Non-Pharmacologic Treatment in Heart Failure

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Device-based treatment of heart failure

Function of device	Examples
Monitor heart failure condition	Implantable hemodynamic monitors, home scales, home monitoring systems
Prevent or treat rhythm disturbances	Pacemakers for bradycardia, ICD, LifeWest Wearable AED (LIFECOR, Inc, PA)
Improve mechanical efficiency of the heart	Left ventricular or multisite pacing, Biventricular pacing, CorCap (Accorn, MN) Myosplint (Myocor, MN)
Cardiac replacement therapy	LVAD, BiVAD, TAH

Adapted from Boehmer, Am J Cardiol, 2003

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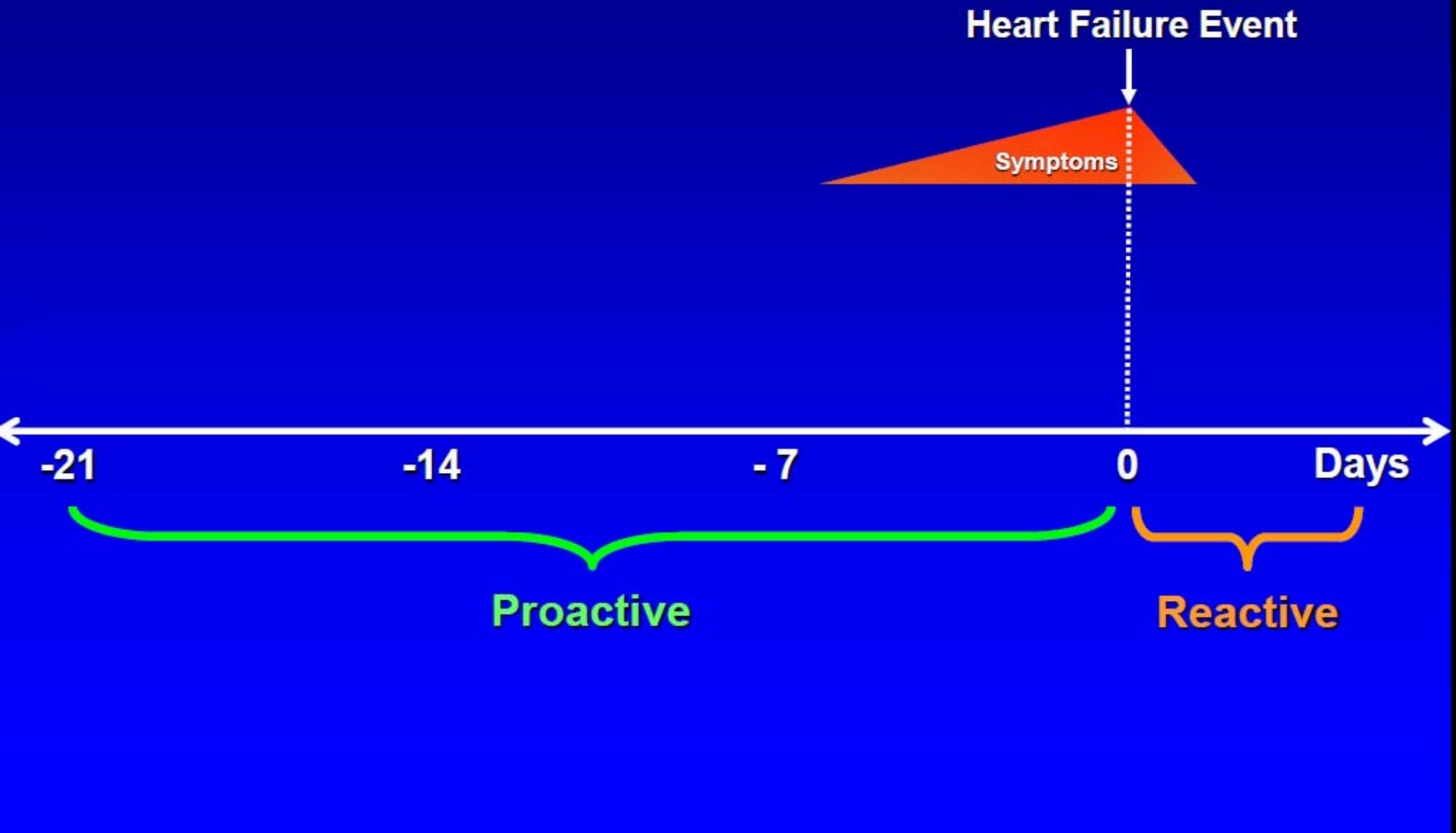
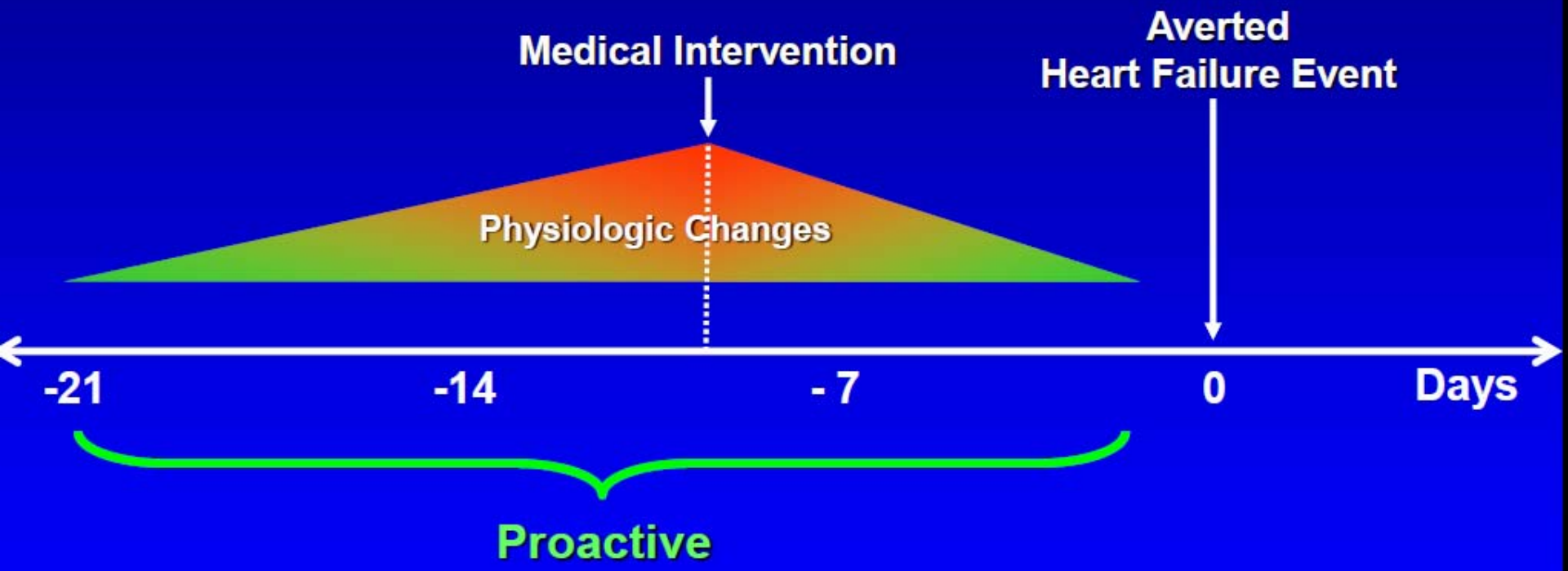
Adapted from Boehmer, Am J Cardiol, 2003

