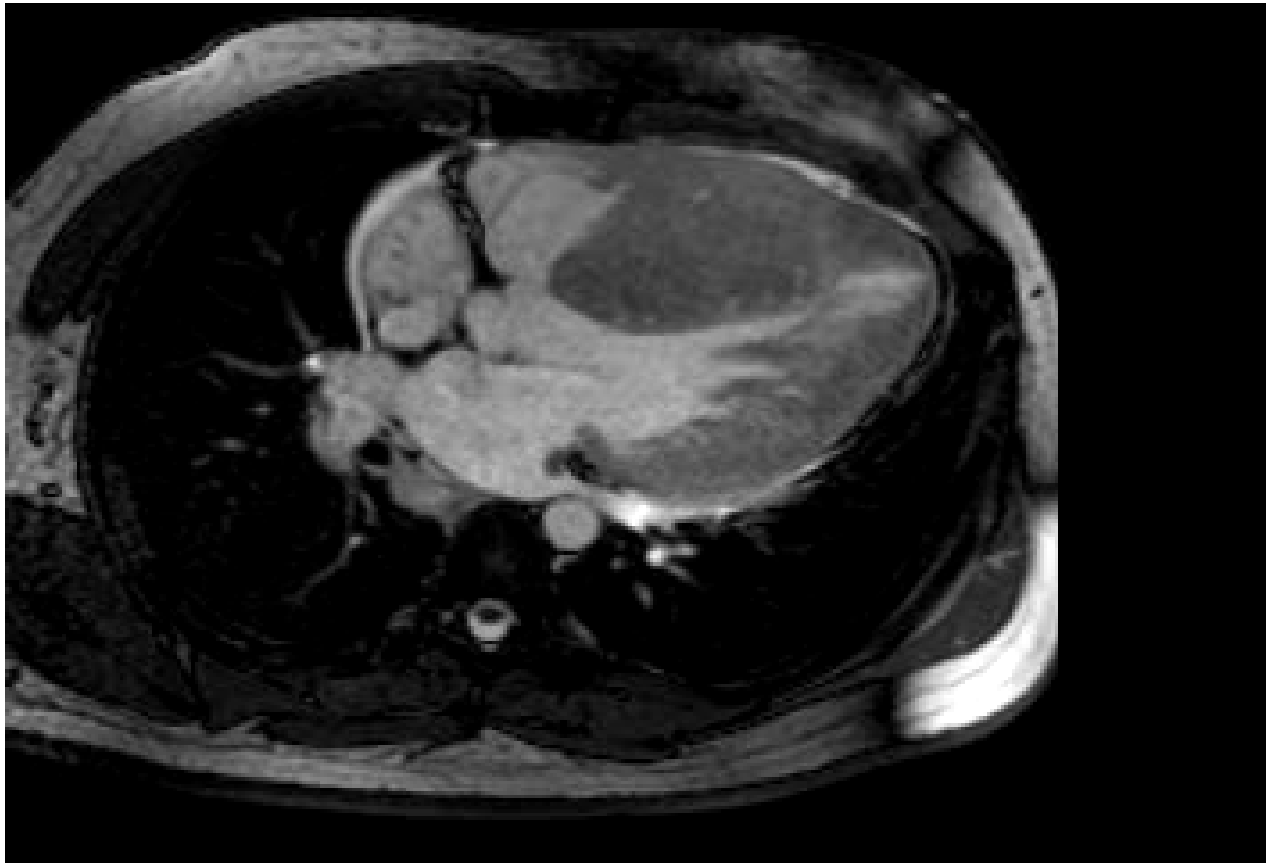
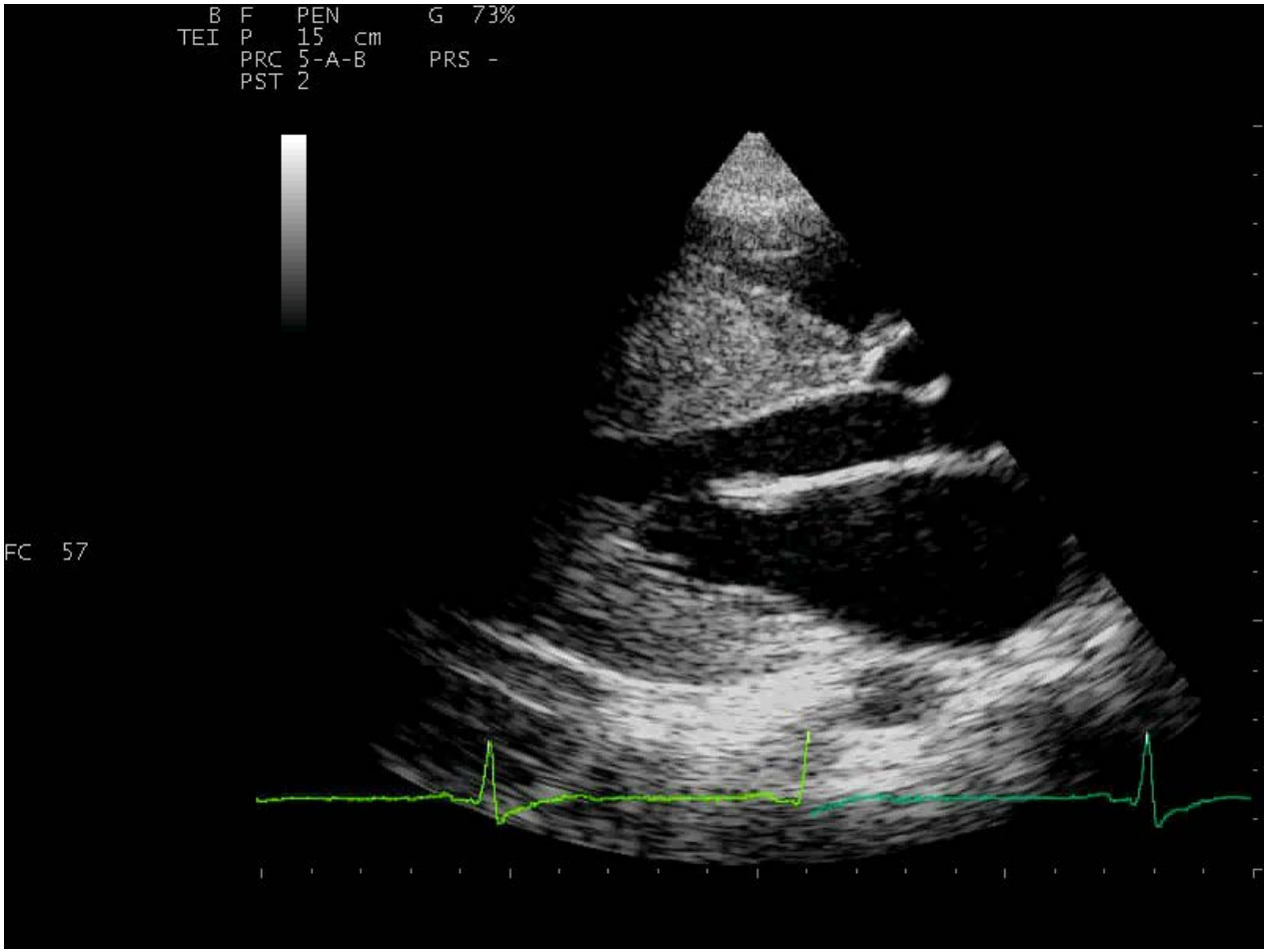
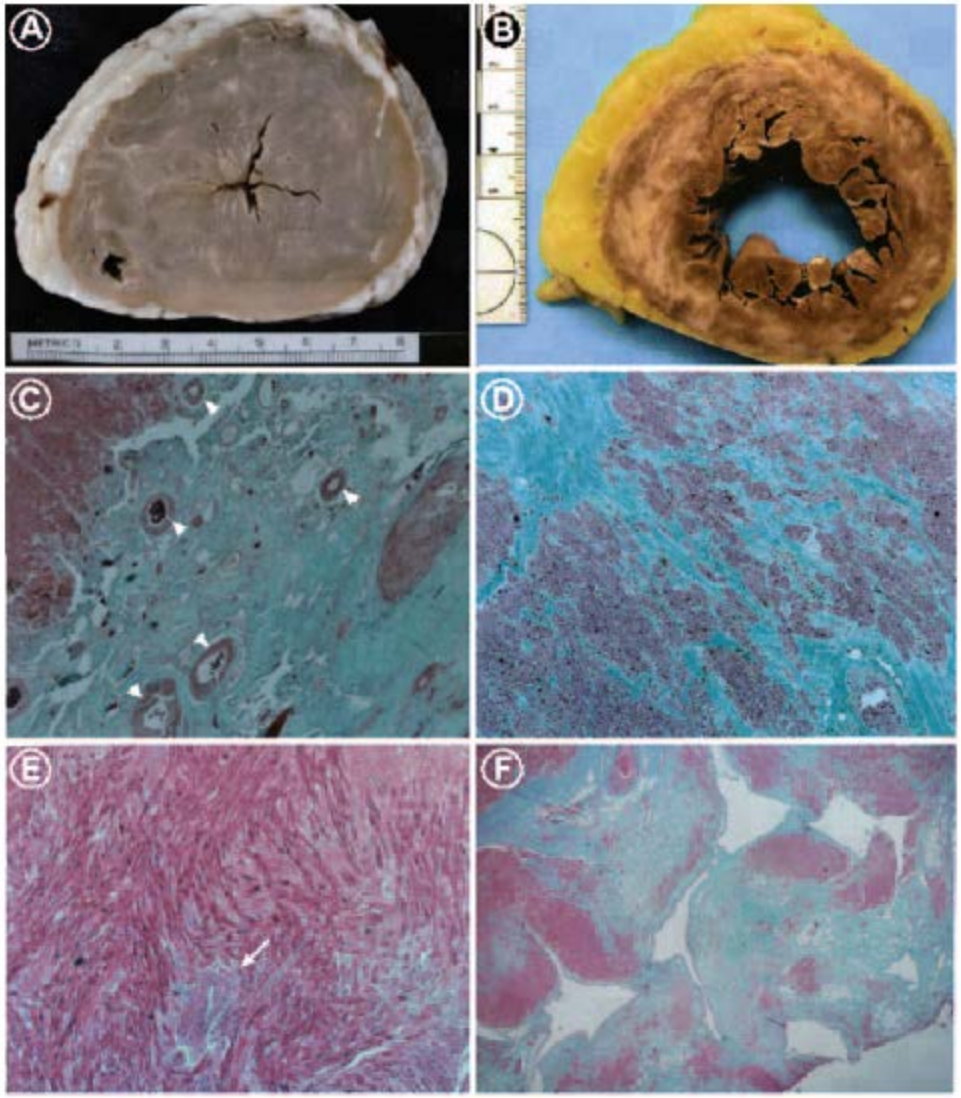



