Presenter Disclosure Information

Gerhard Hindricks has received honoraria for lectures from Biosense, Stereotaxis, St. Jude Medical, Biotronik

Gerhard Hindricks is a member of the Advisory Board / consultant for Biosense, St. Jude Medical, Biotronik, Stereotaxis, Cyberheart

When the atrial fibrillation patient also has heart failure

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- Heart Center -
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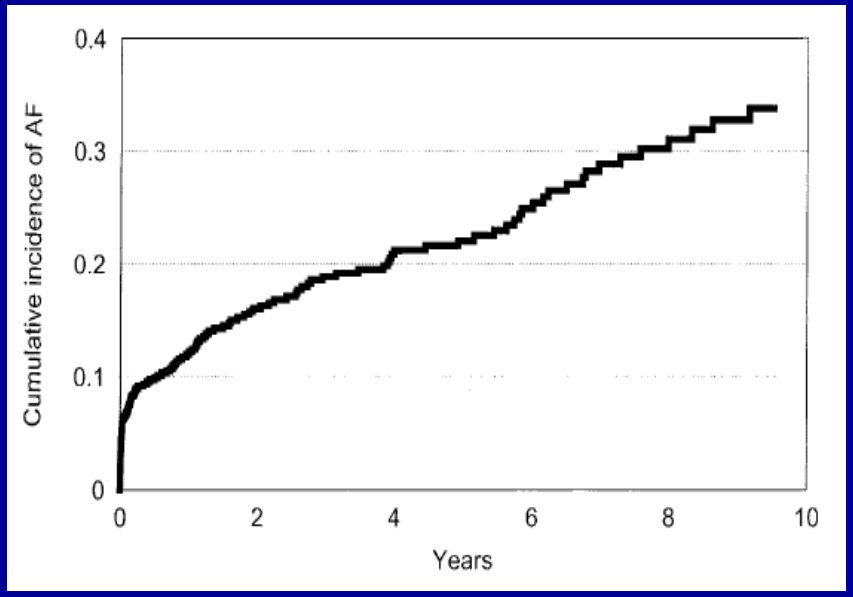
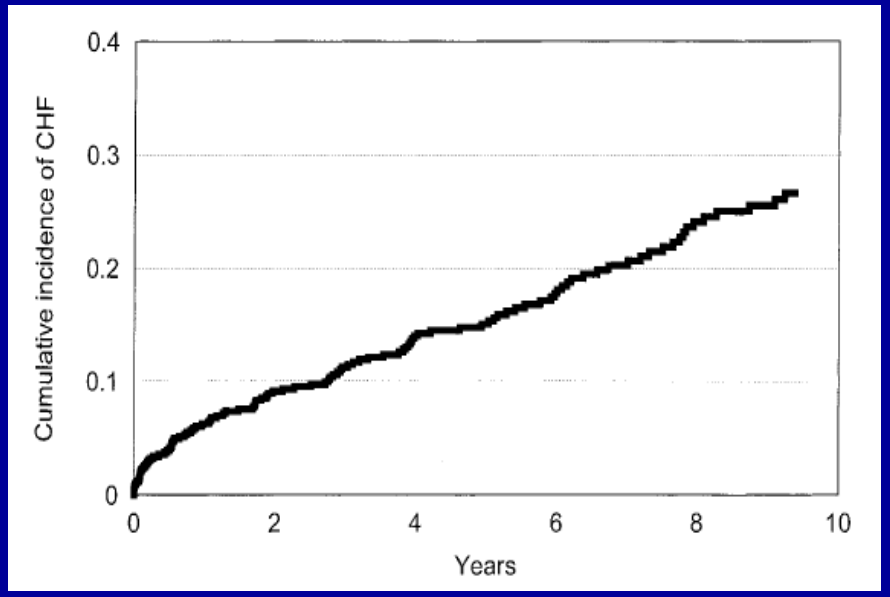
Atrial Fibrillation and Heart Failure

AF in CHF patients



CHF in AF patients



***Circulation 2003*;107:2920-2925**

TABLE 2. Cox Multivariable Proportional Hazards Models Examining the Impact of the Comorbid Condition on Mortality

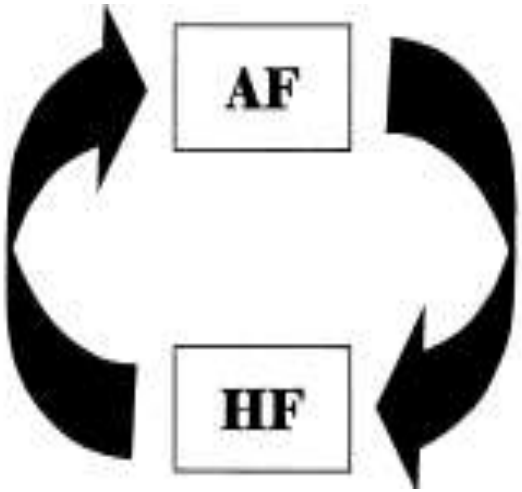
Models	Men, Adjusted HR (95% CI)	Women, Adjusted HR (95% CI)
Comorbid condition as a time-dependent variable		
(A) Mortality after AF		
Impact of incident CHF	2.7 (1.9 to 3.7)*	3.1 (2.2 to 4.2)*
(B) Mortality after CHF		
Impact of incident AF	1.6 (1.2 to 2.1)†	2.7 (2.0 to 3.6)*