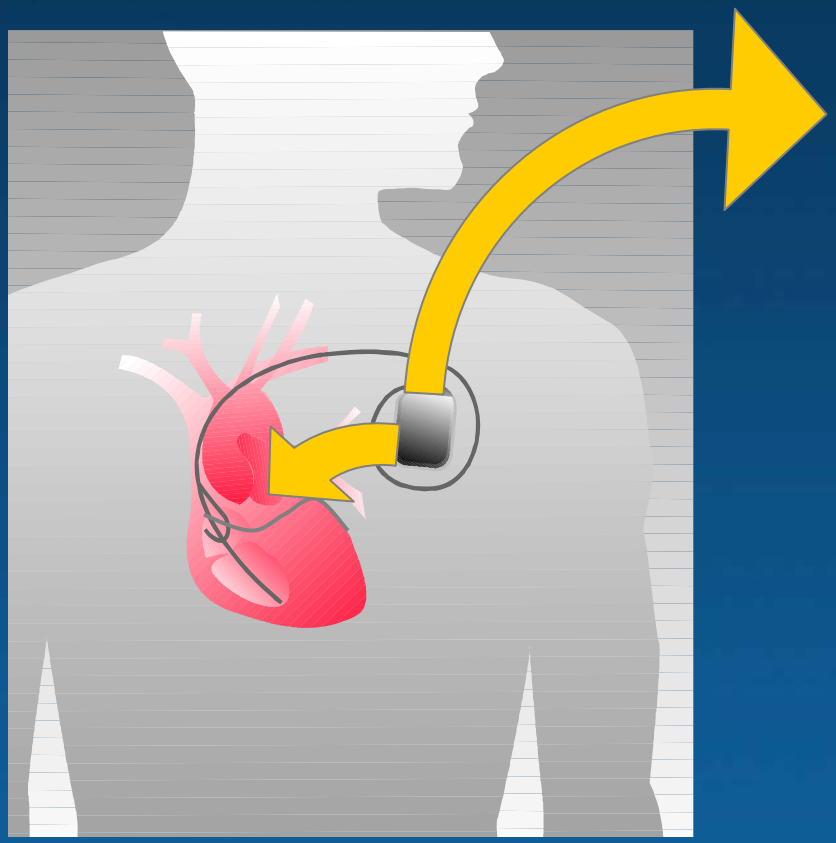
Physiological Premise of Implantable HF Device Diagnostics (1)



Physiological Premise of Implantable HF Device Diagnostics (2)



Devices in heart failure

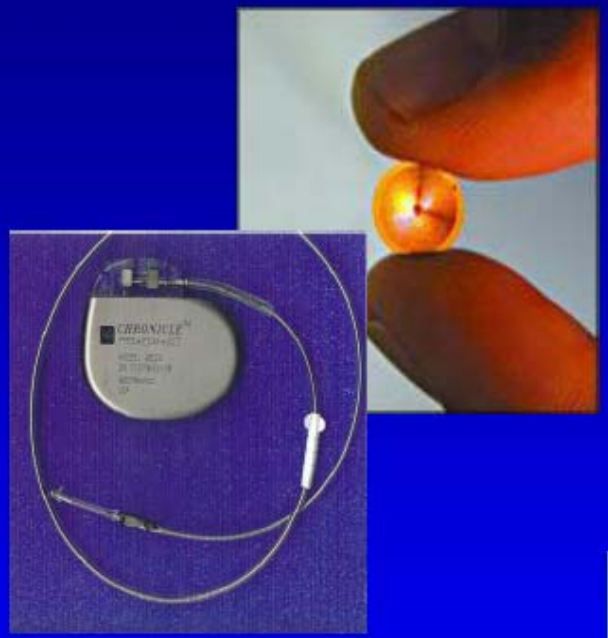


Diagnostic capabilities

- Arrhythmia monitoring
- Heart rate
- Percent pacing
- Physical activity
- Heart rate variability
- Intrathoracic impedance
- RV pressures

Implantable Hemodynamic Monitors

LV Pressure Sensor



RV Pressure Sensors

PA Pressure Sensors

LA Pressure Sensor

The Chronicle®

Implantable continuous hemodynamic monitor (ICHM)

External Pressure Reference

- Heart rate
- Syst RV pressure
- Diast RV pressure
- RV pulse pressure
- ePAD
- pos dP/dt_{max}
- neg dP/dt_{max}
- PEI
- STI
- Activity

Randomized Controlled Trial of an Implantable Continuous Hemodynamic Monitor in Patients With Advanced Heart Failure

The COMPASS-HF Study

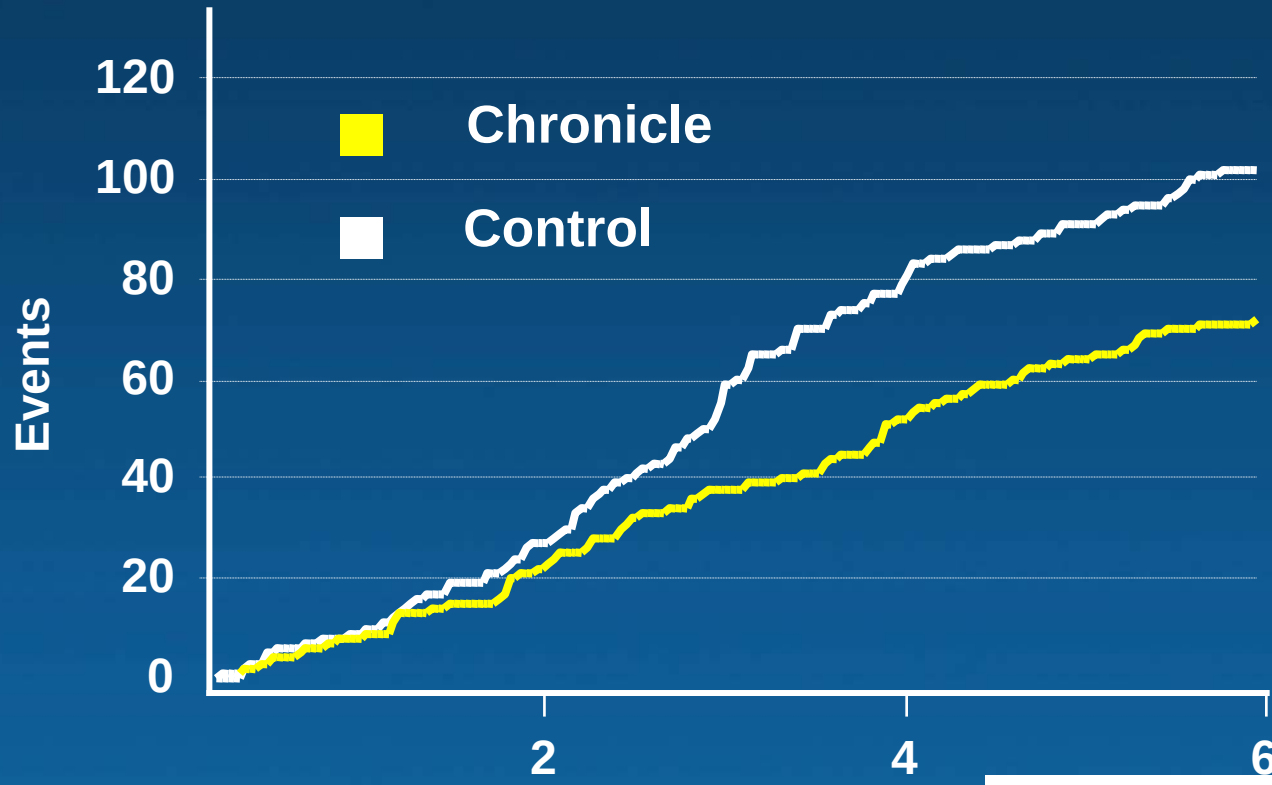
- Primary Effectiveness end-point - the Chronicle group would have a 30% lower rate of combined HF-related events (hospitalizations, emergency department and urgent clinic visits requiring intravenous therapy) compared with the control group.

