



Atrial Fibrillation in Heart Failure patients implanted with a Cardiac Resynchronization Therapy device: 1-year results of the randomized MASCOT study.

C. Muto¹; T. Maounis²; A. Schuchert³; MG. Bongiorno⁴; R. Frank; T. Vesterlund⁶; J. Brachmann⁷; A. Vicentini⁸; G. Jauvert⁹; G. Tadeo¹⁰; D. Gras¹¹; F. Lisi¹²; A. Dello Russo¹³; JL. Rey¹⁴; E. Boulogne¹⁵; L. Padeletti¹⁶ on behalf of the MASCOT study
Investigators

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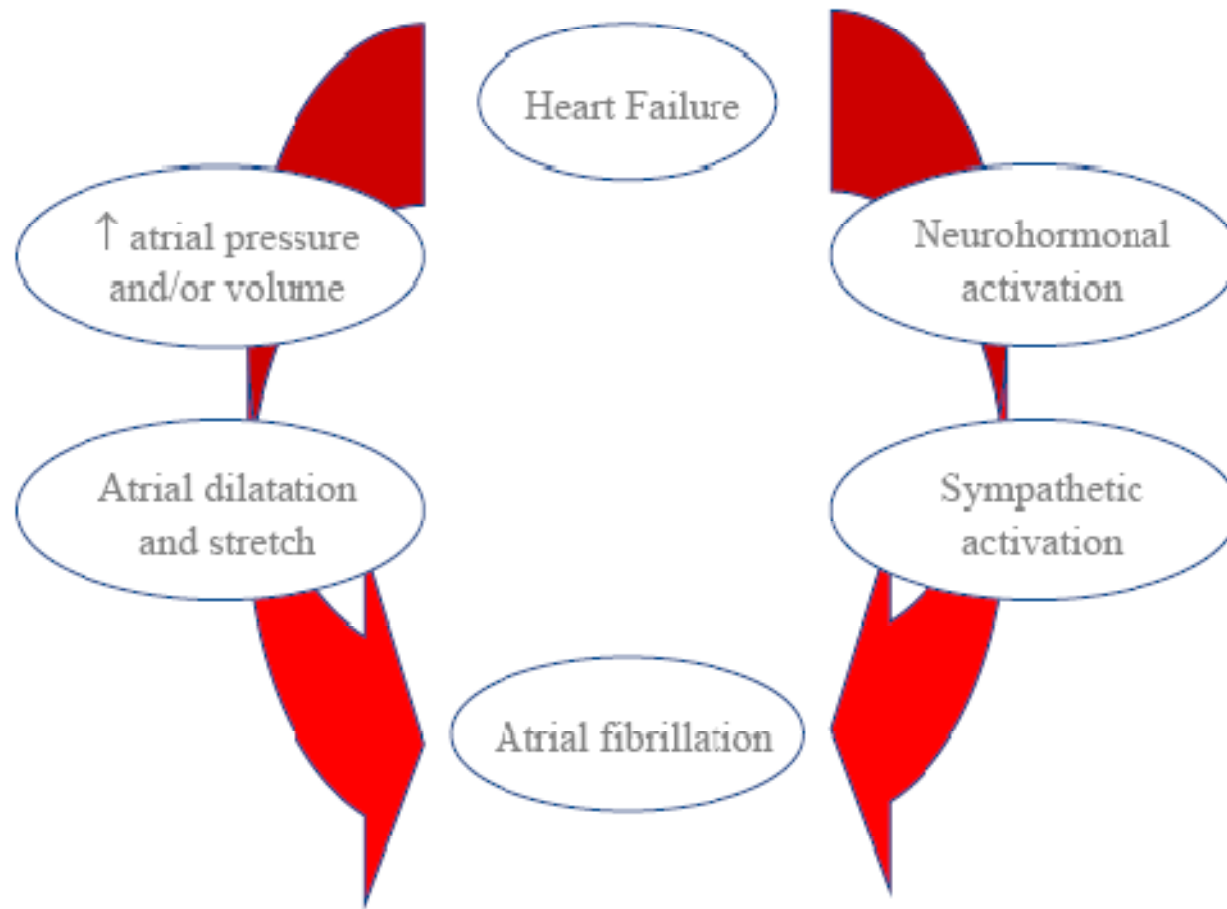
Luigi Padeletti, MD