AF and CHF: a classical vicious circle

Heterogenity of conduction
Cha & Nattel, Circ 2004

Loss of AV synchrony

Altered atrial refractory properties
Cha & Nattel, Circ 2004



Rapid ventricular response
Shinbane, JACC 1997

Interstitial fibrosis
Cha & Nattel, Circ 2004

R-R variability
Clark, JACC 1997

Volume and pressure load
Kalifa & Jalife, Circ 2003

Toxicity of drug treatment

Am J Cardiol 2003;91:2D-8D

Atrial Fibrillation and Heart Failure

- **Atrial fibrillation has a significant negative impact on QoL especially in CHF patients – this negative impact of AF is more pronounced compared to the negative impact of MI on QoL.**

Relative mortality risk of CHF patients with AF

	Patients with AF/all patients included	EF (%)	NYHA class	RR (95% CI)	*P*-value
CHARM[22]	478/7599	>40	II–IV	1.80 (1.46–2.21)	<0.001
	670/7599	≤40	II–IV	1.38 (1.21–1.59)	<0.001
SOLVD trials[23]	419/6517	≤35	I–IV	1.34 (1.12–1.62)	0.002
VALIANT[24]	1812/14703	Mean: 34	NA	1.32 (1.20–1.45)	<0.0001

***Am J Cardiol 2003*;91:2D-8D**

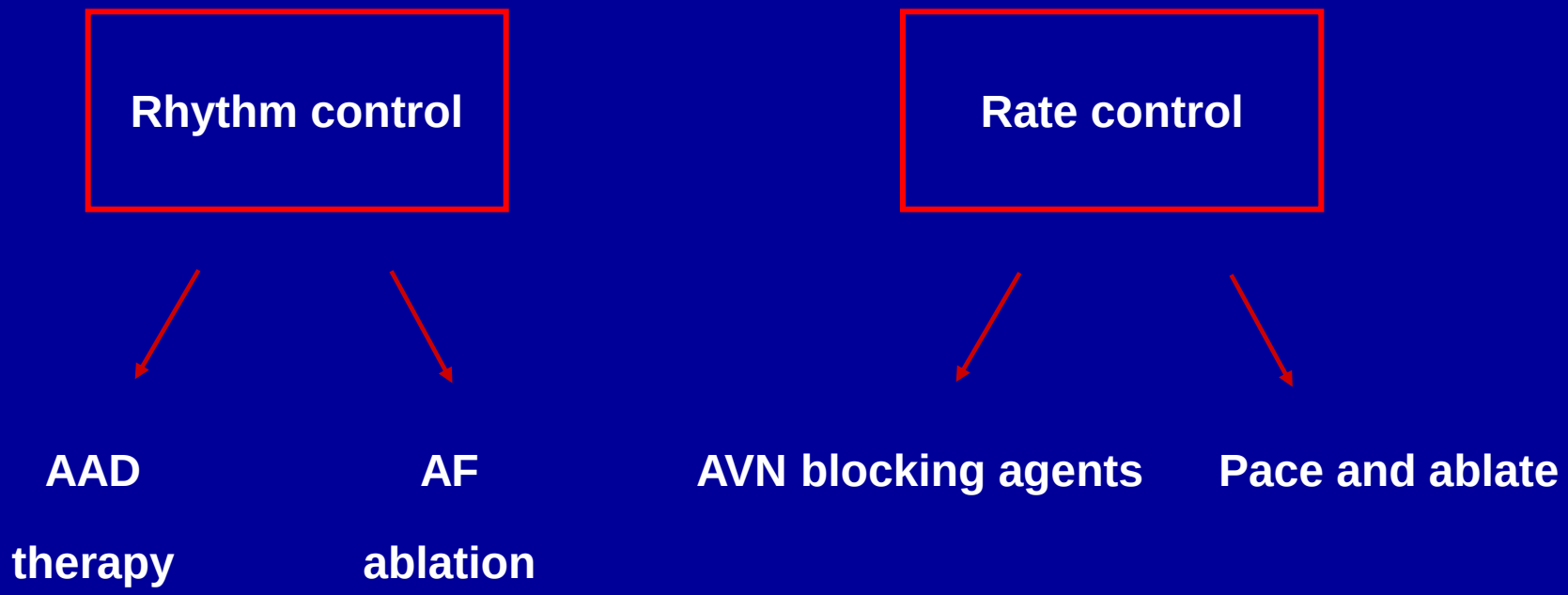
Consequences of AF in CHF patients

- Worsening of heart failure
- Decrease of quality of life
- Increase of thromboembolic risks
- Increased risk for hospitalization
- Increased risk for sudden cardiac death

Interim Conclusion I

- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**

Rate and rhythm control strategies



Interim Conclusion I

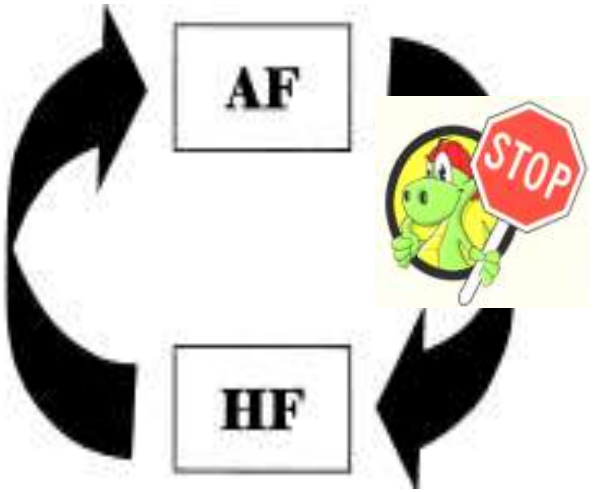
- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**
- **Is sinus rhythm beneficial?**