B F PEN G 73%
TEI P 15 cm
PRC 5-A-B PRS -
PST 2
FC 57

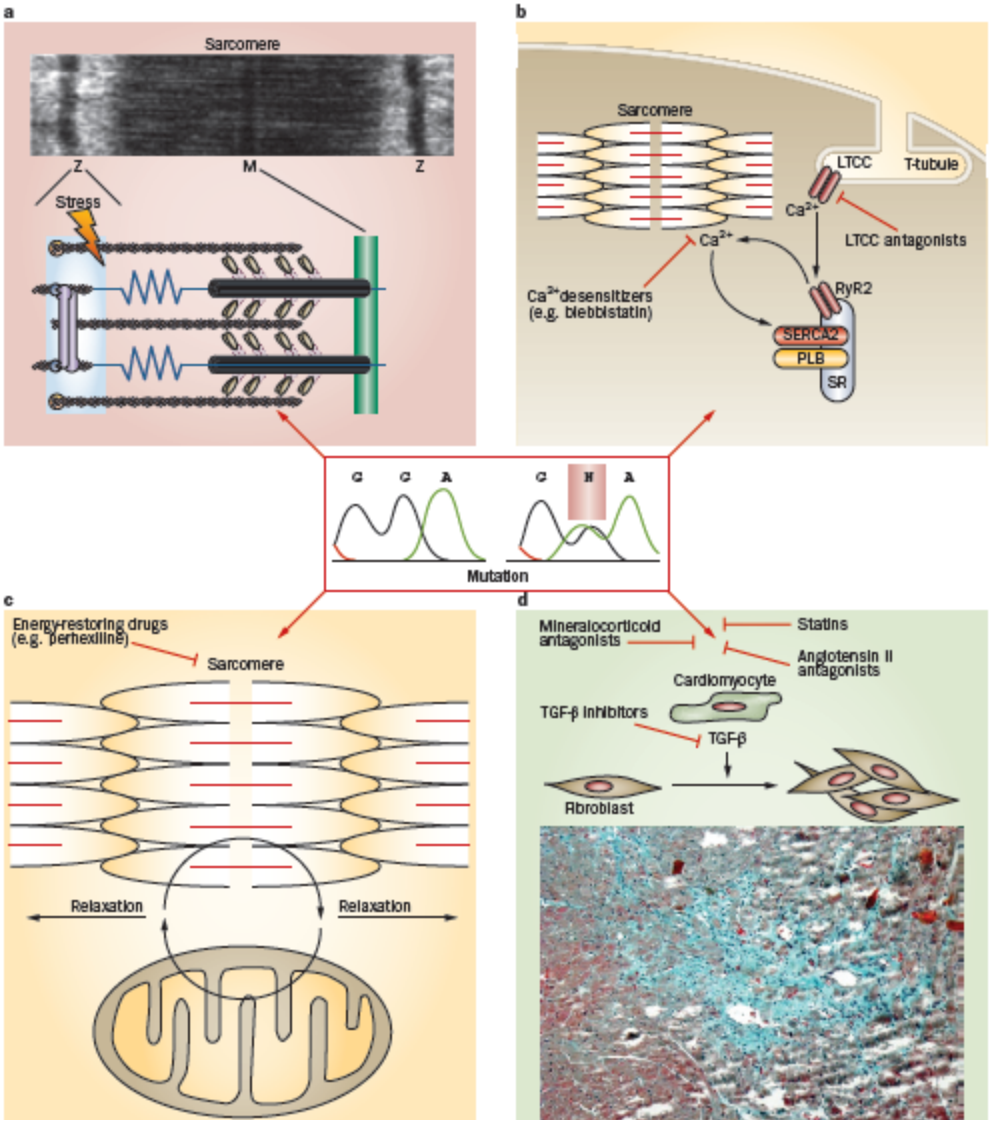


Harris et al
Circulation, 2006

Mechanisms of disease: hypertrophic cardiomyopathy

Norbert Frey, Mark Luedde and Hugo A. Katus

Disturbed Biomechanical Stress Sensing



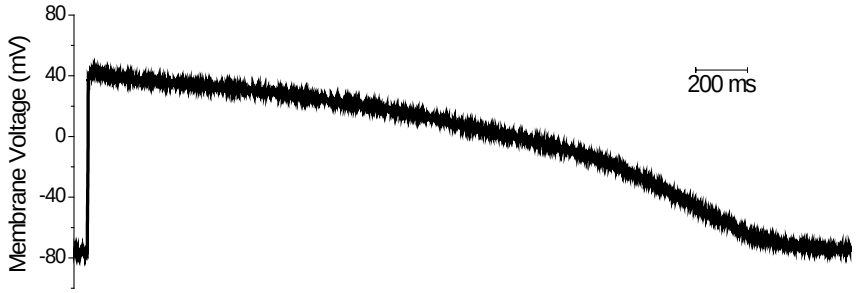
Impaired Calcium Cycling and Sensitivity

Altered Energy Homeostasis

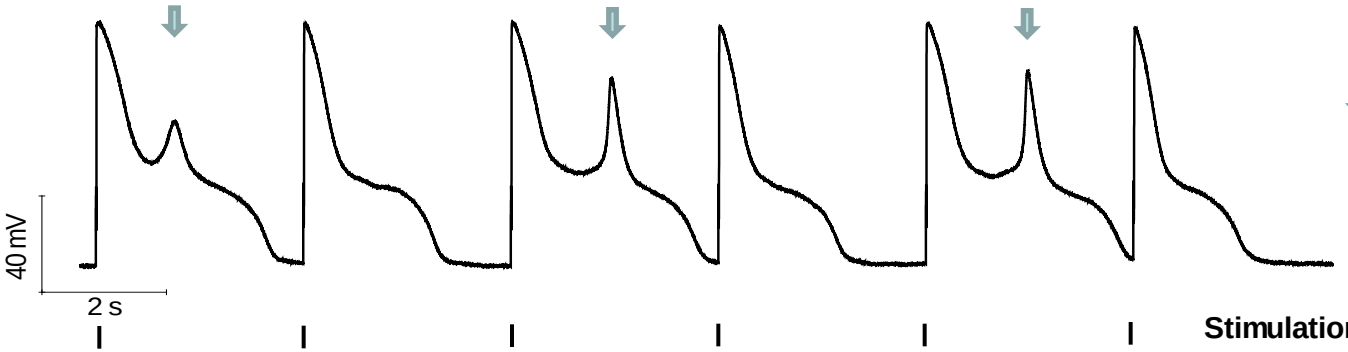
Increased Fibrosis

Frey, N. *et al. Nat. Rev. Cardiol.* 9, 91–100 (2012); published online 25 October 2011; doi:10.1038/nrcardio.2011.159

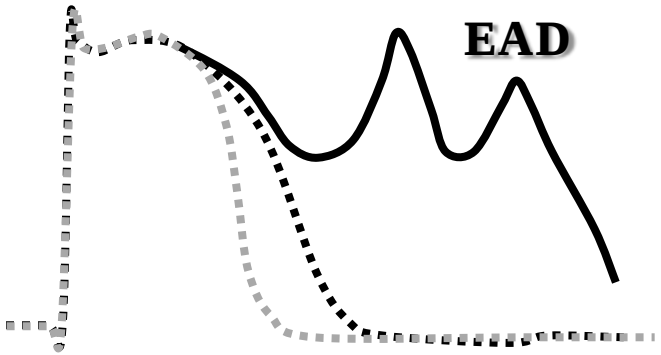
APD Prolongation and Early After Depolarizations (EADs)

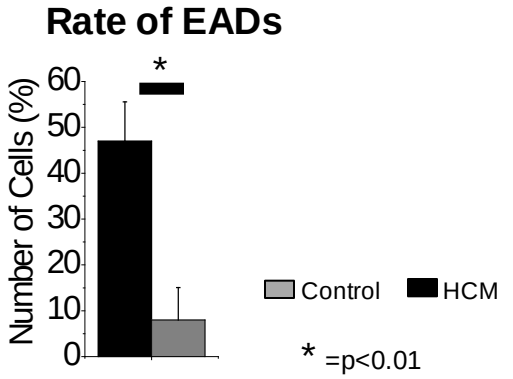


~40% HCM myocytes with severely prolonged APDs (>1000ms)



⇩ =EAD



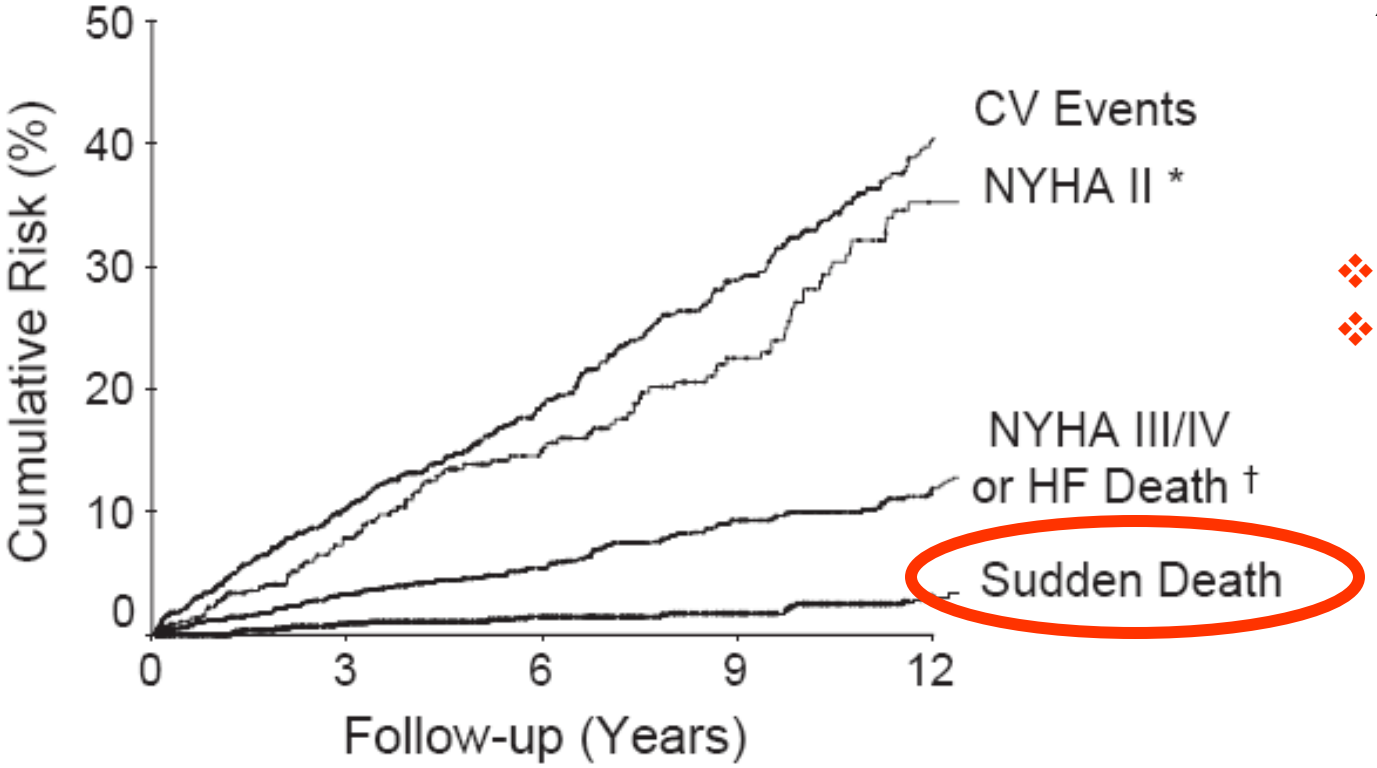


R Coppini et al., submitted

The Italian registry for hypertrophic cardiomyopathy: A nationwide survey

Franco Cecchi, MD, Iacopo Olivotto, MD, Sandro Betocchi, MD, Claudio Rapezzi, MD, Maria Rosa Conte, MD, Gianfranco Sinagra, MD, Elisabetta Zachara, MD, Antonello Gavazzi, MD, Roberto Rordorf, MD, Gianfranco Carnemolla, MD, Maurizio Porcu, MD, Stefano Nistri, MD, Paolo Gruppillo, MD, and Simona Giampaoli, MD, on behalf of the participating centers *Rome and Florence, Italy*