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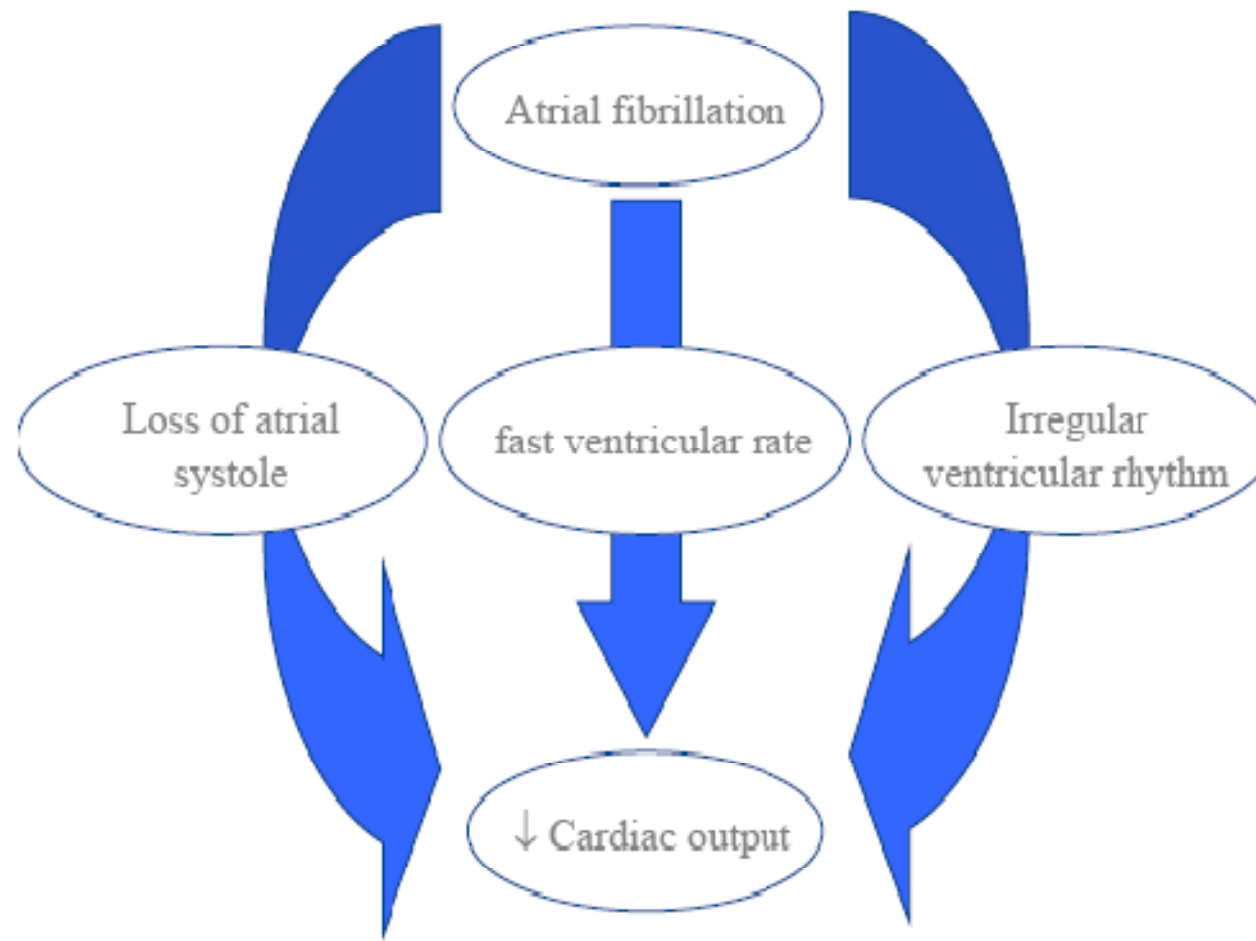
DISCLOSURE INFORMATION:

**The following relationships exist related to this presentation:
Luigi Padeletti is consultant for Boston Scientific,
Medtronic, St.Jude Medical and Sorin Group**

CHF promotes AF



AF worsens CHF



The presence of AF in CHF patients worsens their prognosis

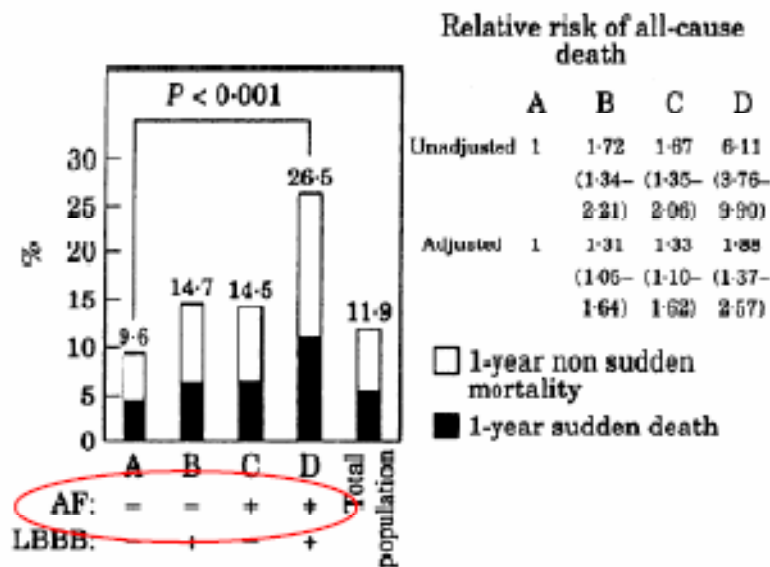
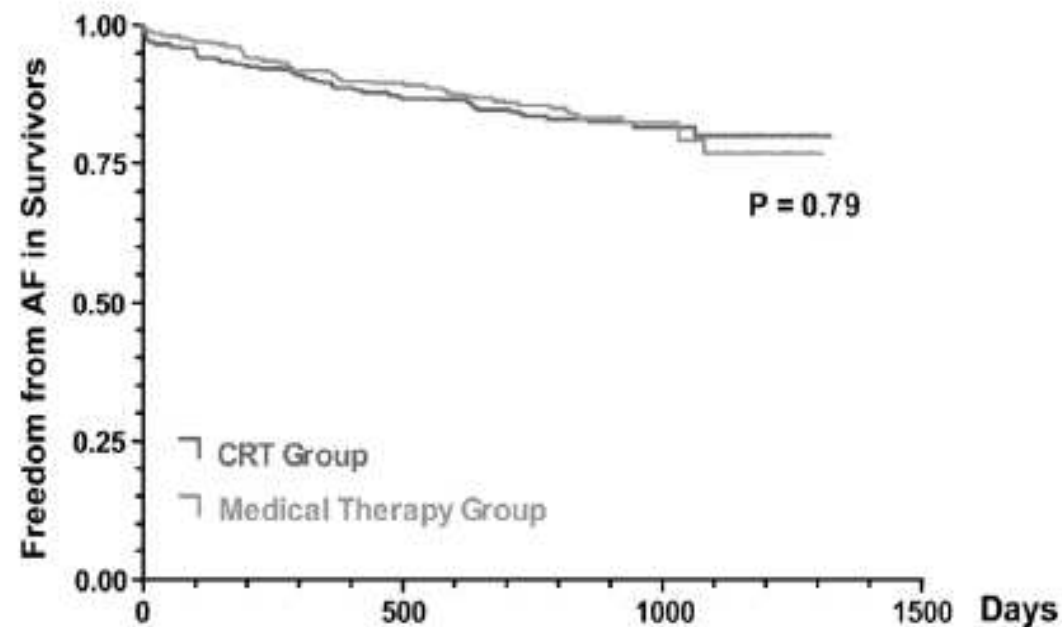