Rationale for rhythm control in CHF patients

Heterogenity of conduction
Cha & Nattel, Circ 2004

Loss of AV synchrony

Altered atrial refractory properties
Cha & Nattel, Circ 2004



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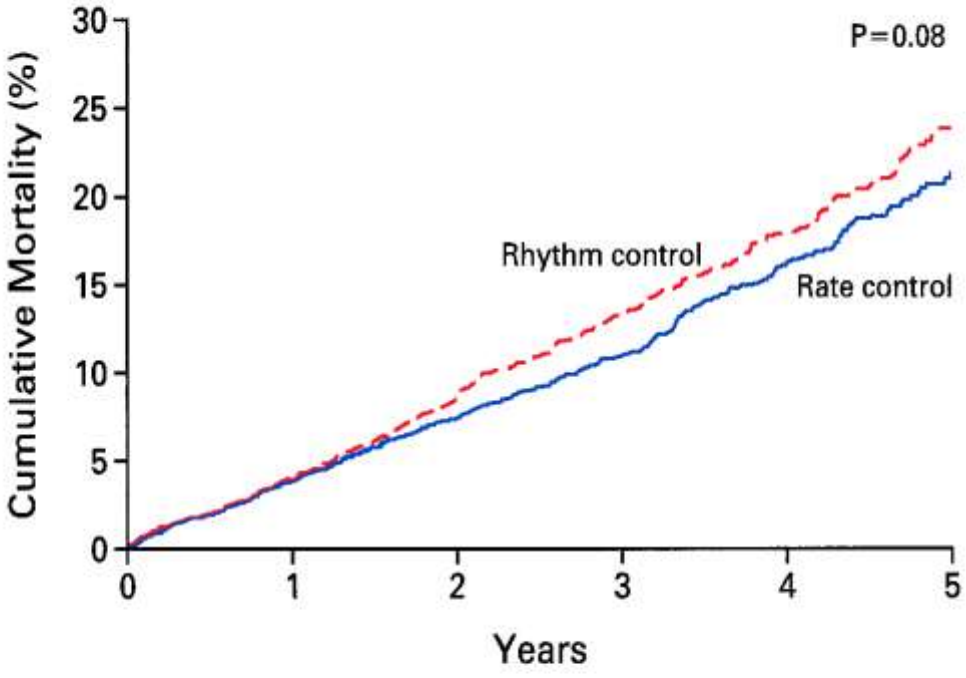
Rate versus rhythm control – AFFIRM

Cumulative mortality from any cause



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)

***NEJM 2002*;347:1825-1833**

Rate versus rhythm control – AFFIRM

Effects of heart failure, rhythm and drugs

TABLE 3. Covariates Significantly Associated With Survival Results With Echocardiographic Data Excluded

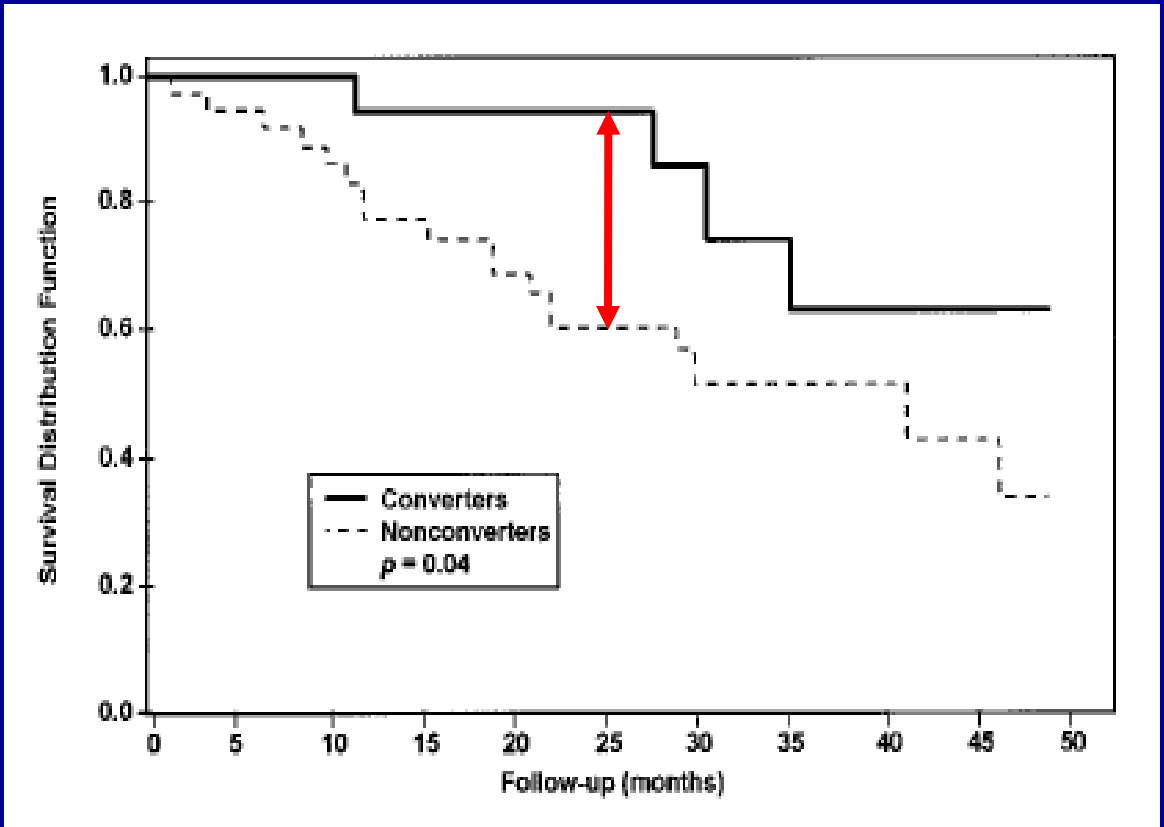
Covariate	*P*	HR	HR: 99% Confidence Limits Lower	Upper
Age at enrollment*	<0.0001	1.06	1.04	1.08
Coronary artery disease	<0.0001	1.65	1.31	2.07
Congestive heart failure	<0.0001	1.83	1.45	2.32
Diabetes	<0.0001	1.56	1.22	2.00
Stroke or transient ischemic attack	<0.0001	1.54	1.17	2.05
Smoking	<0.0001	1.75	1.29	2.39
First episode of atrial fibrillation	0.0067	1.27	1.01	1.58
Sinus rhythm	<0.0001	0.54	0.42	0.70
Warfarin use	<0.0001	0.47	0.36	0.61
Digoxin use	<0.0001	1.50	1.18	1.89
Rhythm-control drug use	0.0005	1.41	1.10	1.83