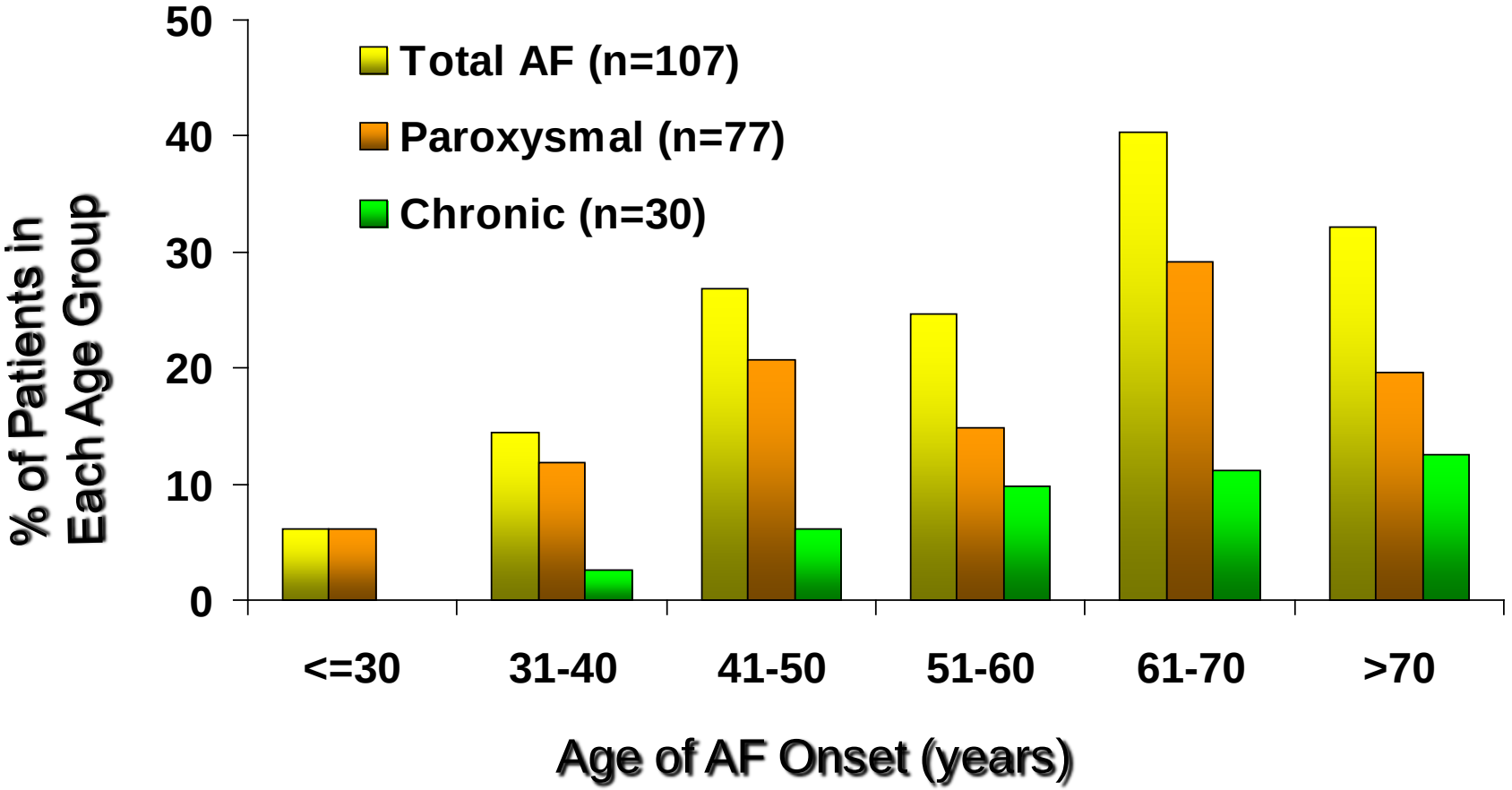
Am Heart J, 2005



- 1677 pz
- FU medio 9,7 anni

Age at onset of atrial fibrillation in 107 patients with HCM

Olivotto et al, Circulation 2001



Is There a Primary Atrial Myopathy in HCM ?

- Frequent LA dilatation in the absence of severe MR or diastolic dysfunction *(Roberts, 1989)*
- Prolonged P-wave duration *(Cecchi, 1997)*
- Reduced atrial systolic function *(Sanada, 1991)*
- AF despite normal LA size *(Olivotto, 2001)*
- Familial occurrence of AF *(Gruver, 1999)*
- LA dysfunction predicts development of AF *(Losi, 2004)*