Figure 1 One-year total mortality and sudden death in patients without complete left bundle-branch block (LBBB) and chronic atrial fibrillation (AF) (group A), with isolated left bundle-branch block (group B), with isolated chronic atrial fibrillation (group C) and simultaneous presence of complete left bundle-branch block and atrial fibrillation (group D).

Patients with both LBBB and AF have a worse 1-year mortality than other CHF patients.

The CARE HF Trial: the AF burden is **MASCOT**
unchanged by CRT



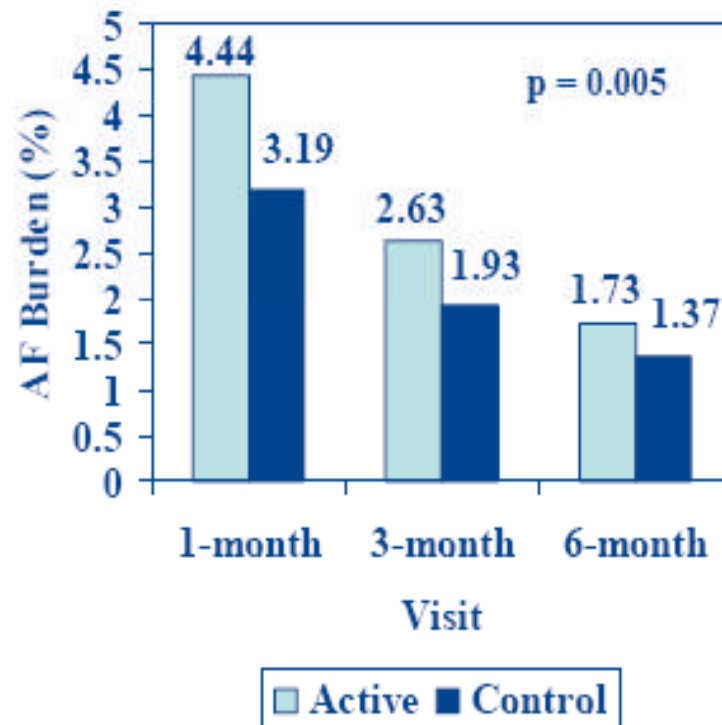
Medical Therapy	404	342	291	169	62	5
CRT	409	345	305	184	78	6

CRT does not prevent or increase the induction of AF

CRT significantly improved the outcome of patients similarly, whether or not they developed AF

Hoppe et al, Circulation 2006

AF Prevention by pacing: Background



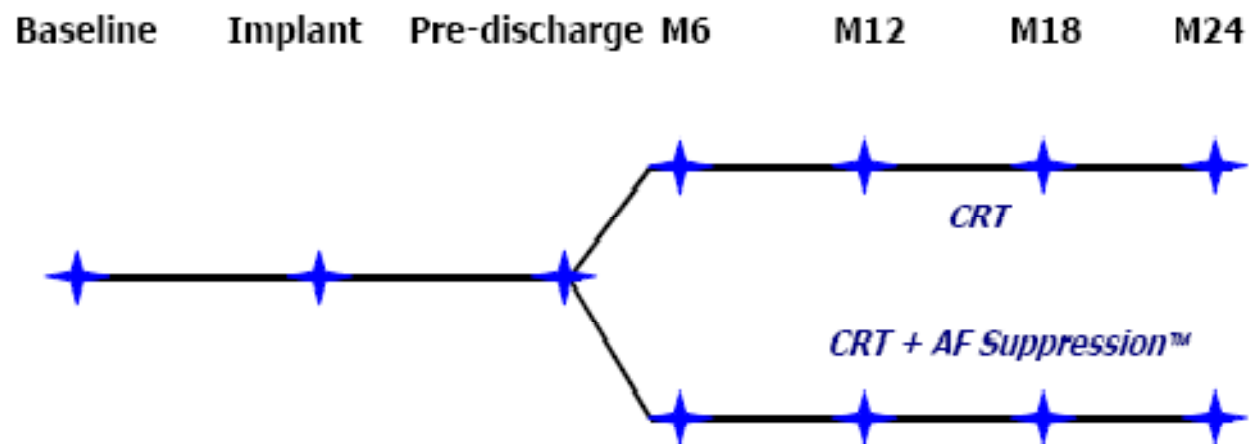
The ADOPT-A study demonstrated that the AF Suppression™ algorithm is safe and decreases symptomatic AF burden significantly in patients with sick sinus syndrome and AF at each follow up visit.