*Per year of age.

***Circulation 2004*;109:1507-1513**

Rhythm control in CHF patients – CHF-STAT

Benefit of restored sinus rhythm by in CHF



Circulation 1998;98:2574-2579

Interim Conclusion II

- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**
- **Is sinus rhythm beneficial?**

Yes, sinus rhythm may be beneficial!

Interim Conclusion II

- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**
- **Sinus rhythm is beneficial.**
- **How to restore sinus rhythm?**

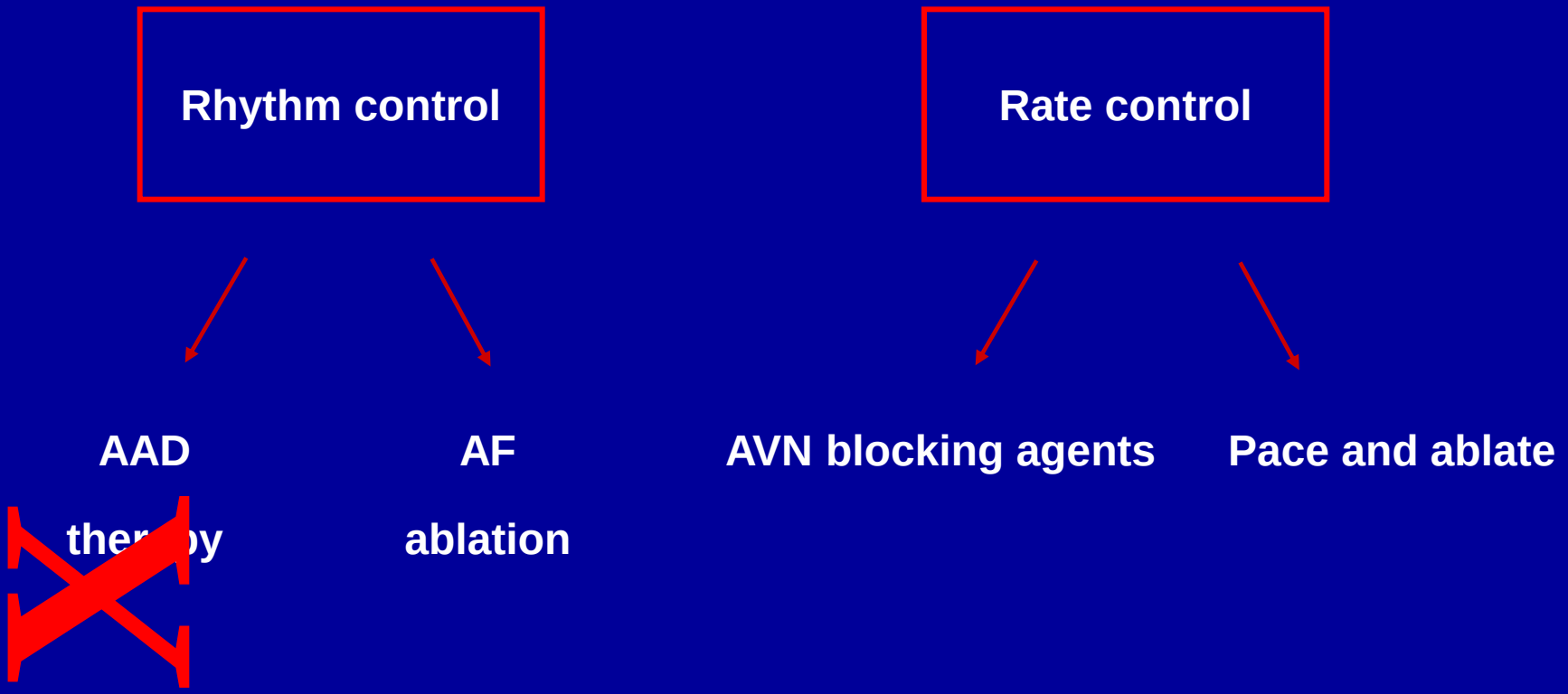
Rate versus rhythm control – AFFIRM

TABLE 3. ADVERSE EVENTS.*

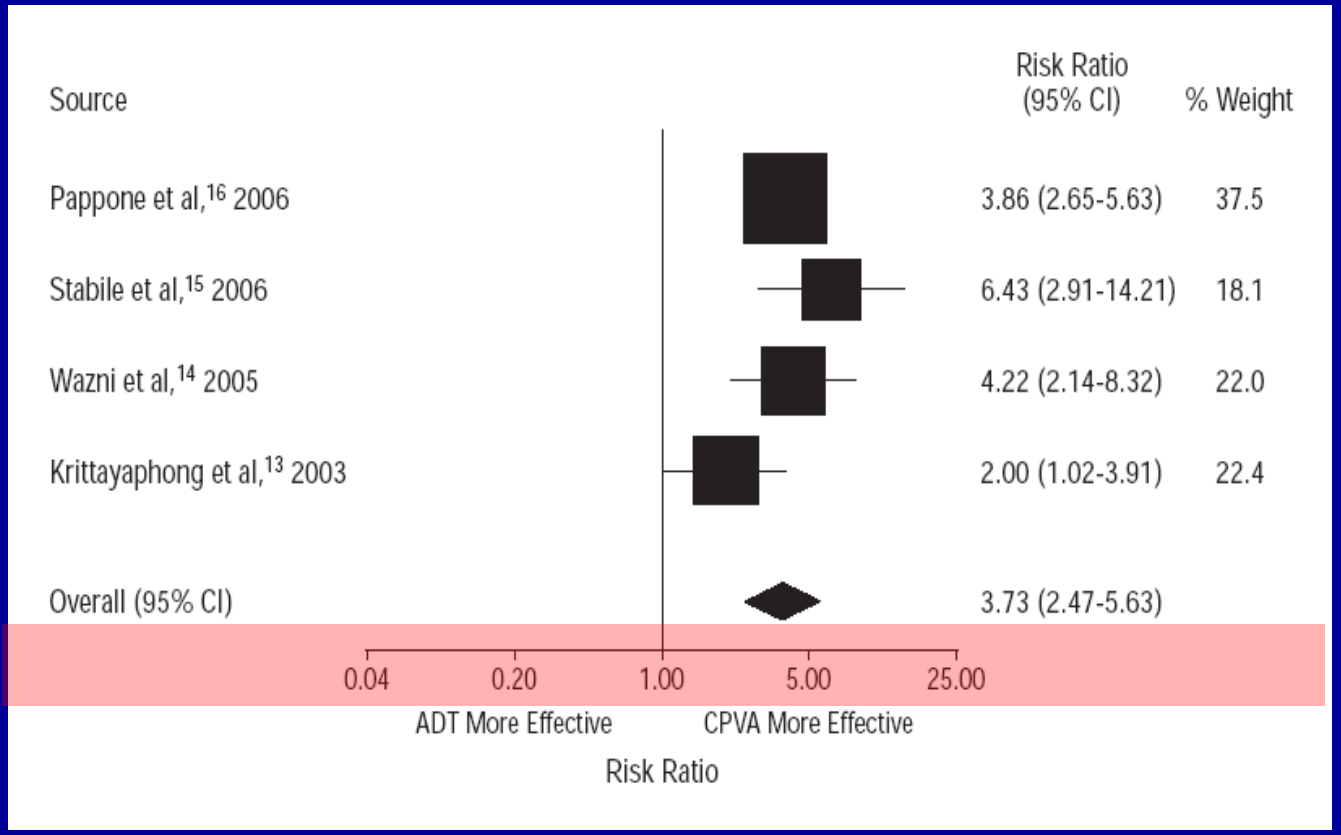
EVENT	OVERALL (N=4060)	RATE-CONTROL GROUP (N=2027)	RHYTHM-CONTROL GROUP (N=2033)	P VALUE
		no. of patients (%)		
Primary end point (death)	666 (26.3)	310 (25.9)	356 (26.7)	0.08†
Secondary end point (composite of death, disabling stroke, disabling anoxic encephalopathy, major bleeding, and cardiac arrest)	861 (32.3)	416 (32.7)	445 (32.0)	0.33
Torsade de pointes	14 (0.5)	2 (0.2)‡	12 (0.8)	0.007