Bourge et al., JACC, 2008

COMPASS-HF

HF-related Hospitalization

Cumulative Events

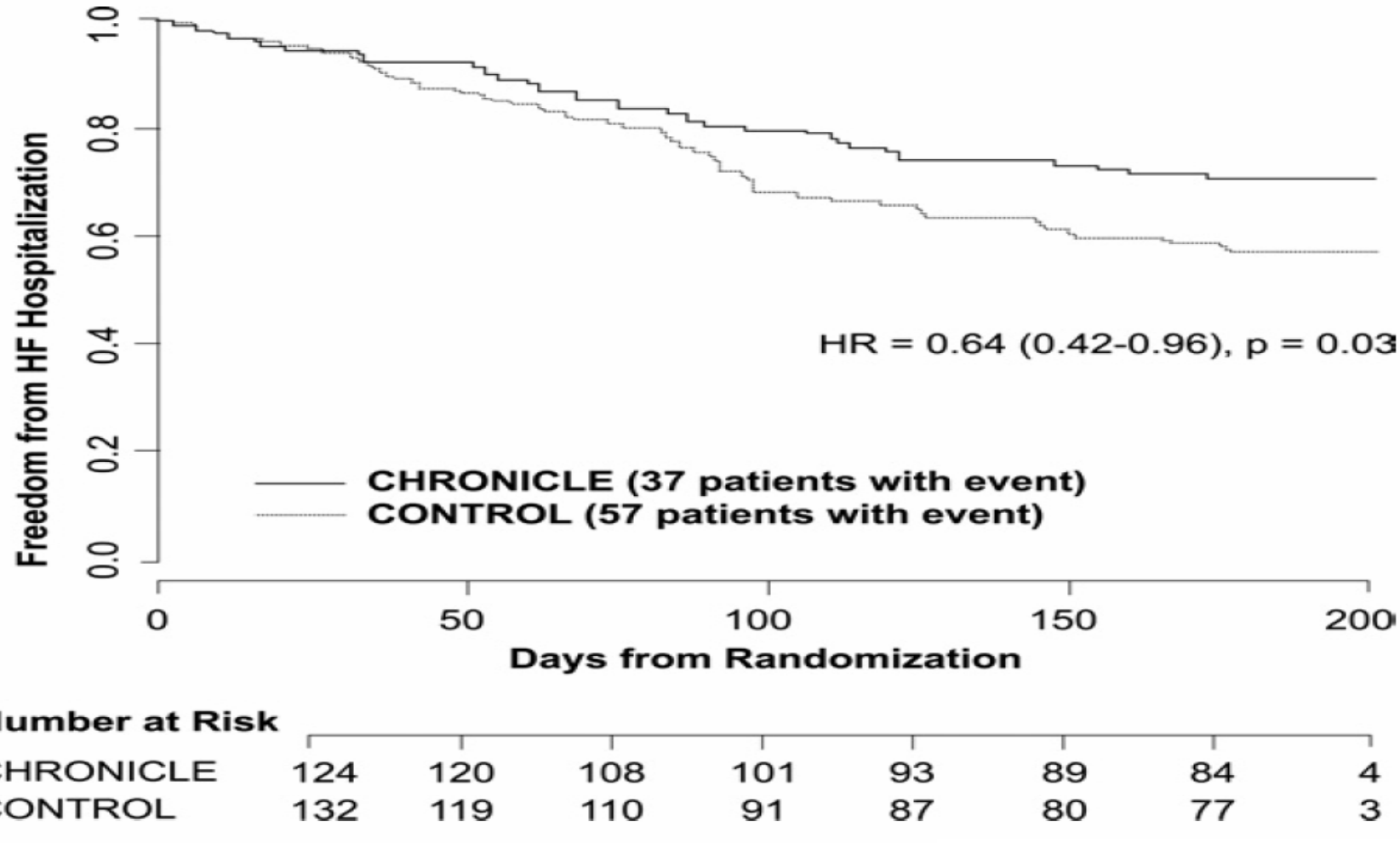


RR: 22%
(p=0.27)

* Hypothesized event rate was 1.2

Bourge et al., JACC, 2008

Reduction in relative risk of a first heart failure related hospitalization



Bourge et al., JACC, 2008

Conclusions

- In patients with moderate to severe HF, the addition of an ICHM to optimal medical management did not significantly reduce the rate of all HF-related events.
- Additional trials will be necessary to establish clinical benefit of ICHM-guided care in this patient population.