Carlson et al. J Am Coll Cardiol. 2003

MASCOT - Study design

Multicenter, single-blind, randomized, parallel study evaluating the safety and efficacy of a specific AOP algorithm (AF Suppression™, St Jude Medical, Sylmar, CA) in CRT patients.

After successful CRT device implantation, and before hospital discharge, the patients were randomly assigned to AOP ON versus OFF for the duration of follow-up.



MASCOT-Main inclusion & exclusion criteria

Patients were enrolled in the study if they had:

- congestive heart failure (CHF);
- New York Heart Class (NYHA) III or IV;
- spontaneous QRS duration ≥ 130 ms or mechanical interventricular delay > 50 ms;
- left ventricular ejection fraction $\leq 35\%$;
- left ventricular end-diastolic diameter ≥ 55 mm;
- optimal conventional medical therapy;

Patients could not be enrolled if they had:

- Permanent AF
-

MASCOT - Study endpoints

Primary:

- Reduction in the incidence of permanent Atrial Fibrillation at 12 and 24 months.

Secondary:

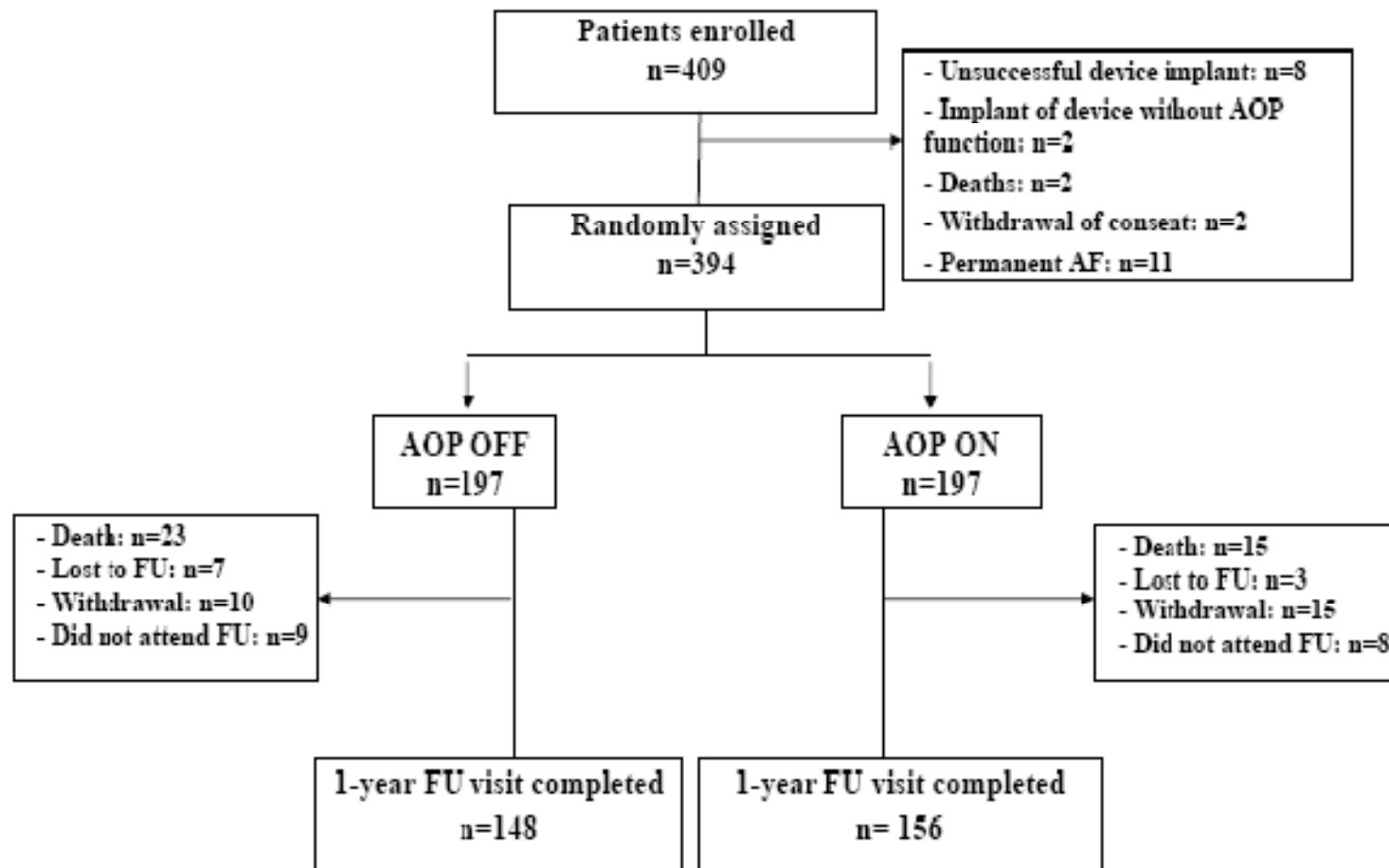
- Incidence of new-onset AF;
- Changes in LVEF, LVESD, LVEDD;
- Changes in NYHA functional class;
- Changes in quality of life;
- Mortality.

MASCOT - Recruitment

At least 379 patients needed to be enrolled in the study to detect a 6.2% absolute reduction in the development of permanent AF between the control and treatment groups, assuming a 1-sided, 5% significance level, with an 80% power.

409 patients were recruited between September 2003 and March 2006 in 34 centers spread over 10 countries.