AF in HCM Occurs in 2 Contexts

LV Outflow obstruction

May dictate timing of surgery

Often recurs after surgery

Causes severe symptoms

May cause loss of obstruction

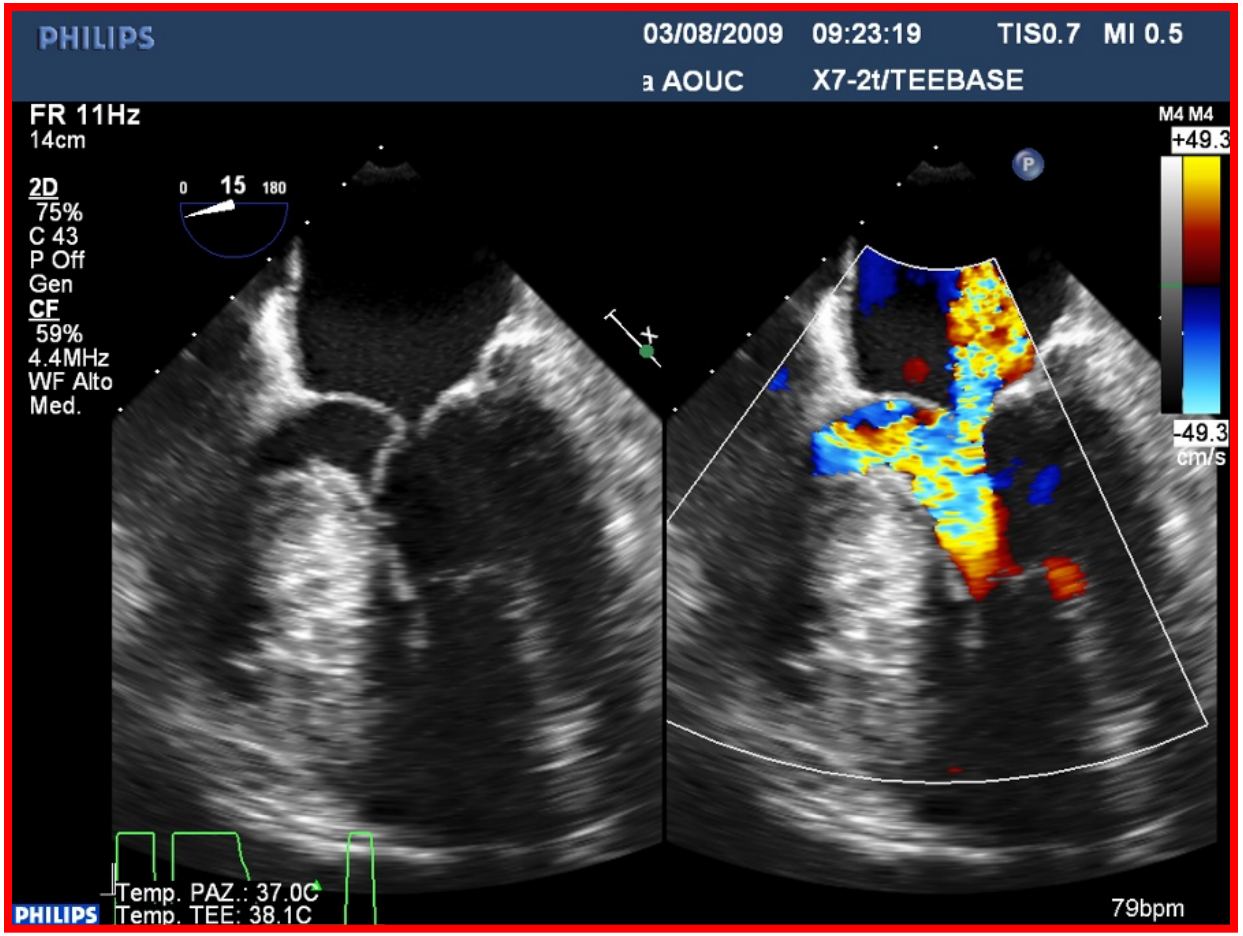
Disease Progression

Causes further progression

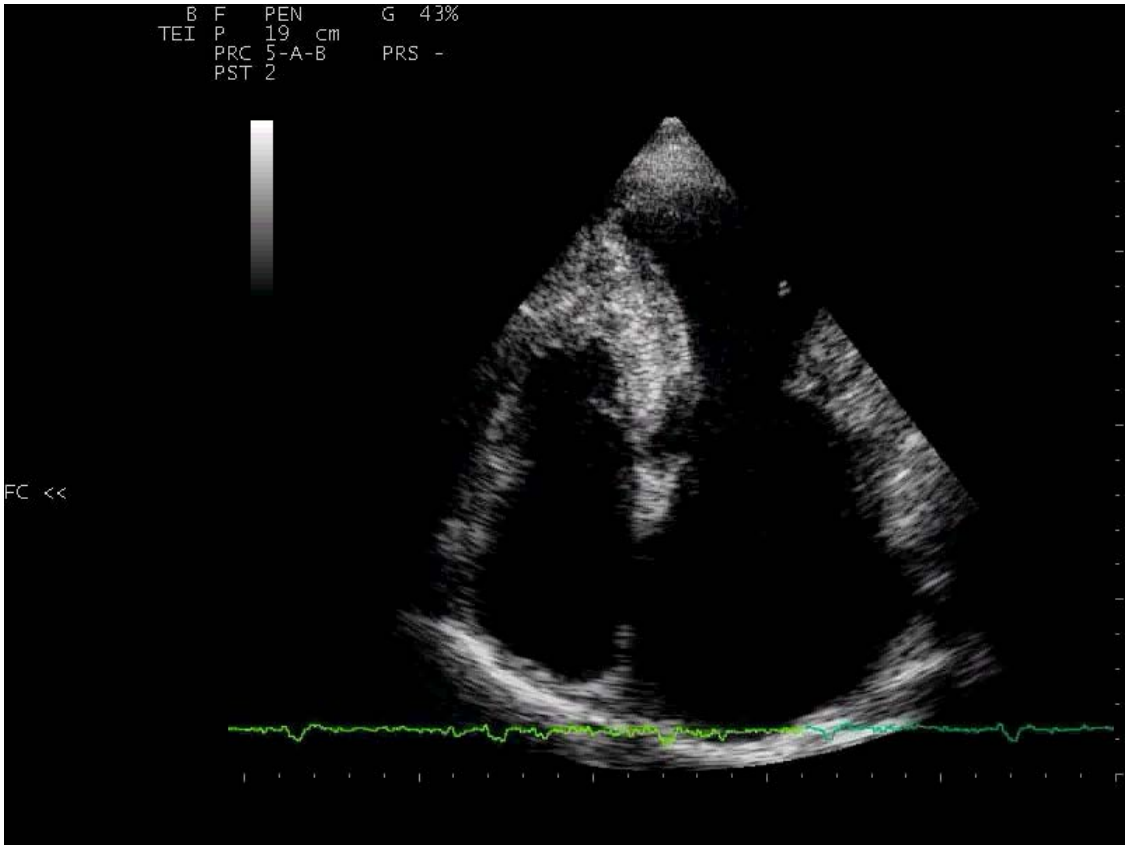
High embolic risk

Rate control reasonable in the end-stage

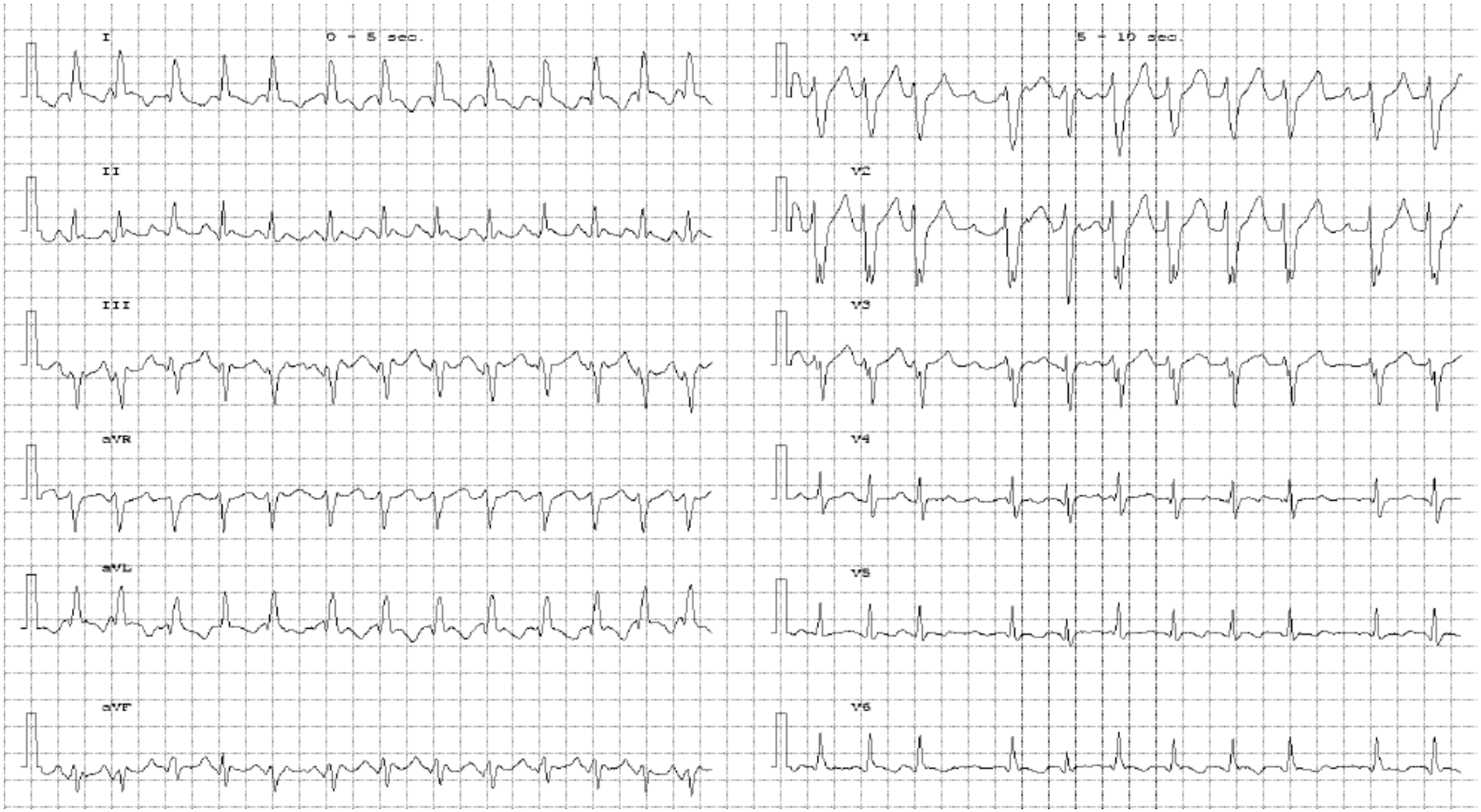
Echocardiography and LVOT Obstruction



Left Atrial Remodeling and Dysfunction are an Important Feature of End-Stage HCM

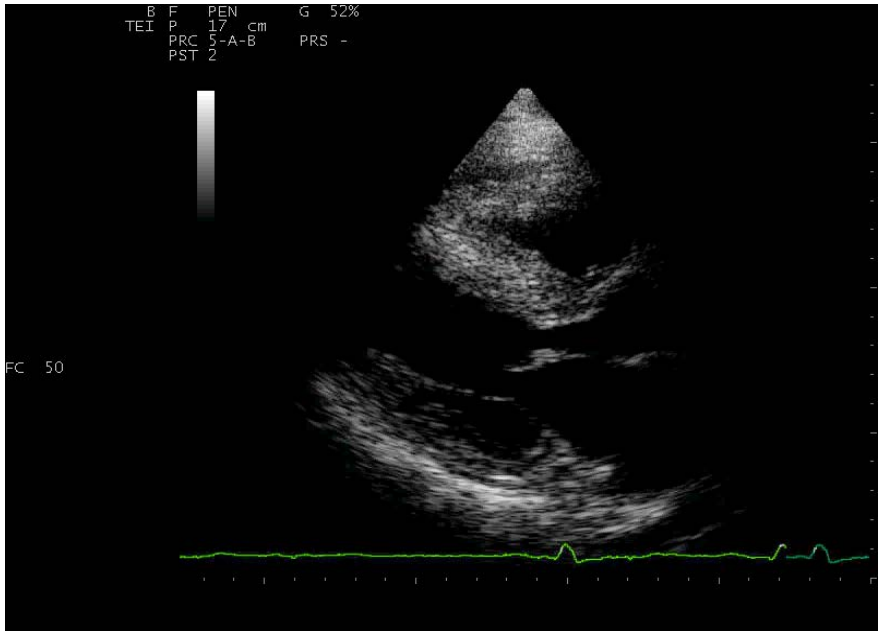


ATRIAL FIBRILLATION

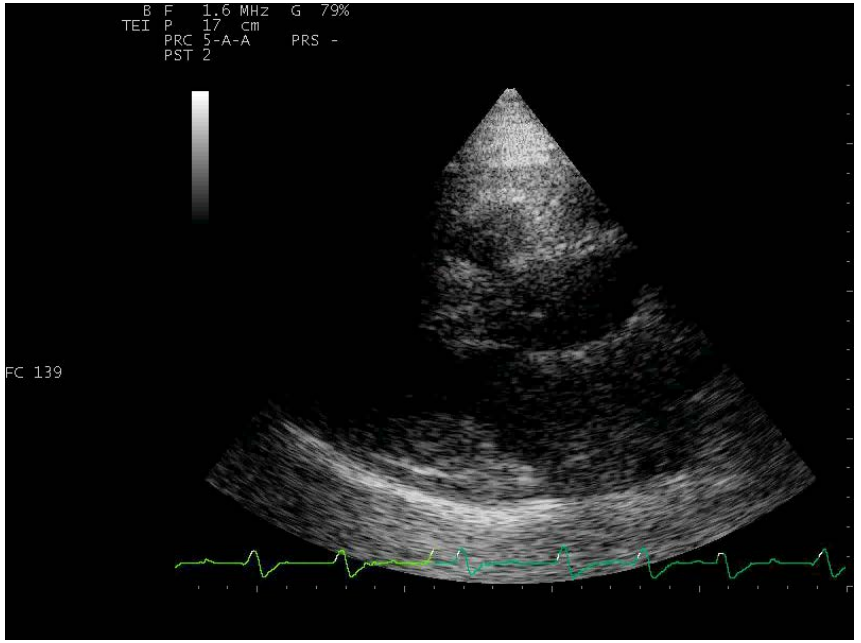


Acute Consequences of AF in HCM

Loss of Atrial Contraction + Fast Ventricular Rates = Hemodynamic Instability



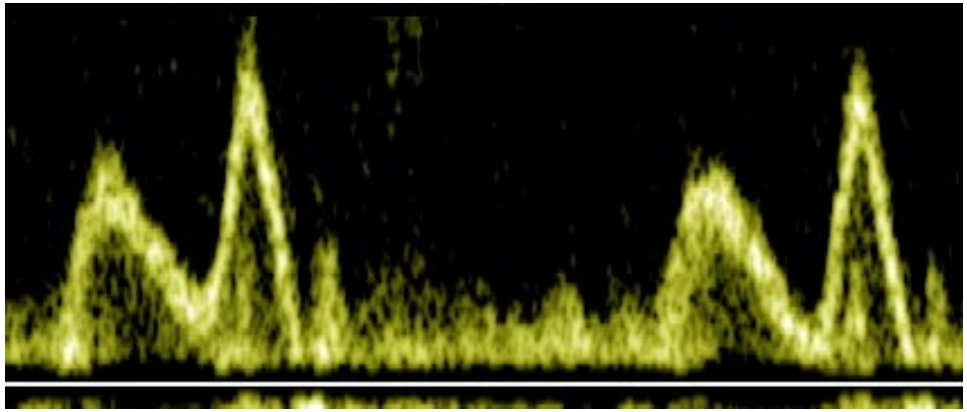
Sinus Rhythm



Atrial Fibrillation

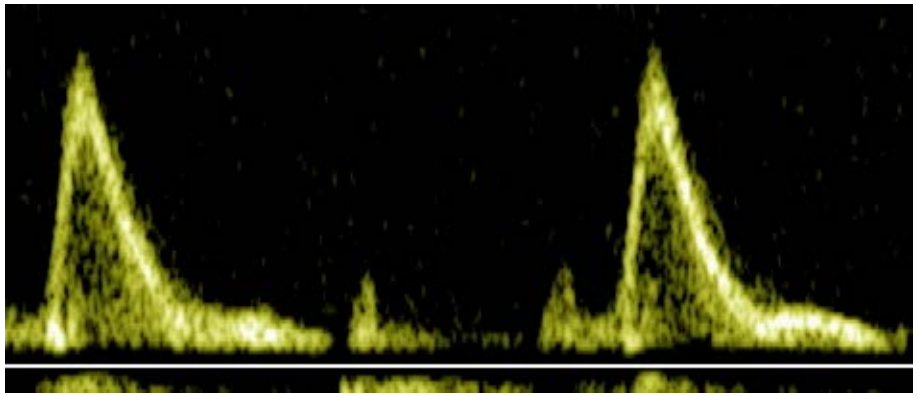
Role of Atrial Contribution to LV Filling