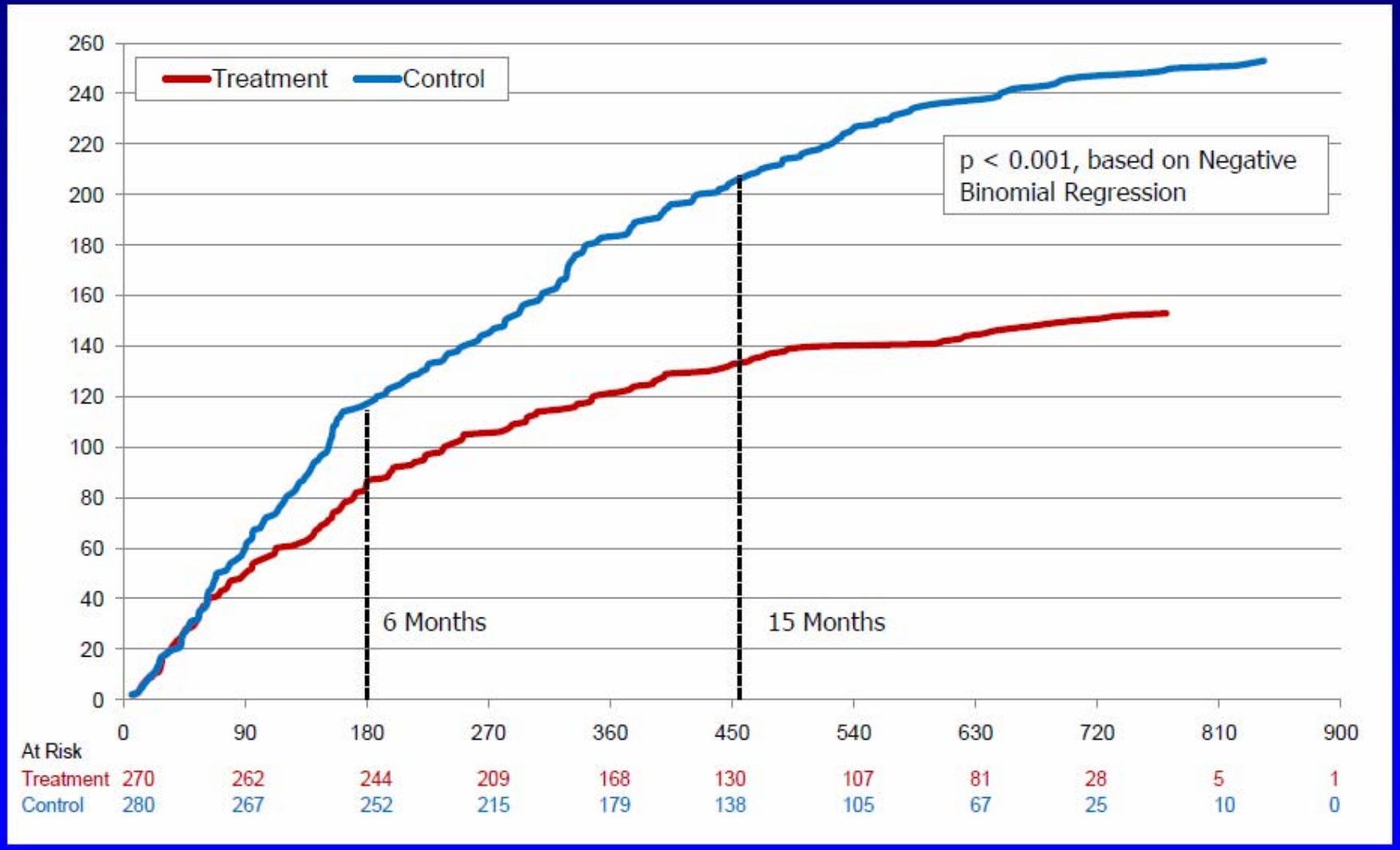
Bourge et al., JACC, 2008

Primary Results of the CardioMEMS Heart Sensor Allows Monitoring of Pressure to Improve Outcomes in NYHA Class III Heart Failure Patients (CHAMPION) Trial

William T. Abraham, MD and Philip B. Adamson, MD
On behalf of the CHAMPION Trial Committees and Study Group

Presented at ESC-HF 2010

Cumulative HF Hospitalizations Over Entire Randomized Follow-Up Period



Intrathoracic impedance

Dryer lungs

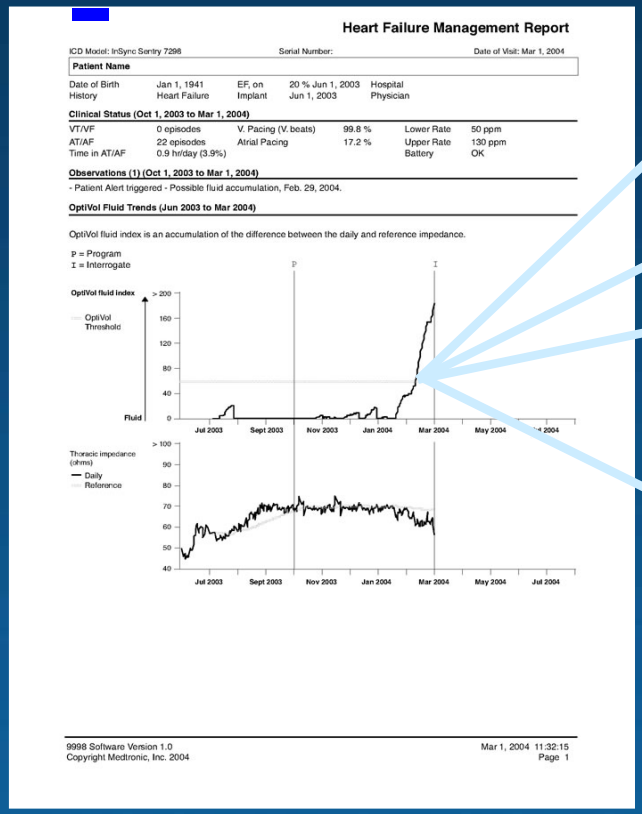
Impedance ↑

Wetter lungs

Impedance ↓

Intrathoracic impedance

Fluid Accumulation Notification Options



Heart Failure Management Report

ICD Model: InSync Sentry 7298 Serial Number: Date of Visit: Mar 1, 2004

Patient Name

Date of Birth	Jan 1, 1941	EF, on	20 % Jun 1, 2003	Hospital	
History	Heart Failure	Implant	Jun 1, 2003	Physician	

Clinical Status (Oct 1, 2003 to Mar 1, 2004)

VT/VF	0 episodes	V. Pacing (V. beats)	99.8 %	Lower Rate	50 ppm
AT/AF	22 episodes	Atrial Pacing	17.2 %	Upper Rate	130 ppm
Time in AT/AF	0.9 hr/day (3.9%)			Battery	OK

Observations (1) (Oct 1, 2003 to Mar 1, 2004)

- Patient Alert triggered - Possible fluid accumulation, Feb. 29, 2004.

OptiVol Fluid Trends (Jun 2003 to Mar 2004)

OptiVol fluid index is an accumulation of the difference between the daily and reference impedance.

P = Program
I = Interrogate

OptiVol fluid index
OptiVol Threshold
Fluid
> 200
160
120
80
40
0
Jul 2003 Sept 2003 Nov 2003 Jan 2004 Mar 2004 May 2004

Thoracic impedance (ohms)
Daily
Reference
> 100
90
80
70
60
50
40
Jul 2003 Sept 2003 Nov 2003 Jan 2004 Mar 2004 May 2004 Jul 2004

9998 Software Version 1.0
Copyright Medtronic, Inc. 2004

Mar 1, 2004 11:32:15
Page 1

- Observations with Trends
- Device audible alert
- SentryCheck™
- Patient look indicator

European Heart Journal (2007) 28, 1835–1840
doi:10.1093/eurheartj/ehl506

European Heart Journal

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Clinical research
Heart failure/cardiomyopathy

Clinical utility of intrathoracic impedance monitoring to alert patients with an implanted device of deteriorating chronic heart failure

- 640 pts with heart failure elligible for CRT-D (InSync Sentry®, Medtronic Inc, USA) implantation were enrolled in 42 countries.
- Lack of FU reports in 267 pts.
- Finally 373 pt files were analyzed.

Vollmann et al., 2008

Main Findings

- The device alert detected HF deterioration with an adjusted sensitivity and an adjusted PPV of 60% each.
- Failure of the alert algorithm to detect clinical HF deterioration was in 55% of the cases associated with an increase of the fluid index that was yet below the programmable alert threshold.
- Half of the false-positive alerts were related to other clinical findings or therapeutic interventions.