MASCOT – Patients flow



All analyses were based on the intention-to-treat principle

MASCOT – Baseline characteristics (1)

	TOTAL (n=409)
Age (years)	68 ± 10
Male (%)	79
NYHA Class III (%)	86
Ischemic heart disease (%)	50
ACE/ARBs (%)	87
Beta-Blocker (%)	71
Diuretics (%)	95
QRS width (ms)	163 ± 29
QoL	45 ± 21
AF History (%)	19

MASCOT – Baseline characteristics (2)

	TOTAL (n=409)
Heart rate (bpm)	71 ± 7
Systolic BP (mm Hg)	119 ± 18
Diastolic BP (mm Hg)	71 ± 11
LVEF (%)	25 ± 6
LVESD/DD (mm)	60 ± 10 / 70 ± 10
LVESV/DV (ml)	164 ± 68 / 222 ± 81
LA diameter (mm)	47 ± 9
Hypertension (%)	43
Diabetes (%)	29

MASCOT – AOP ON vs. OFF

	OFF (n=197)	ON (n=197)
Male (%)	80	79
Ages (years)	68 ± 9	68 ± 10
NYHA Class III (%)	88	84
Ischemic (%)	51	47
AF History (%)	17	19
QRS width (ms)	162 ± 26	166 ± 32
QoL	46 ± 22	43 ± 20
LVEF (%)	25 ± 6	26 ± 7

All p-values between the 2 groups non significant

MASCOT – Response to AOP

	AOP OFF	AOP ON	
% atrial pacing	30±33	80±29	$P < 0.0001$
% ventricular pacing	95±10	95±14	$P = \text{ns}$
Heart rate (bpm)	67±11	72±13	$P = 0.05$

The AOP algorithm was turned OFF in 13 patients, because of permanent AF (2 pts), atrial lead displacement (2 pts), high atrial threshold and risk of early battery depletion (4 pts), and intolerable palpitations/atrial tachyarrhythmias in (5 pts).

It was turned ON in 1 patient suffering from paroxysmal AF.

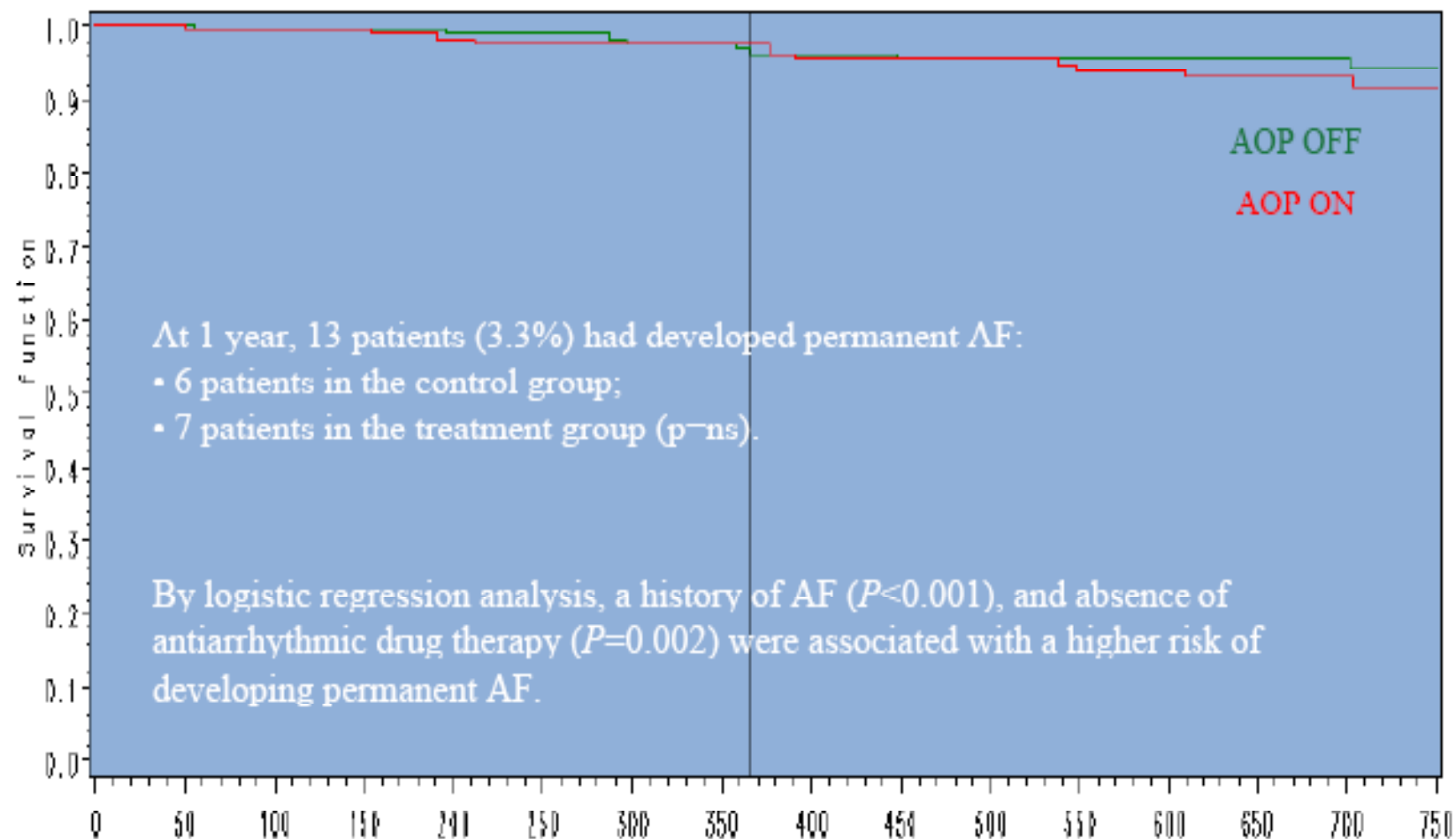
MASCOT – Response to CRT

	AOP OFF		AOP ON	
	Baseline	1 year	Baseline	1 year
% of pts who improved ≥ 1 NYHA class	N/A	70	N/A	67
LVEF (%)	24.5 \pm 6.2	32.7 \pm 10.9*	25.8 \pm 6.8	33.1 \pm 12.6*
LVESD (mm)	60 \pm 10	53 \pm 13*	60 \pm 10	57 \pm 14*
QoL	46 \pm 22	24 \pm 20*	43 \pm 20	25 \pm 20*