Sustained ventricular tachycardia	15 (0.6)	9 (0.7)	6 (0.6)	0.44
Cardiac arrest followed by resuscitation				
Ventricular fibrillation or ventricular tachycardia	19 (0.6)	10 (0.7)	9 (0.5)	0.83
Pulseless electrical activity, bradycardia, or other rhythm	10 (0.3)	1 (<0.1)	9 (0.6)	0.01
Central nervous system event				
Total	211 (8.2)	105 (7.4)	106 (8.9)	0.93
Ischemic stroke§	157 (6.3)	77 (5.5)	80 (7.1)	0.79
After discontinuation of warfarin	69	25	44	
During warfarin but with INR <2.0	44	27	17	
Concurrent atrial fibrillation	67	42	25	
Primary intracerebral hemorrhage	34 (1.2)	18 (1.1)	16 (1.3)	0.73
Subdural or subarachnoid hemorrhage	24 (0.8)	11 (0.8)	13 (0.8)	0.68
Disabling anoxic encephalopathy	9 (0.3)	4 (0.2)	5 (0.4)	0.74
Myocardial infarction	140 (5.5)	67 (4.9)	73 (6.1)	0.60
Hemorrhage not involving the central nervous system	203 (7.3)	107 (7.7)	96 (6.9)	0.44
Systemic embolism	16 (0.5)	9 (0.5)	7 (0.4)	0.62
Pulmonary embolism	8 (0.3)	2 (0.1)	6 (0.5)	0.16
Hospitalization after base line	2594 (76.6)	1220 (73.0)	1374 (80.1)	<0.001