Female, Age 58



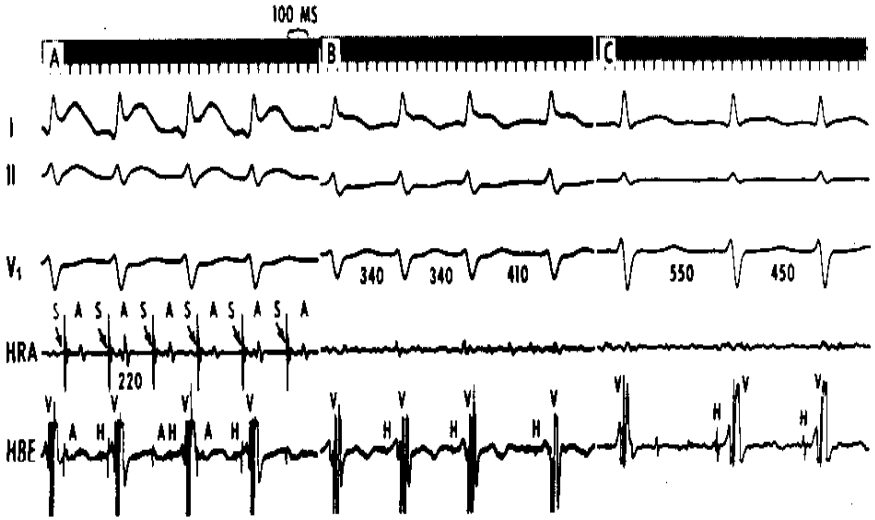
NYHA FC II

NYHA FC III-IV



AF can trigger VF in HCM due to hemodynamic impairment and ischemia

Myocardial ischemia induced by RA pacing and AF



Stafford WJ, JACC 1986

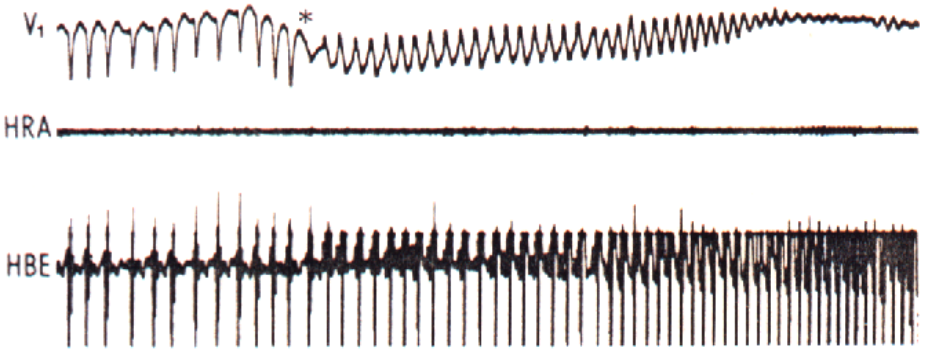
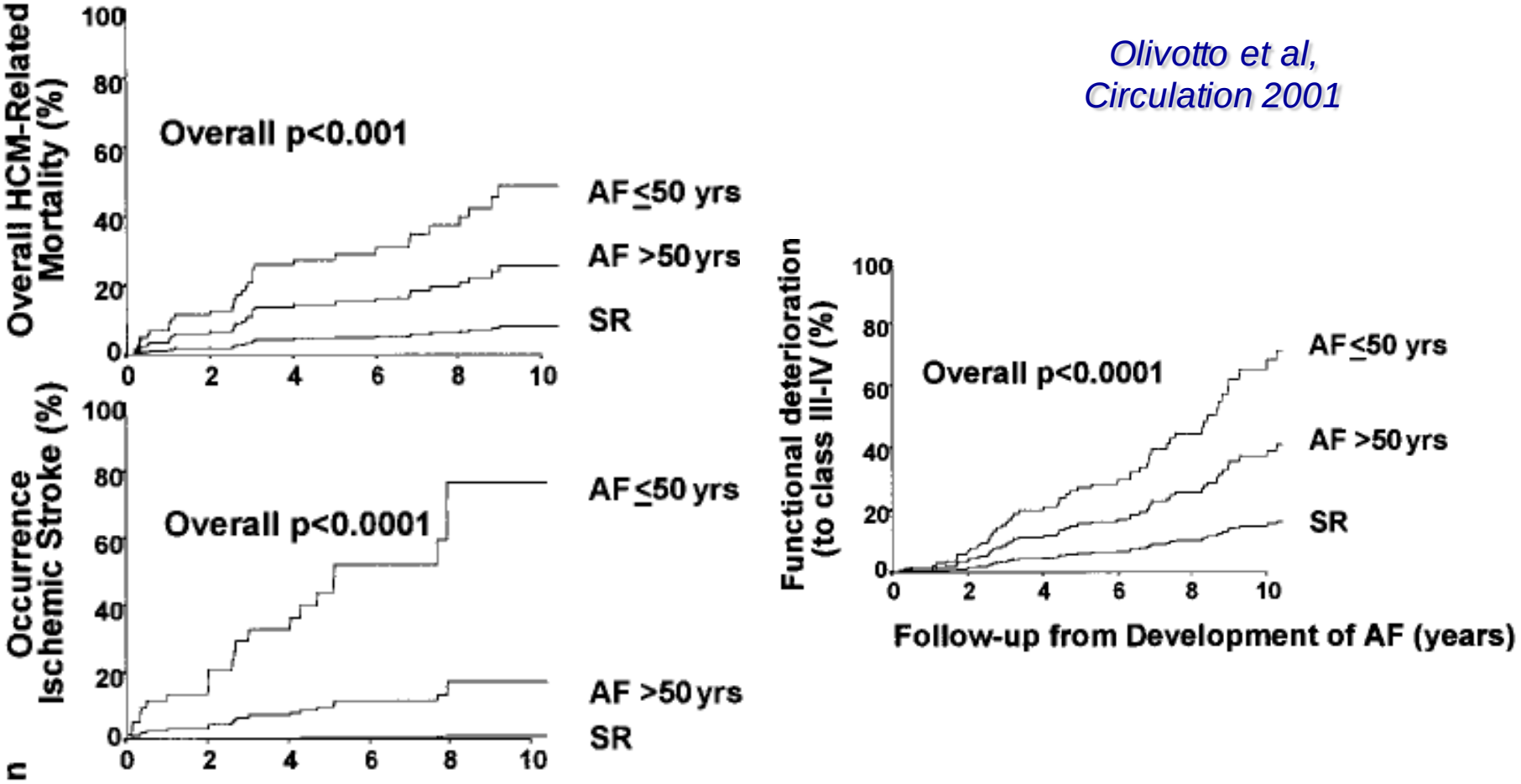


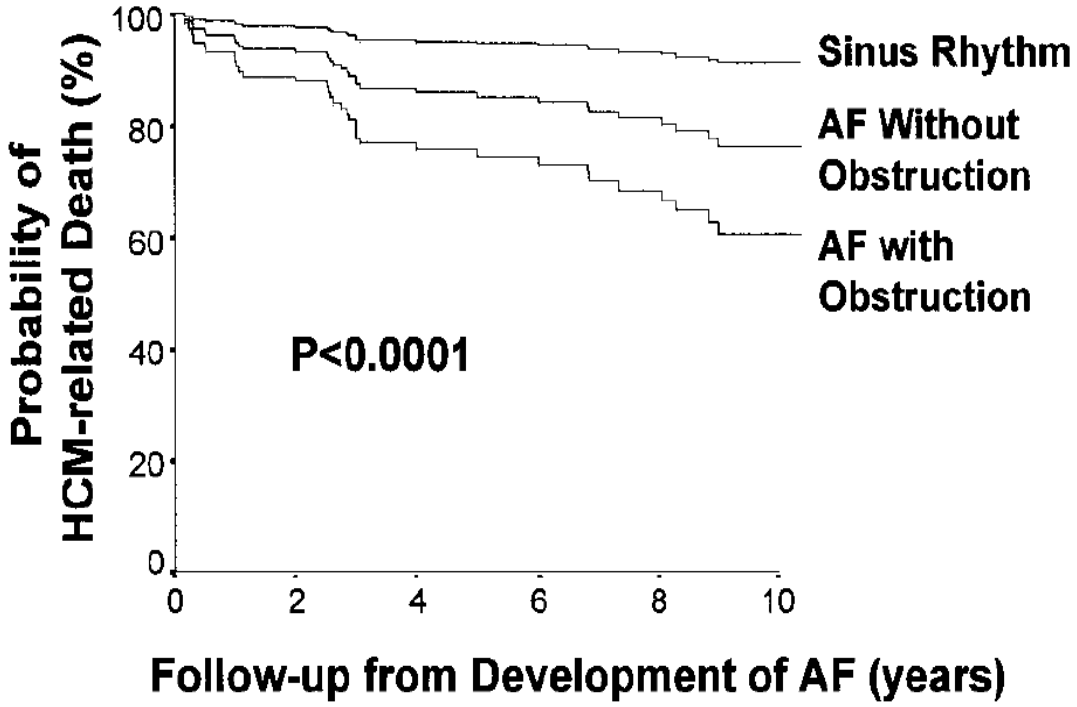
Figure 2. After 100 seconds of induced atrial fibrillation, spontaneous degeneration to ventricular fibrillation occurs, indicated by the **asterisk.** Abbreviations as in Figure 1.

AF in younger patients is associated with an increased risk of CV mortality and stroke

Olivotto et al, Circulation 2001



AF in HCM pts with outflow obstruction causes further increase in mortality



Olivotto et al, Circulation. 2001

Clinical and Echocardiographic Determinants of Long-Term Survival After Surgical Myectomy in Obstructive Hypertrophic Cardiomyopathy

Anna Woo, MD, SM; William G. Williams, MD; Richard Choi, MD; E. Douglas Wigle, MD; Evelyn Rozenblyum; Katie Fedwick; Samuel Siu, MD, SM; Anthony Ralph-Edwards, MD; Harry Rakowski, MD