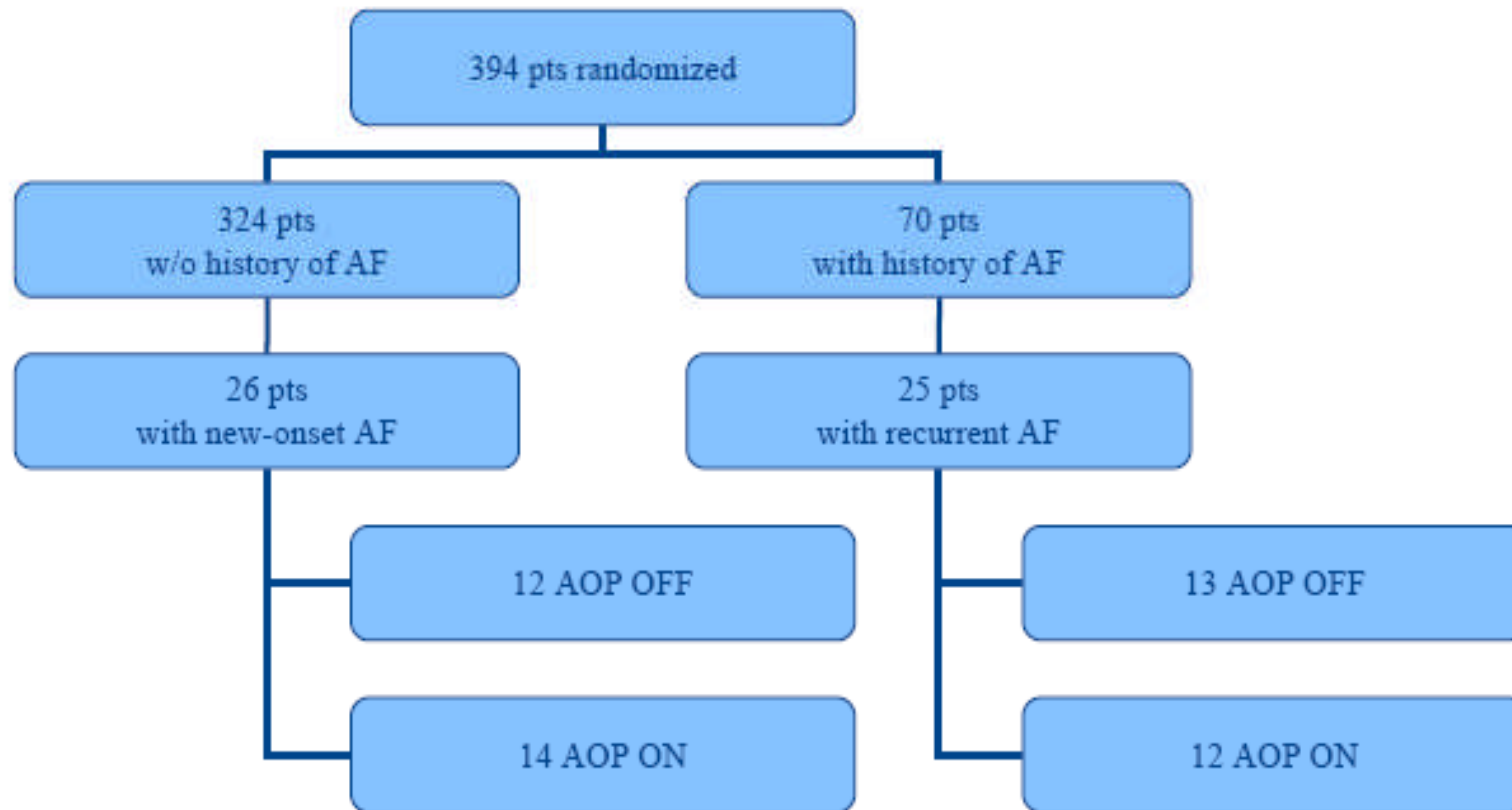
* $p < 0.0001$ compared to baseline

There are no differences between groups at 1-year.