NEJM 2002;347:1825-1833

Rate and rhythm control strategies



AF ablation for rhythm control



Arch Intern Med 2008;168:581-586

Interim Conclusion III

- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**
- **Sinus rhythm is beneficial.**
- **How to restore sinus rhythm?**

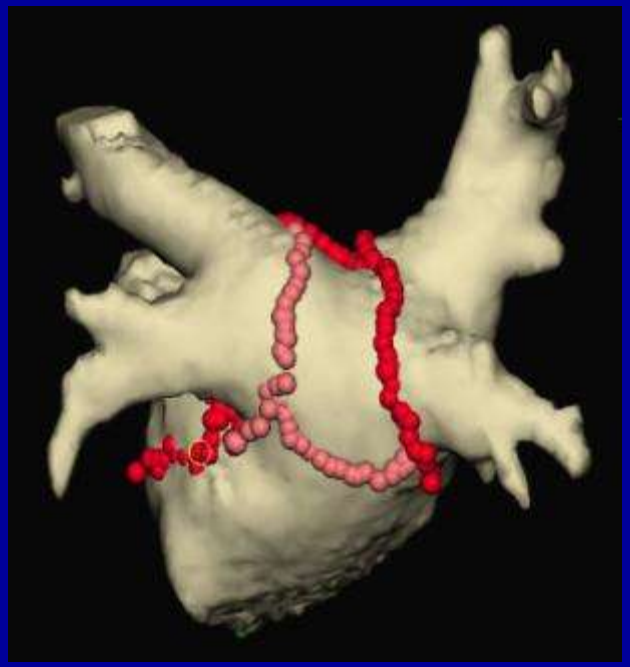
Catheter ablation is superior to antiarrhythmic drugs!

Interim Conclusion III

- **Atrial fibrillation and heart failure interact like a classical vicious circle.**
- **Interruption of this vicious circle is a reasonable therapeutic goal.**
- **Sinus rhythm is beneficial.**
- **Catheter ablation is superior to antiarrhythmic drugs.**

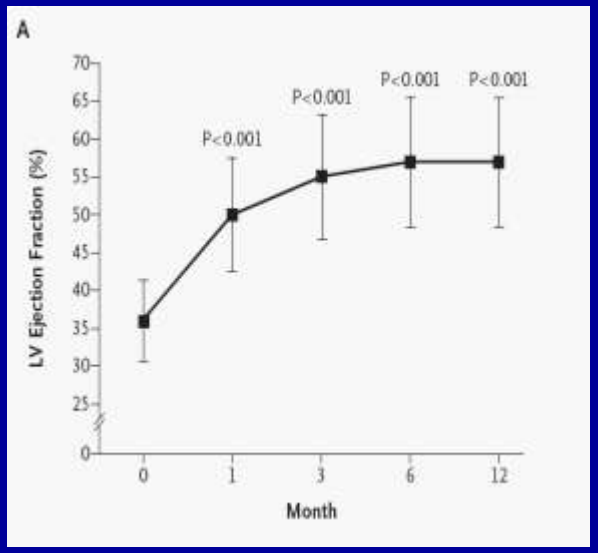
What are the effects of AF catheter ablation in CHF patients?

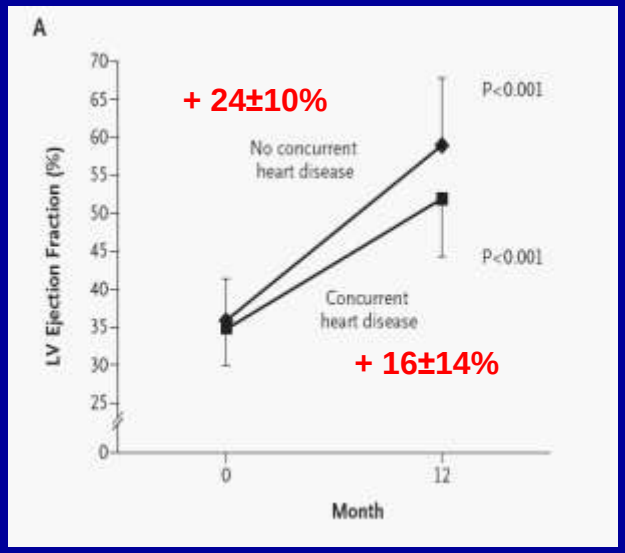
AF ablation for rhythm control in CHF patients