Vollmann et al., 2008

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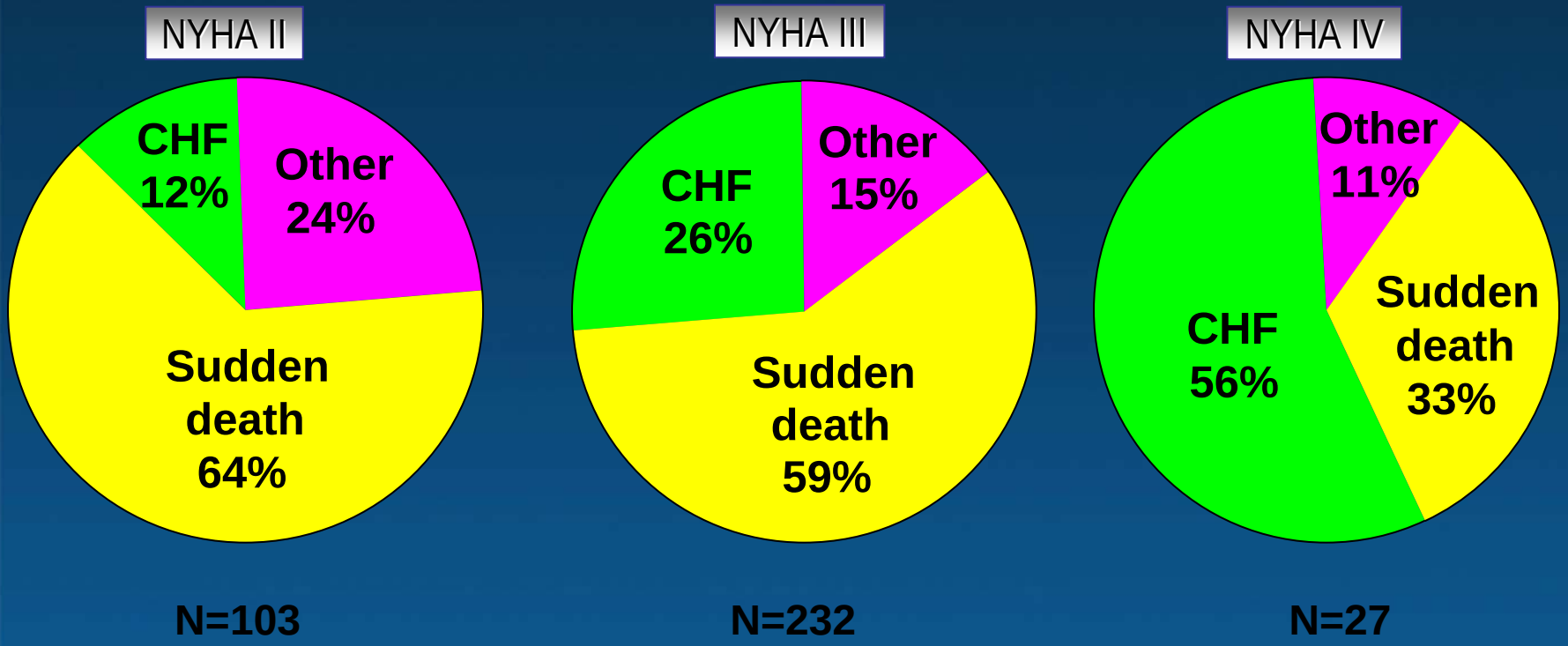
Adapted from Boehmer, Am J Cardiol, 2003

Severity of Heart Failure and Mode of Death

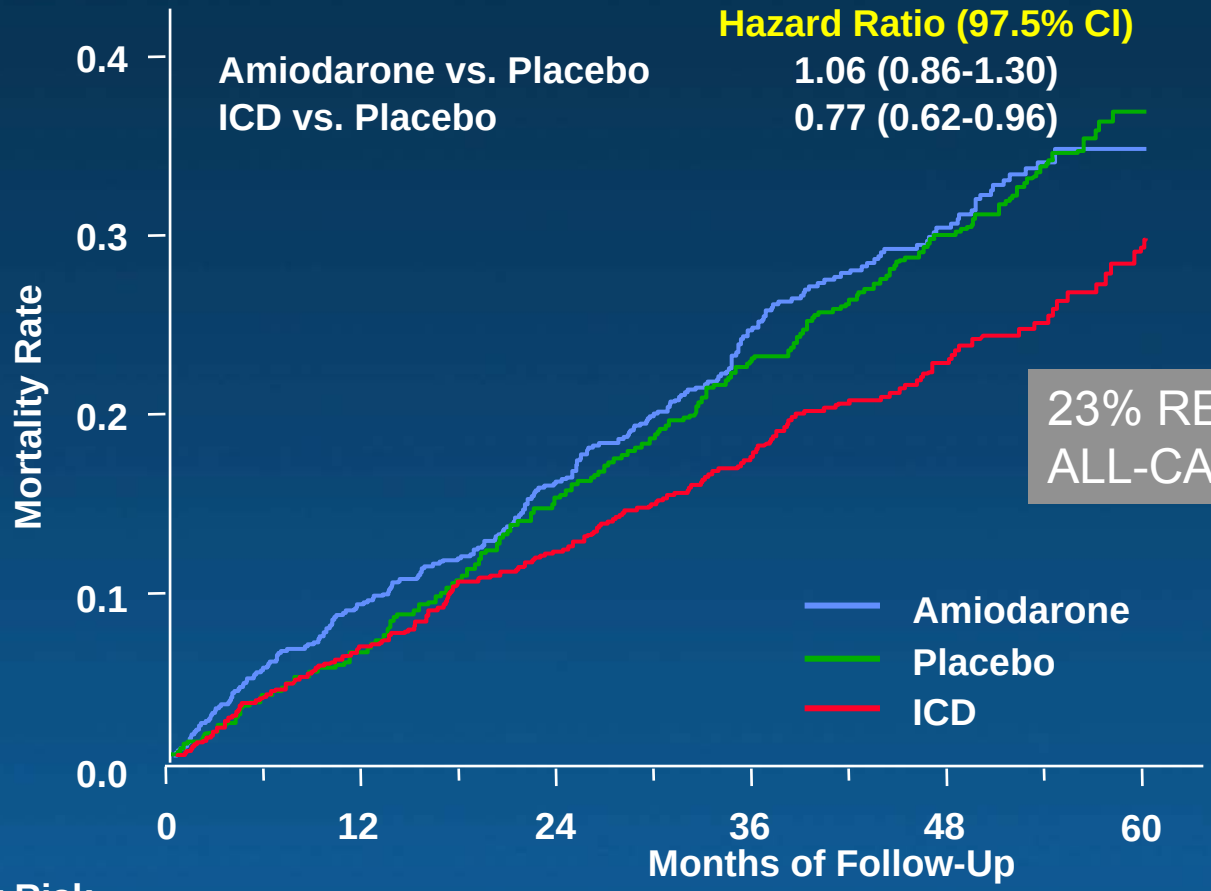


N = number of deaths

MERIT-HF Study Group. Effect of Metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL randomized intervention trial in congestive heart failure (MERIT-HF). LANCET. 1999;353:2001-07.