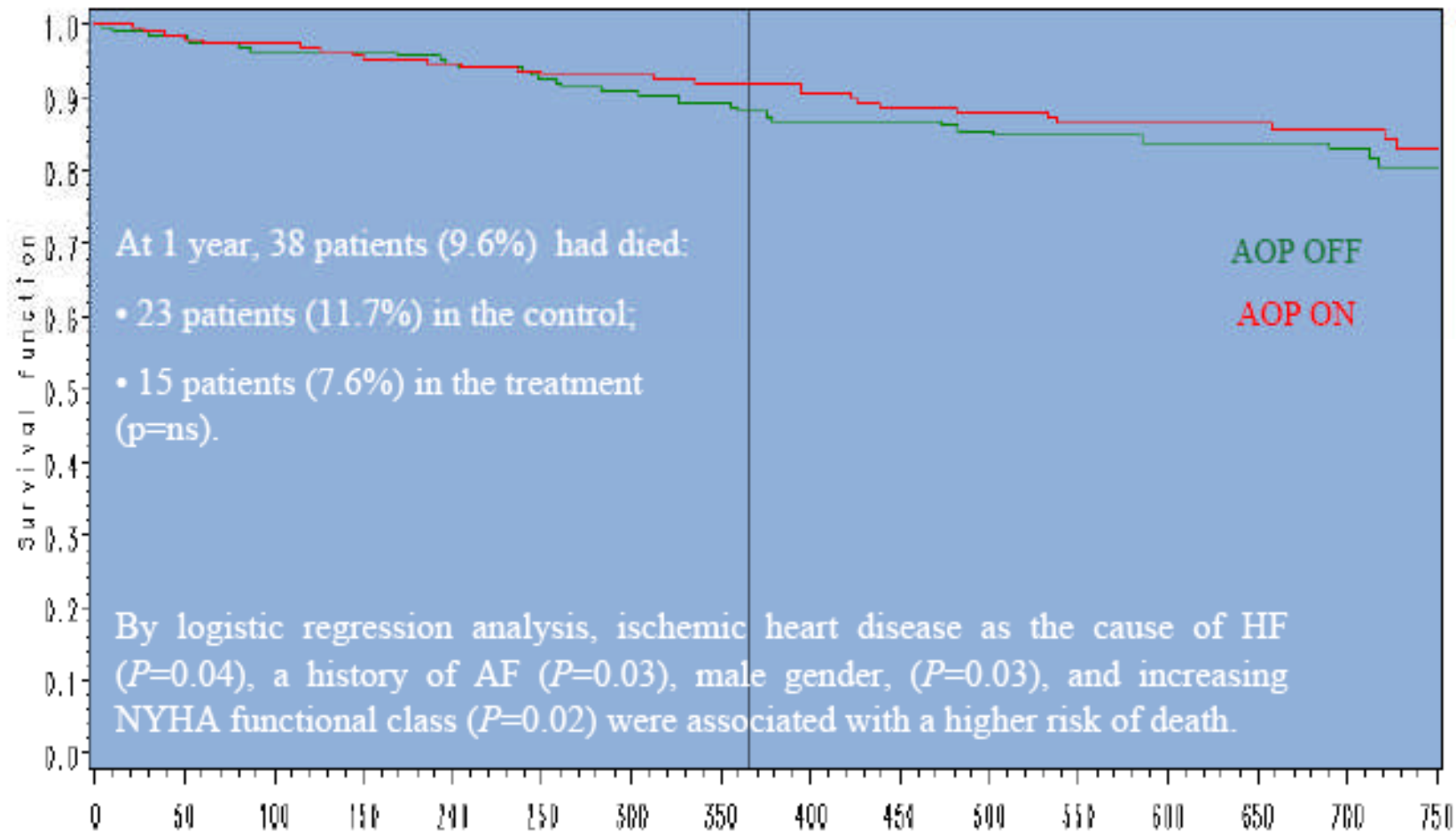
MASCOT – Incidence of permanent AF



MASCOT – New onset AF



MASCOT – Mortality



MASCOT – Conclusions

The MASCOT study is the 1st study that investigated prospectively the development of AF in CRT patients.

The incidence of permanent AF is much lower than expected in the CRT population (3.3%) and thus the efficacy of atrial overdrive pacing could not be assessed.

AOP appears to be safe and well tolerated by heart failure patients and does not impair the response to CRT.

AOP should be switched OFF to save battery energy and could be turned ON based on device diagnostics and patient symptoms in case of atrial tachyarrhythmias.