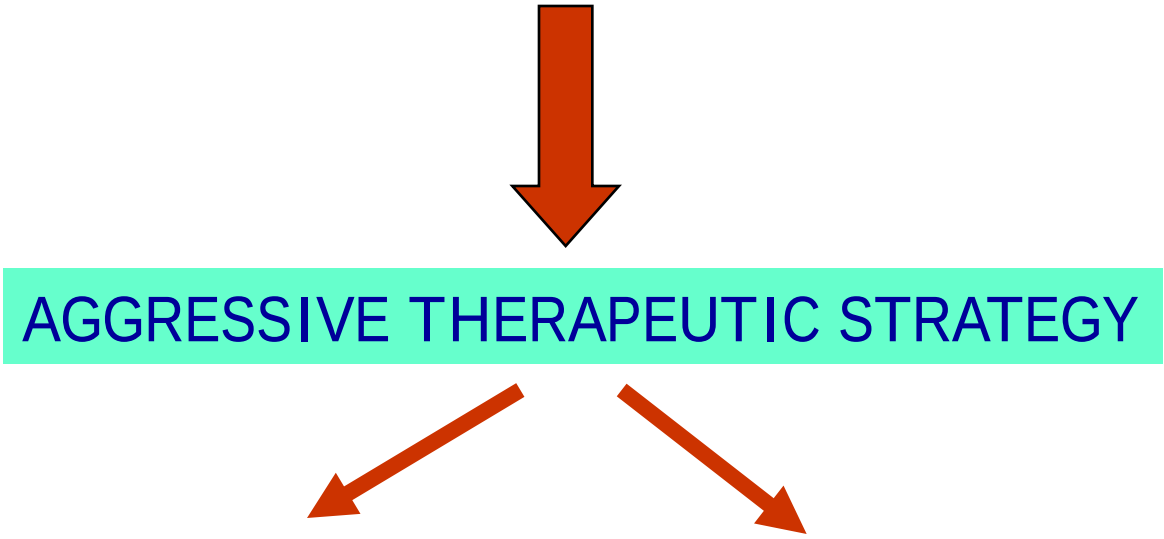
Circulation 2005

TABLE 3. Clinical and Echocardiographic Predictors of Overall Mortality Among 338 Patients Who Underwent Myectomy

Variable	Individual Analysis HR (95% CI)	*P*	Multivariable Analysis HR (95% CI)	*P*
Age ≥50 y*	3.3 (1.9–5.8)	<0.0001	2.8 (1.5–5.1)	0.0008
Female gender*	1.7 (1.0–2.8)	0.06	2.5 (1.5–4.3)	0.0009
History of preoperative AF*	2.7 (1.6–4.8)	0.0004	2.2 (1.2–4.0)	0.008
LA diameter ≥46 mm*	2.9 (1.6–5.3)	0.0005	2.9 (1.6–5.4)	0.0008
Septal/posterior thickness ratio ≥1.8*	0.5 (0.3–0.8)	0.009	0.8 (0.4–1.5)	0.5
Concomitant CABG*	4.8 (2.3–10.2)	<0.0001	3.7 (1.7–8.2)	0.001

*The group of patients without the indicated feature represents the reference category for the calculation of risk.

AF = High Morbidity



AF is the most common complication with “global” implications

Ischemic Stroke

WARFARIN

Hemorragic Stroke

+ Antiarrhythmic Toxicity and Proarrhythmia

RHYTHM VS. RATE CONTROL

SR Maintenance	Rate Control
Optimal relief of symptoms	Less good relief of symptoms
Hemodynamic improvement	Incomplete hemodynamic improvement
? Reduced embolic risk	? Increased embolic risk
? Improved prognosis	? Unknown long-term prognosis
Increased risk of proarrhythmia / side effects of Tx	**Low risk of proarrhythmic / adverse effects of Tx**
Risk of sudden deterioration due to AF recurrence	**No risk of sudden deterioration due to AF recurrence / Less hospitalizations**

Table 16 Suggested doses and main caveats for commonly used antiarrhythmic drugs

Drug	Dose	Main contraindications and precautions	ECG features prompting lower dose or discontinuation	AV nodal slowing
Disopyramide	100–250 mg t.i.d.	Contraindicated in systolic heart failure. Caution when using concomitant therapy with QT-prolonging drugs.	QT interval >500 ms	None
Flecainide Flecainide XL	100–200 mg b.i.d. 200 mg o.d.	Contraindicated if creatinine clearance <50 mg/mL, in coronary artery disease, reduced LV ejection fraction. Caution in the presence of conduction system disease.	QRS duration increase >25% above baseline	None
Propafenone Propafenone SR	150–300 mg t.i.d. 225–425 mg b.i.d.	Contraindicated in coronary artery disease, reduced LV ejection fraction. Caution in the presence of conduction system disease and renal impairment.	QRS duration increase >25% above baseline	Slight
d,l-Sotalol	80–160 mg b.i.d.	Contraindicated in the presence of significant LV hypertrophy, systolic heart failure, pre-existing QT prolongation, hypokalaemia creatinine clearance <50 mg/mL. Moderate renal dysfunction requires careful adaptation of dose.	QT interval >500 ms	Similar to high-dose β-blockers
Amiodarone	600 mg o.d. for 4 weeks, 400 mg o.d. for 4 weeks, then 200 mg o.d.	Caution when using concomitant therapy with QT-prolonging drugs, heart failure. Dose of vitamin K antagonists and of digitoxin/digoxin should be reduced.	QT interval >500 ms	10–12 bpm in AF
Dronedarone	400 mg b.i.d.	Contraindicated in NYHA class III–IV or unstable heart failure, during concomitant therapy with QT-prolonging drugs, powerful CYP3A4 inhibitors, and creatinine clearance <30 mg/mL. Dose of digitoxin/digoxin should be reduced. Elevations in serum creatinine of 0.1–0.2 mg/dL are common and do not reflect reduced renal function.	QT interval >500 ms	10–12 bpm in AF

EUROPEAN SOCIETY OF CARDIOLOGY®

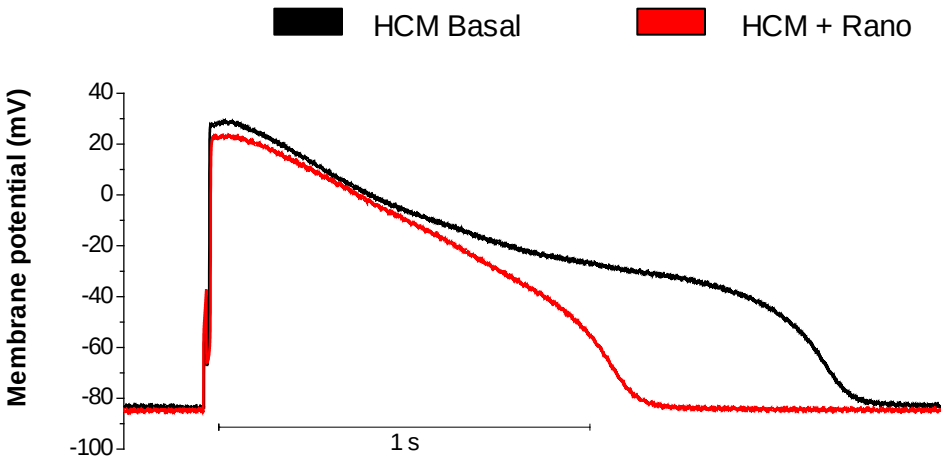
Europace (2010) **12**, 1360–1420
doi:10.1093/europace/euq350

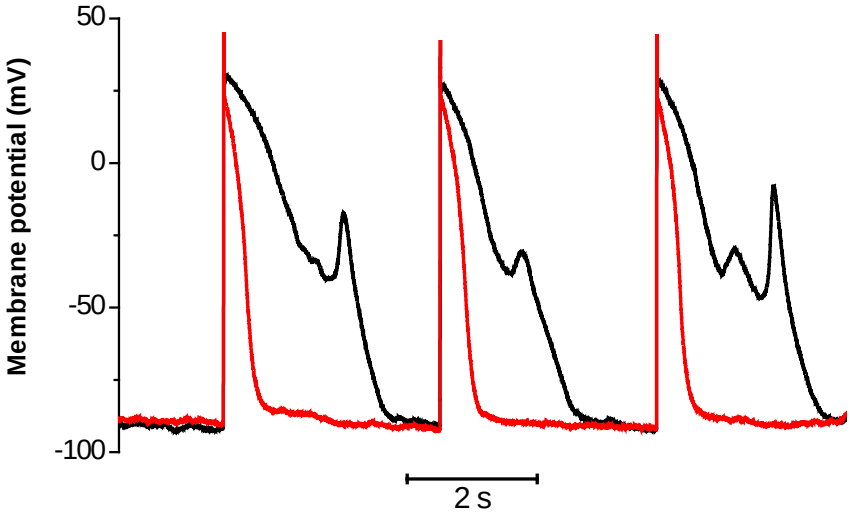
Comparison of Effectiveness and Safety of Ranolazine Versus Amiodarone for Preventing Atrial Fibrillation After Coronary Artery Bypass Grafting

Ronald H. Miles, MD[a], Rod Passman, MD, MSCE[b], and David K. Murdock, MD, MS[a,*]

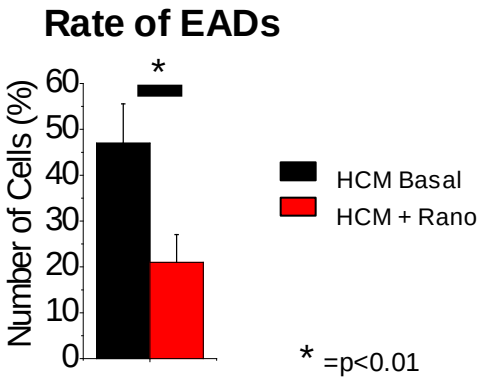
Characteristic	Amiodarone	Ranolazine	p Value
Postoperative atrial fibrillation	26.5%	17.5%	0.035
Heart block	0%	0%	1.0
Stroke or transient ischemic attack	0%	0.5%	0.87
Renal failure with dialysis	1.1%	0.9%	0.88
Prolonged ventilation	6.0%	3.8%	0.28
30-Day readmission	10.4%	10.4%	1.0
30-Day Mortality	1.09%	0.94%	0.88