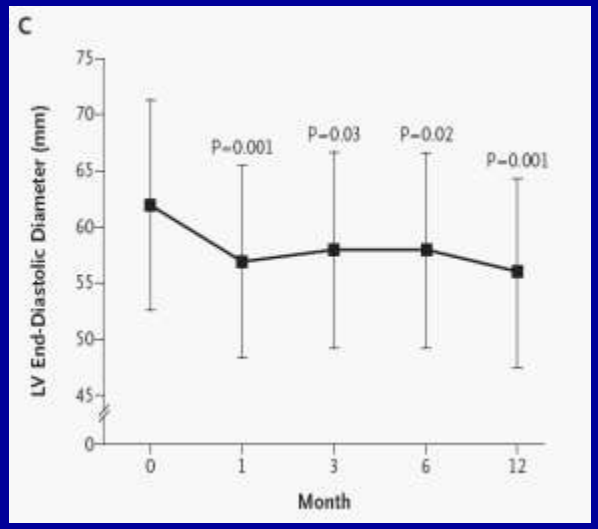


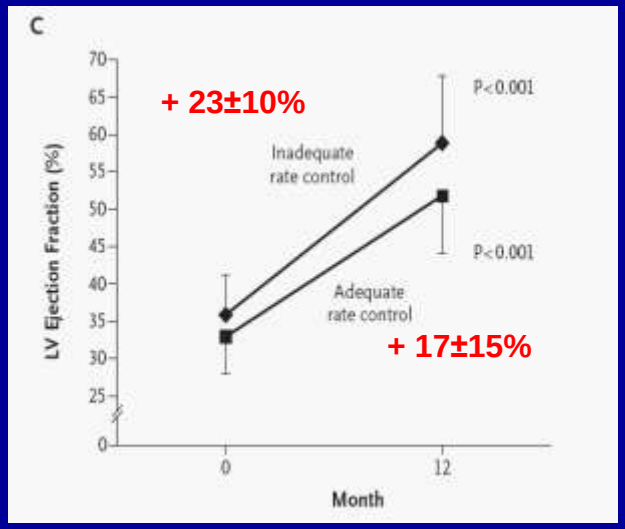
- Chen et al. *J Am Coll Cardiol* 2004;43:1004-1009
- Hsu et al. *N Engl J Med* 2004;351:2373-2383
- Tondo et al. *PACE* 2006;29:962-970
- Gentlesk et al. *JCE 2007*;18:9-14
- Khan et al. *N Engl J Med* 2008;359:1778-1785