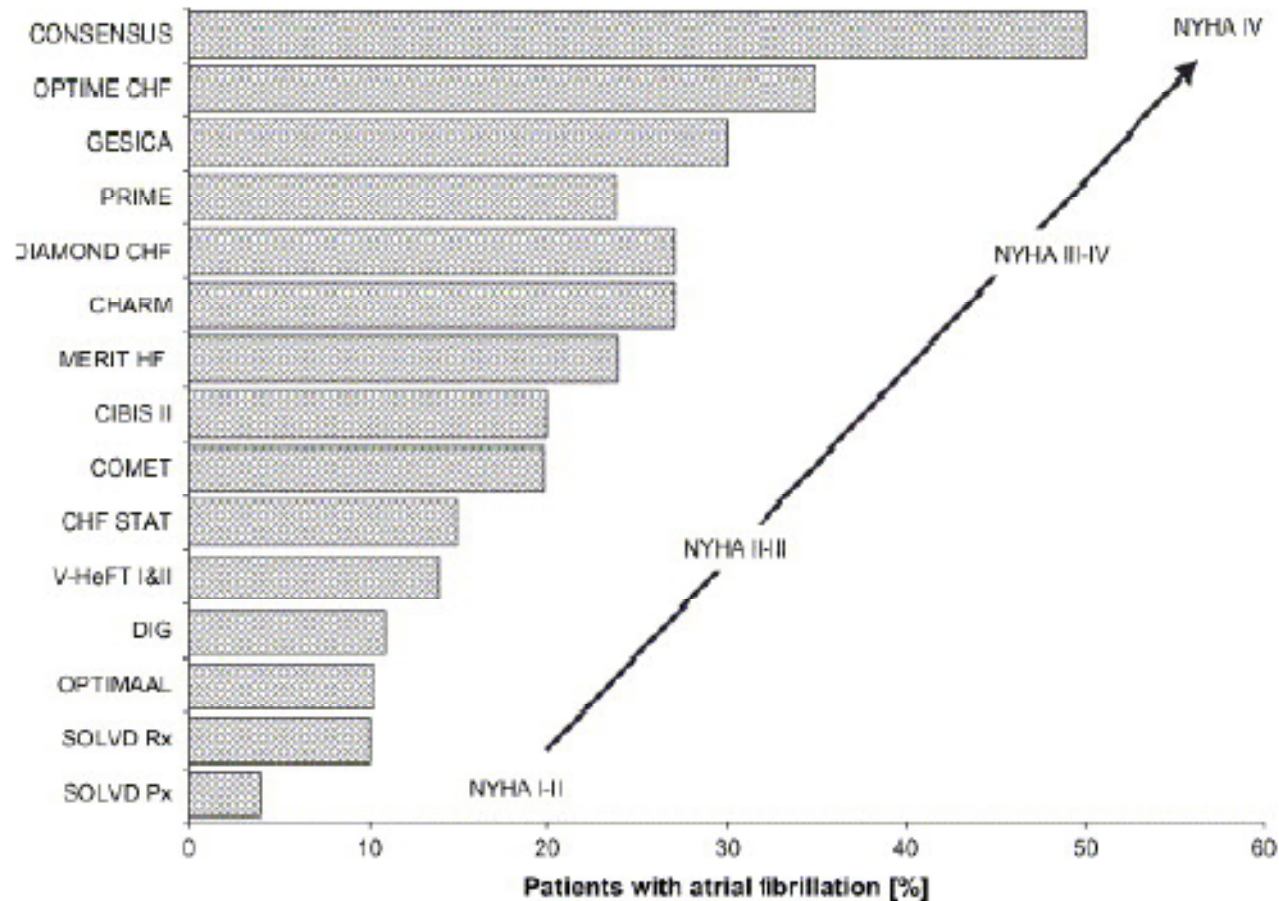
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*More slides to help with
presentation*

Prevalence of AF in clinical studies of CHF



The occurrence of AF in CHF patients increases mortality



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)*
Comorbid condition as a categorical variable		
(C) Mortality after AF		
Impact of prior CHF	2.2 (1.6 to 3.0)*	1.8 (1.3 to 2.3)*
Impact of concurrent CHF‡	2.4 (1.6 to 3.5)*	1.4 (1.0 to 1.9)
(D) Mortality after CHF		
Impact of prior AF	0.8 (0.6 to 1.0)	1.2 (0.9 to 1.6)
Impact of concurrent AF‡	1.0 (0.7 to 1.4)	1.1 (0.8 to 1.5)

* $P < 0.0001$, † $P < 0.01$.

‡Diagnosed on same day. Each letter (A through D) denotes a separate model. Models with the comorbid condition as a time-dependent variable (A and B) are restricted to those without the comorbid condition at the index event. Hazard ratios (HR) are adjusted for age, time period, myocardial infarction, stroke/transient ischemic attack, diabetes, valvular disease, ECG/left ventricular hypertrophy, systolic blood pressure, antihypertensive therapy, and smoking.

The development of AF in patients with CHF is associated with increased mortality.

MASCOT - Implant information

96% of the patients were successfully implanted.

Lead positions:

- RA appendage: 90%.
- RV apex: 81 % (90% in CRT-D, 70% in CRT-P).
- LV lead: 70% lateral/postero-lateral vein.

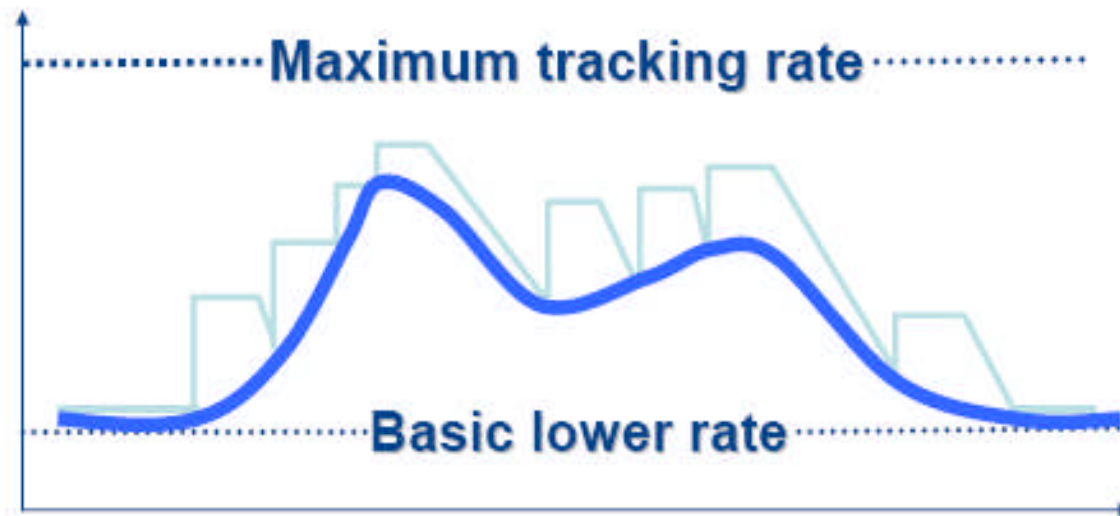
56% of the patients received a CRT-D device.

394 patients were randomized at the time of pre-hospital discharge.

Atrial Overdrive Pacing

MASCOT

AF Suppression™ (St. Jude Medical)



AF Suppression™

Sinus rate