Ranolazine reduces the rate of EADs in HCM cardiomyocytes

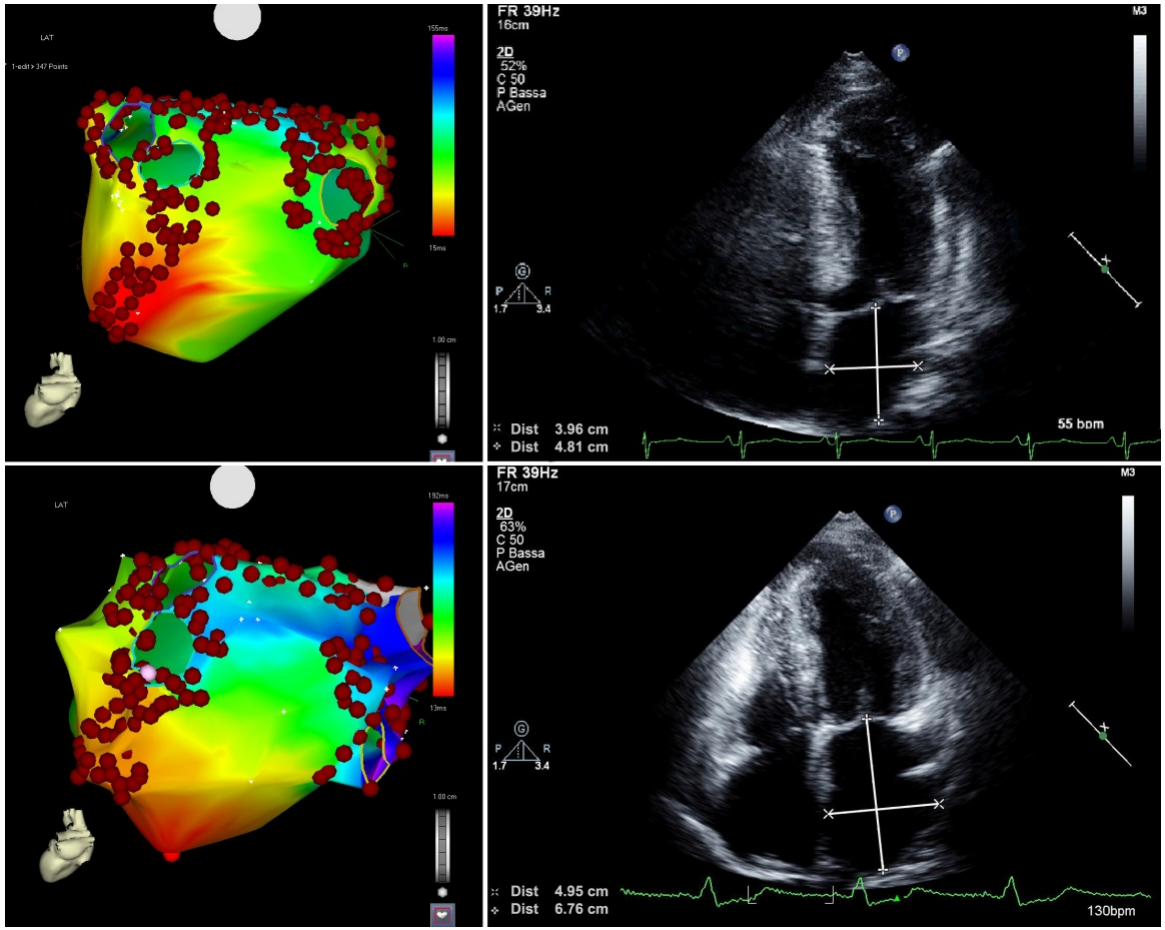




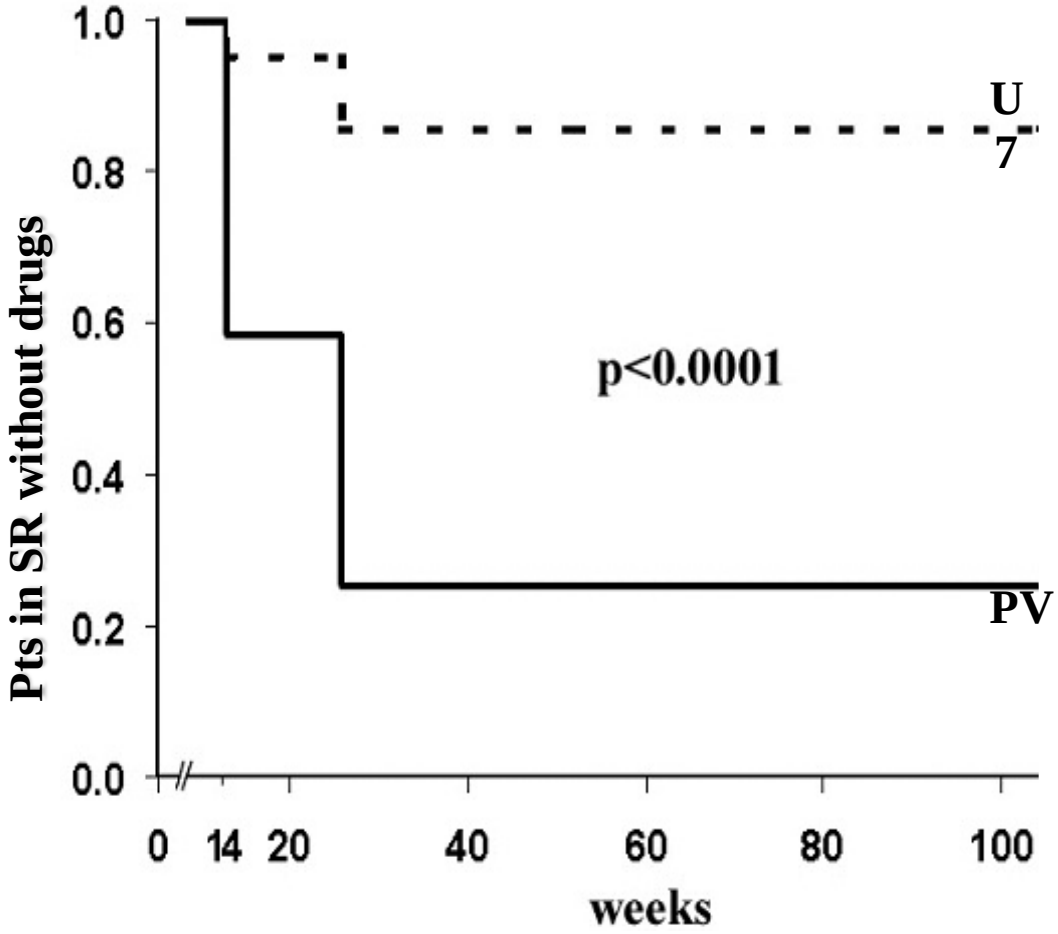
Coppini et al, submitted

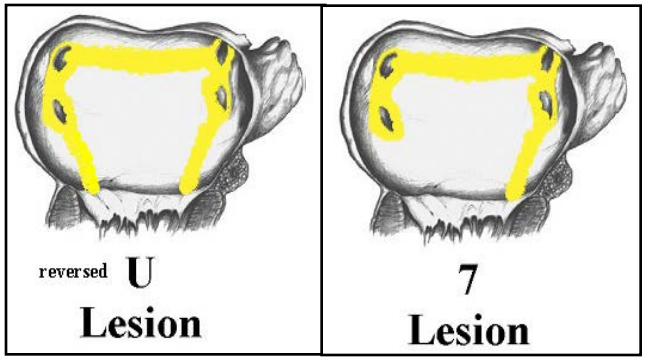


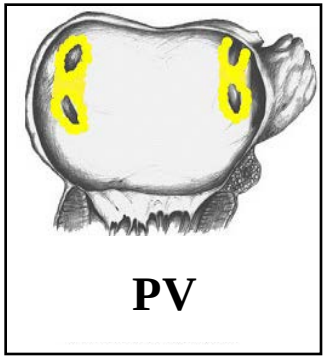
Is Catheter Ablation of AF a Viable Option for HCM Patients ?



Chronic AF and Valvular Heart Disease







Gaita, J Am Coll Cardiol 2000;36:159.

Gaita et al. Circulation 2005. 18;111:136

Efficacy of catheter ablation for atrial fibrillation in hypertrophic cardiomyopathy: impact of age, atrial remodelling, and disease progression

DiDonna et al, Europace 2010

Patients

61 HCM pts, mean age 54±12 years,
AF-related symptoms refractory to medical treatment

- Paroxysmal 35 (57%)
- Persistent 15 (25%)
- Permanent 11 (18%)

Left atrium (AP diameter)	51±6 mm
Max. LV thickness (mm)	20±4 mm
LV outflow gradient ≤30 mmHg	12 (19%)

Efficacy of catheter ablation for atrial fibrillation in hypertrophic cardiomyopathy: impact of age, atrial remodelling, and disease progression

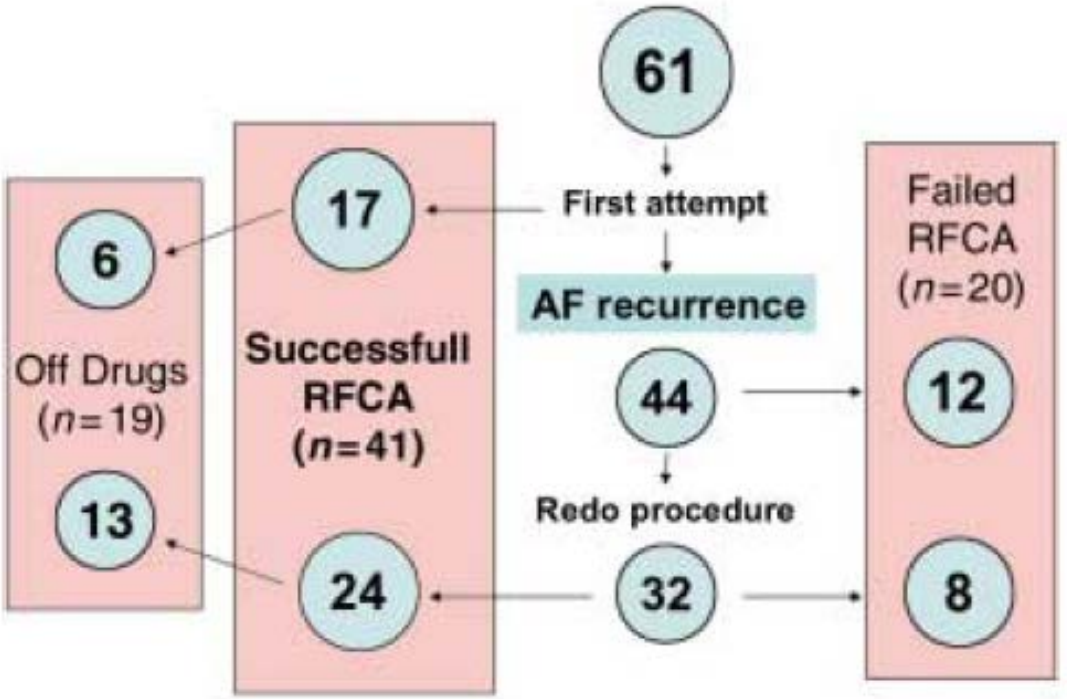
DiDonna et al, Europace 2010

Results

- ✓ Mean F-up 29±16 months
- ✓ Final success rate 41/61 pts (67%)
  - Paroxysmal AF 71%
  - Persistent AF 73%
  - Permanent AF 46%
- ✓ Major complications: none

Efficacy of catheter ablation for atrial fibrillation in hypertrophic cardiomyopathy: impact of age, atrial remodelling, and disease progression