SCD-HeFT

Mortality Rate Overall Results

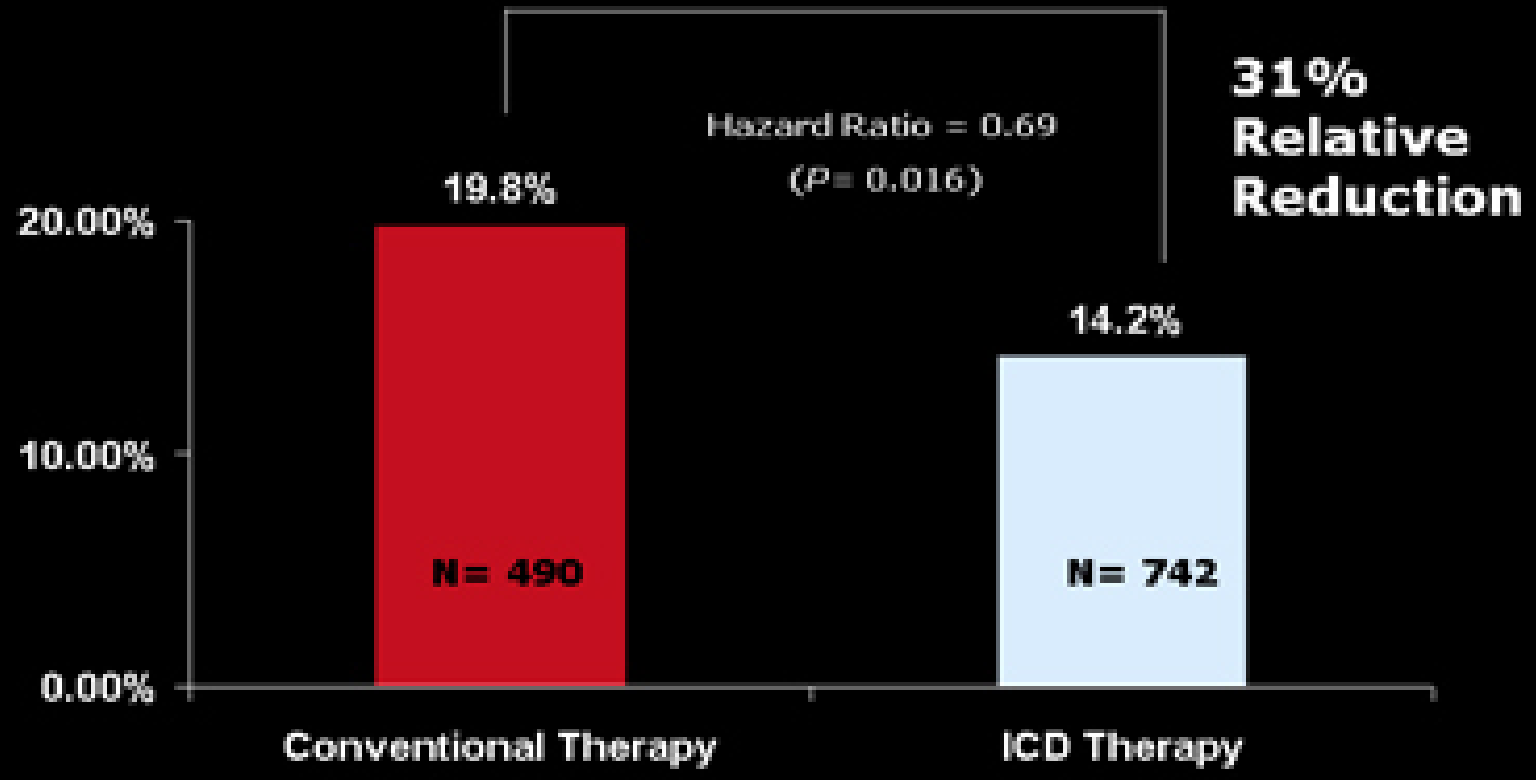


23% REDUCTION IN ALL-CAUSE MORTALITY

No. at Risk						
Amiodarone	845	772	715	484	280	97
Placebo	847	797	724	505	304	89
ICD	829	778	733	501	304	103

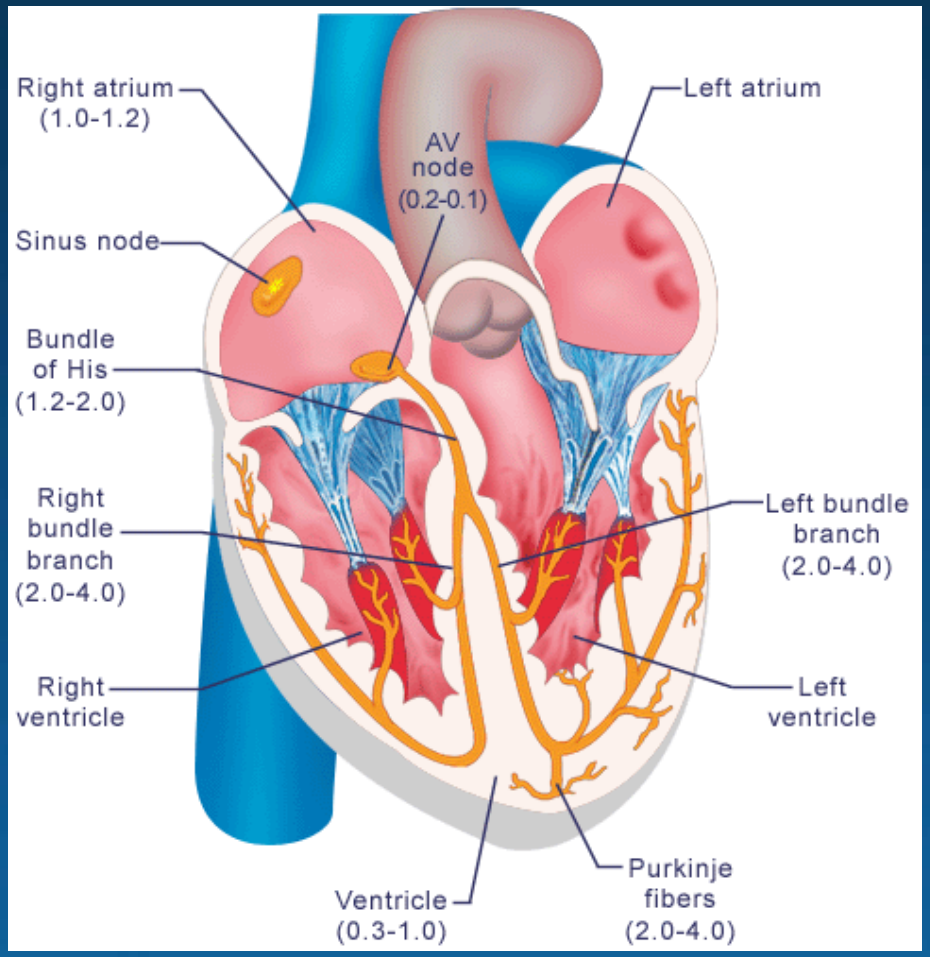
Bardy GH. *N Engl J Med.* 2005;352:225-237.