AF ablation for rhythm control in CHF patients





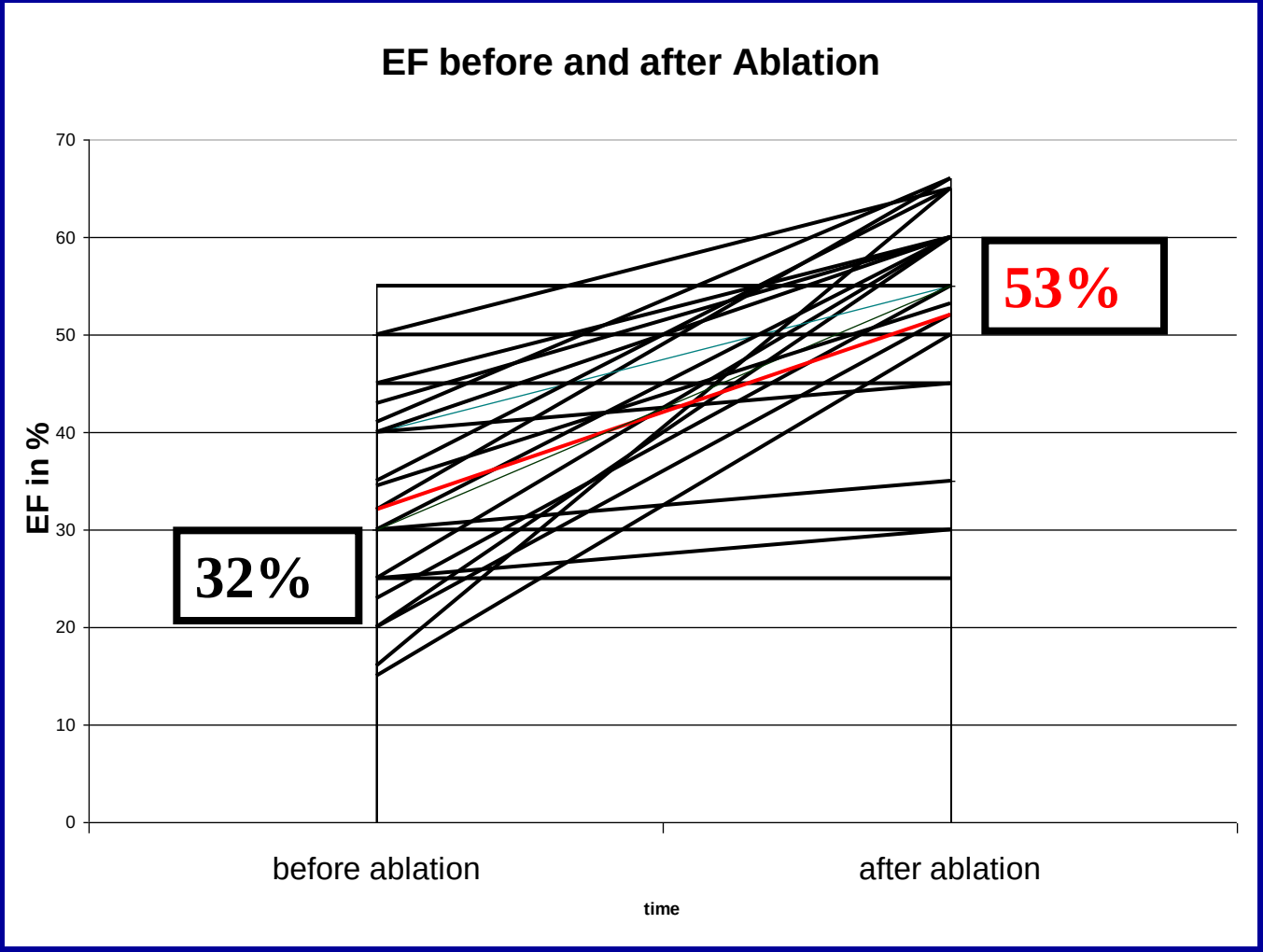




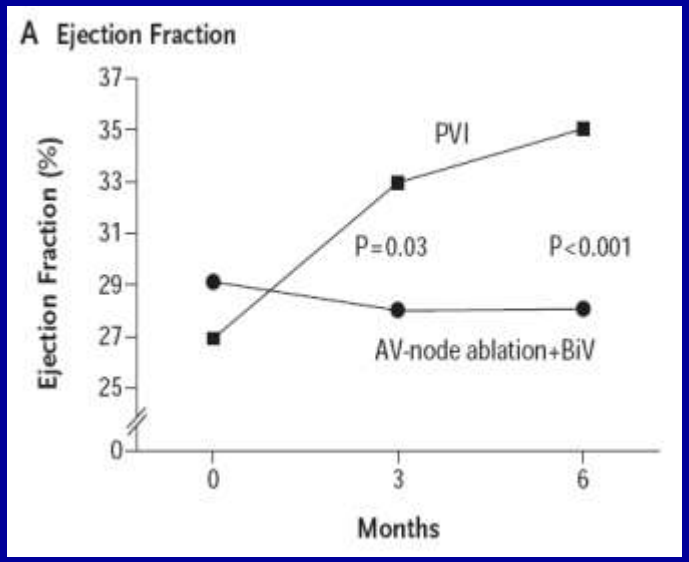
N Engl J Med 2004;351:2373-2383

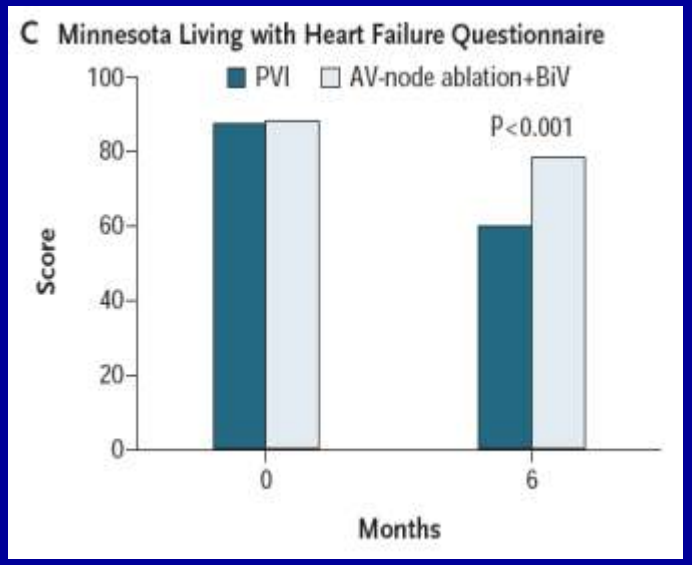
AF ablation for rhythm control in CHF patients

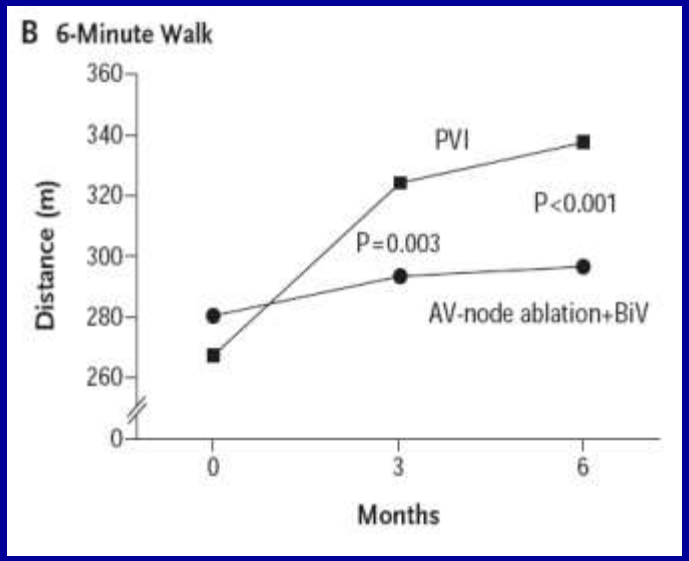
- Heart Center Leipzig data -



PABA – CHF







→ **Adverse effects of AA drugs and AV nodal blocking agents minimized !**

→ **Rhythm control by PVI is superior to best possible rate-control strategy !**

***N Engl J Med 2008*;359:1778-1785**

Final conclusions

- **Atrial fibrillation and heart failure interact like a classical vicious circle. AF drives CHF and CHF drives AF.**
- **This vicious circle leads to (I) reduced QoL, (II) increased morbidity and hospitalization, and (III) increased mortality.**
- **Re-estabishment of sinus rhythm may offer some benefits to AF / CHF patients. However, antiarrhythmic drugs need to be given with extreme cautions.**
- **AF ablation is probably the best approach to rhythm control and should be attempted in CHF patients.**
- **Further studies are needed to assess the impact of AF ablation (versus AAD therapy) on survival in CHF patients**

Perspective

- **AMICA** (NCT00652522)
  Atrial Fibrillation Management In Congestive Heart Failure with Ablation
- **ARC-HF** (NCT00878384)
  Catheter Ablation versus Medical Rate Control for Atrial Fibrillation in Patients with Heart Failure
- **CASTLE-AF** (NCT00643188)
  Catheter Ablation versus Standard Conventional Treatment in Patients with LEft Ventricular Dysfunction and Atrial Fibrillation
- **CABANA** (NCT00578617)
  Catheter ABlation versus ANtiarrhythmic Drug Therapy for Atrial Fibrillation