DiDonna et al, Europace 2010



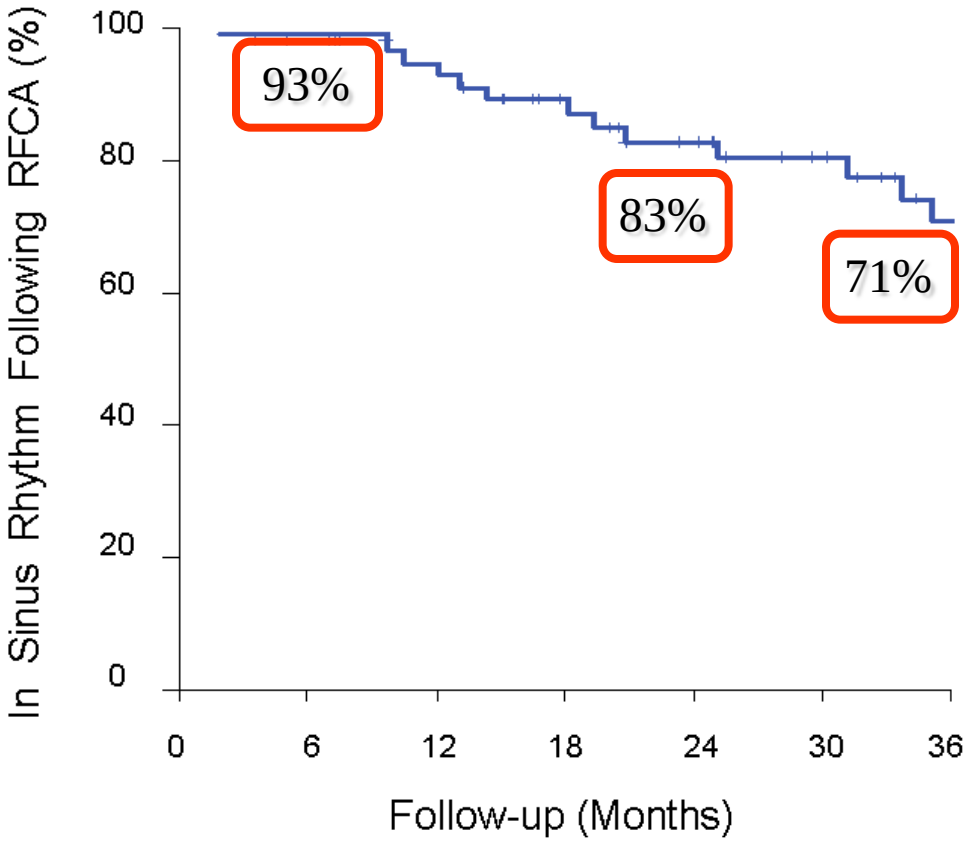
65% in RS
31% off AA

52% Redo

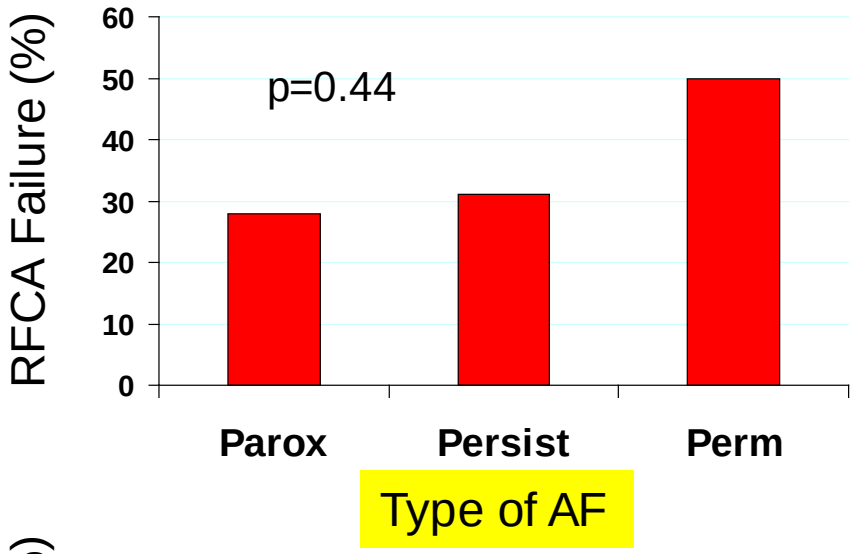
33% Failed

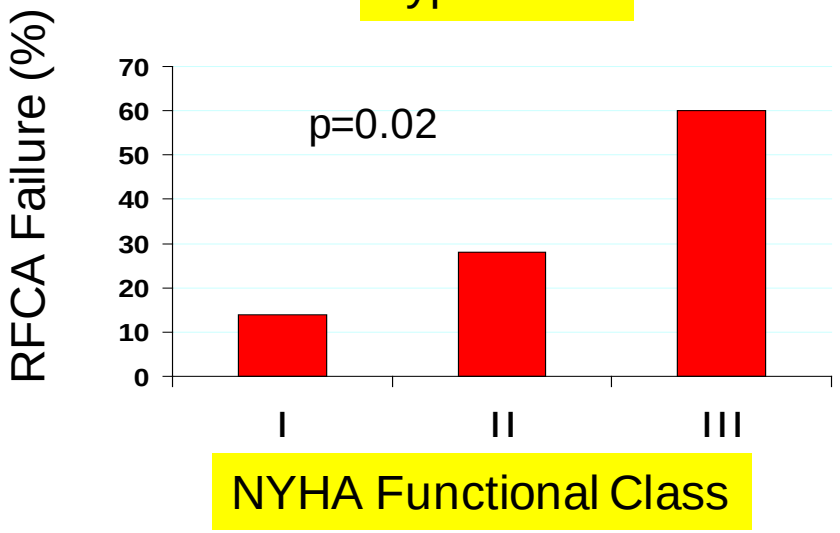
Overall success rate at 1, 2 and 3 Years of F-up

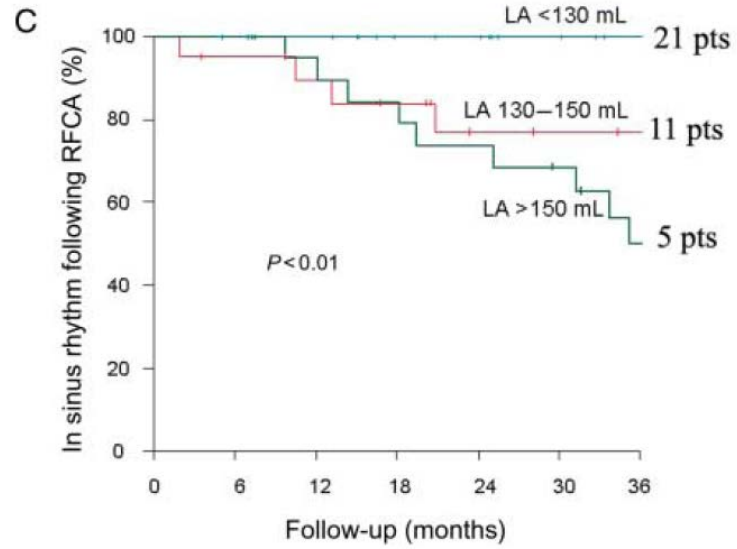
DiDonna et al, Europace 2010

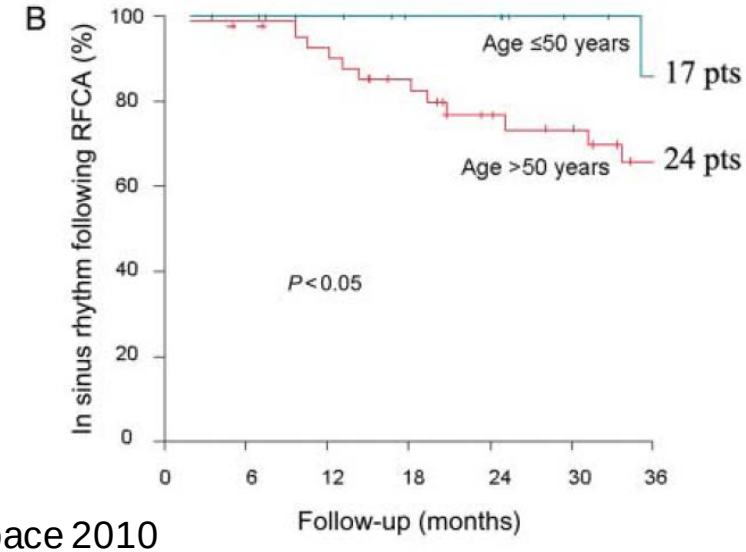


Predictors of Failure

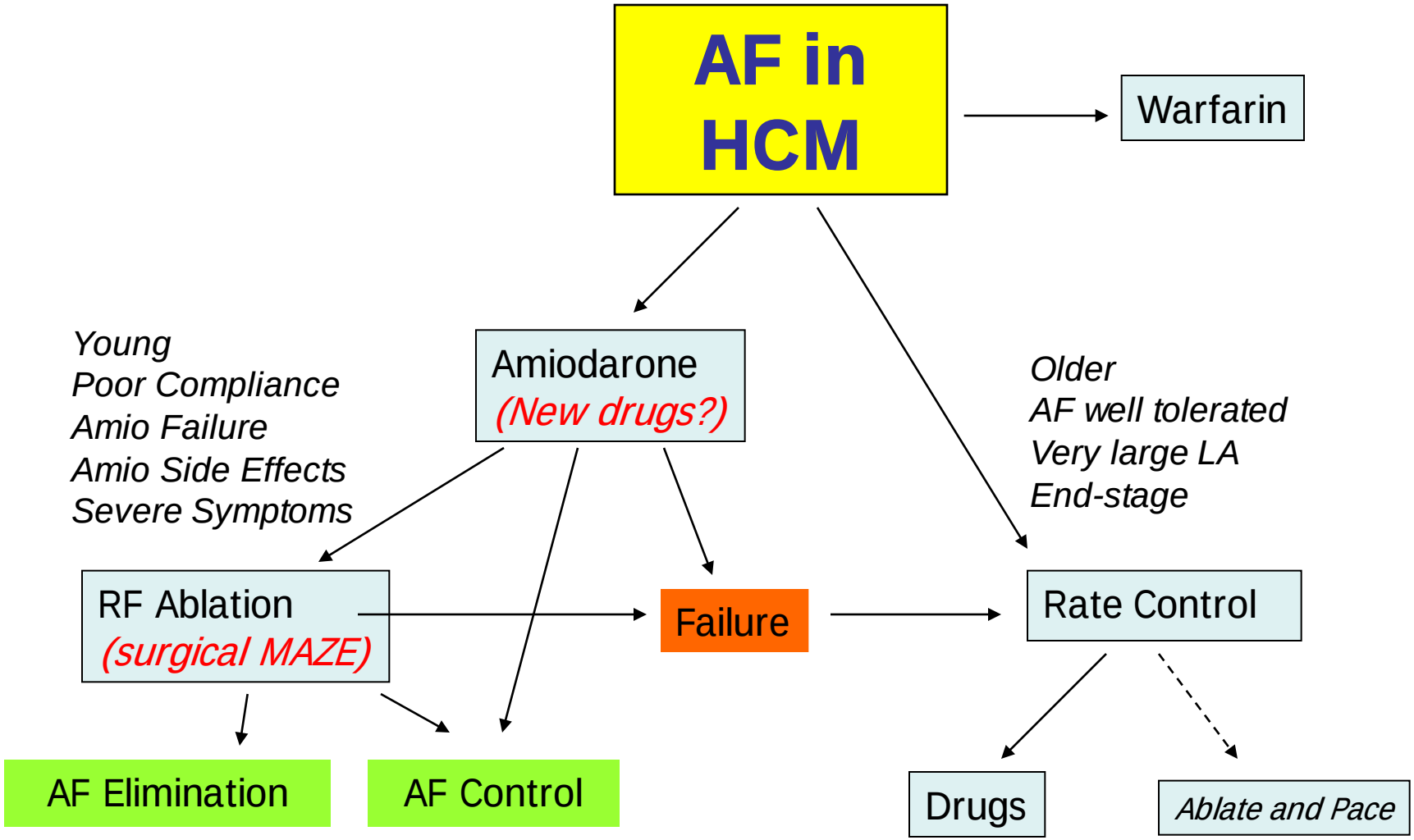








DiDonna et al, Europace 2010


AF in HCM
Warfarin
Young
Poor Compliance
Amio Failure
Amio Side Effects
Severe Symptoms
Amiodarone
(New drugs?)
Older
AF well tolerated
Very large LA
End-stage
RF Ablation
(surgical MAZE)
Failure
Rate Control
AF Elimination
AF Control
Drugs
Ablate and Pace

THANK YOU