MADIT II: Multicenter Automatic Defibrillator Implantation Trial II



Moss AJ. *N Engl J Med.* 2002;346:877-883

Contraction Depends on Activation



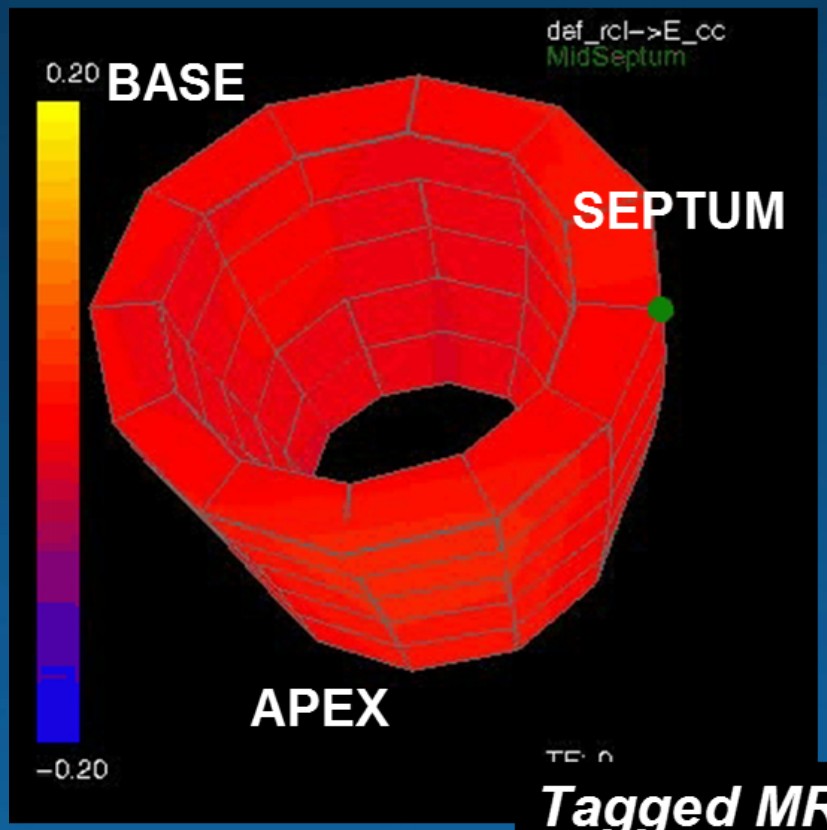
Shrier http://www.mmip.mcgill.ca/unit2/shrier/lect34electrocardiogram.htm

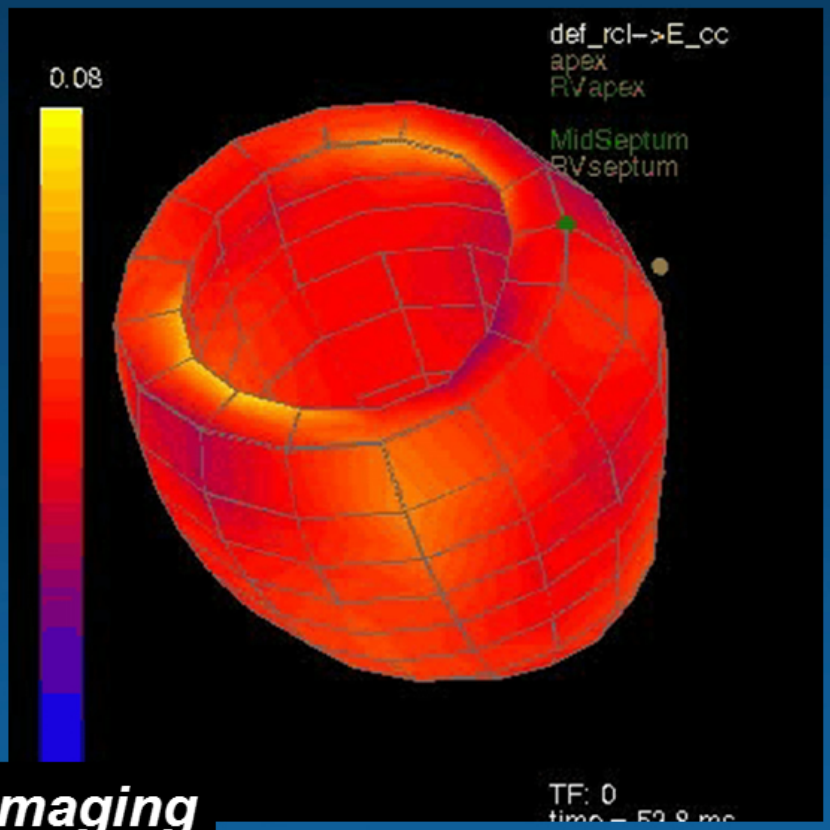
HF1 ASW

Normal vs Abnormal Contraction

Mechanical Dyssynchrony with IVCD

Normal **Dilated Cardiomyopathy**





Tagged MRI Imaging

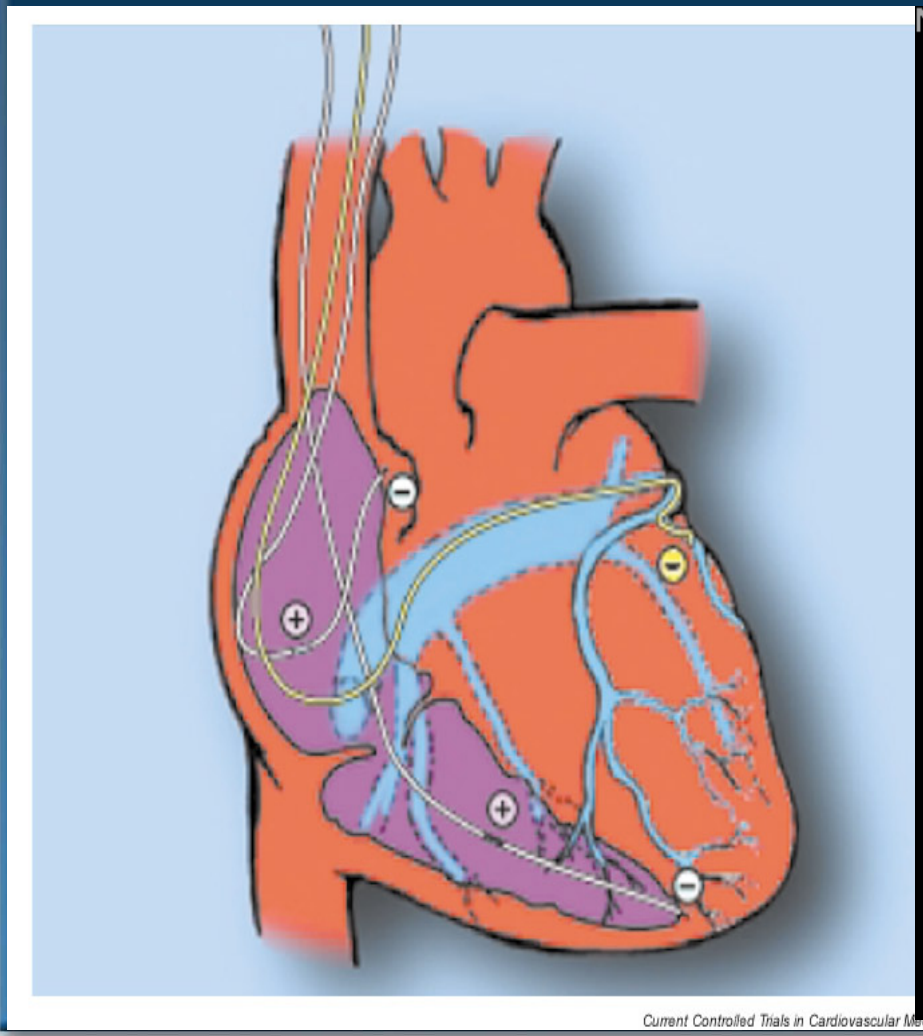
Curry C. Circulation 2000;101:e2

Dysynchrony - Consequences

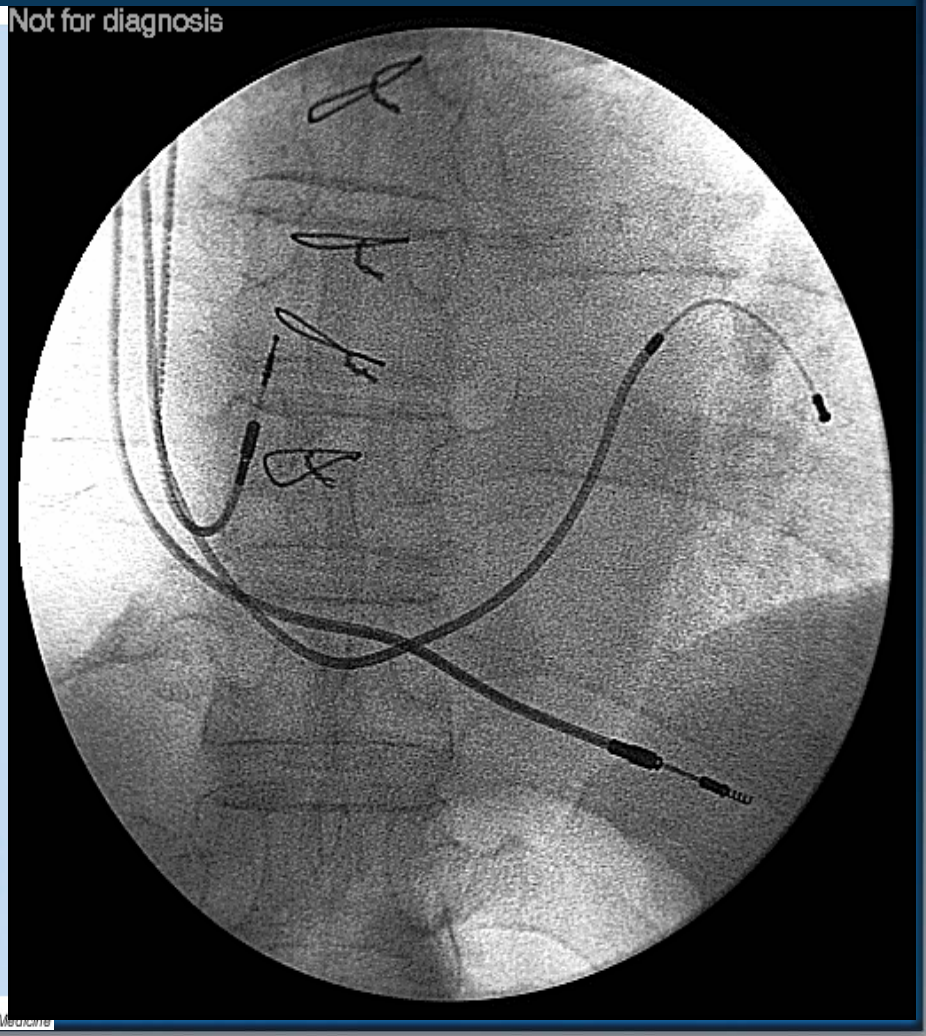
- Abnormal septal motion[1]
- Reduced dP/dt[3,4]
- Reduced pulse pressure[4]
- Lower ejection fraction[4]
- Reduced diastolic filling [1,2,4]
- Mitral regurgitation[1,2,4]

1 Grines CL, Bashore TM, Boudoulas H, et al. *Circulation* 1989;79:845-853.
2 Xiao, HB, Lee CH, Gibson DG. *Br Heart J* 1991;66:443-447.
3 Xiao HB, Brecker SJD, Gibson DG. *Br Heart J* 1992;68:403-407.
4 Yu C-M, Chau E, Sanderson JE, et al. *Circulation*. 2002;105:438-445.

Biventricular pacemaker leads



Current Controlled Trials in Cardiovascular Medicine

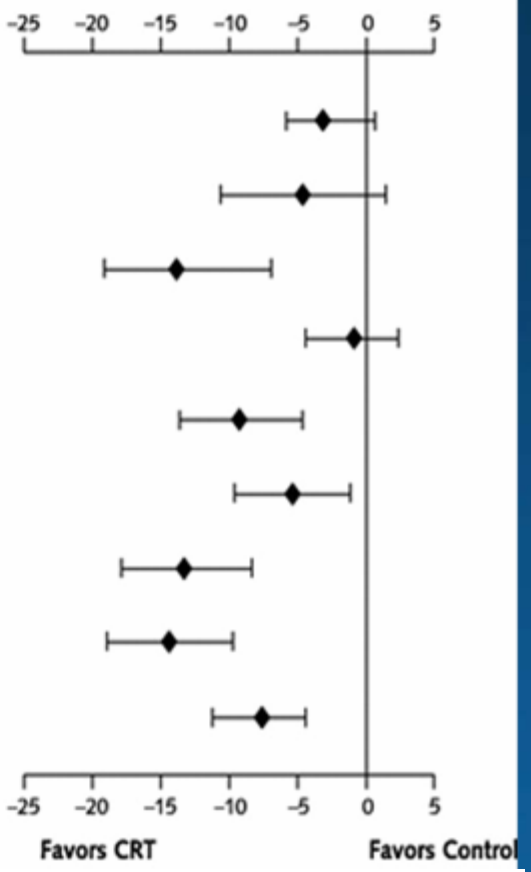


CRT Background

- CRT has been shown to be consistently associated with:
  - Reductions in LV size and volume
  - Increased Stroke Volume
  - Increased Ejection Fraction
  - Reduced Mitral Regurgitation
  - Improved exercise capacity
  - Improved QOL and functional capacity

Quality of Life and CRT

Study, Year (Reference)	Quality of Life: CRT Group Patients, *n*	CRT Group Mean MLWHF Score ± SD	Control Group Patients, *n*	Control Group Mean MLWHF Score ± SD	Weighted Mean Difference in MLWHF Score (95% CI)
PATH-CHF, 2002 (19)	41	25.2 ± 10.6	41	28.1 ± 11.2	−2.9 (−6.4 to 0.6)
MUSTIC-AF, 2002 (18)	39	−9.9 ± 21.3	39	−5.5 ± 21.7	−4.4 (−11.2 to 2.4)
MUSTIC-SR, 2001 (12)	45	−17.4 ± 21.6	45	−3.8 ± 22.4	−13.6 (−20 to −7.2)
CONTAK-CD, 2003 (15)	234	−5.2 ± 19.8	225	−4.5 ± 20.2	−0.7 (−4.4 to 3)
MIRACLE, 2002 (13)	213	−18 ± 28.6	193	−9 ± 22.9	−9 (−14 to −4)
MIRACLE-ICD, 2003 (14)	162	−18.3 ± 23.2	153	−13.1 ± 22.7	−5.2 (−10.3 to −0.1)
COMPANION, 2004 (21)	459	−25 ± −26	104	−12 ± 23	−13 (−18 to −8)
COMPANION-CD, 2004 (21)	479	−26 ± 28	103	−12 ± 23	−14 (−19.1 to −8.9)
Overall					−7.6 (−11.5 to −3.8)

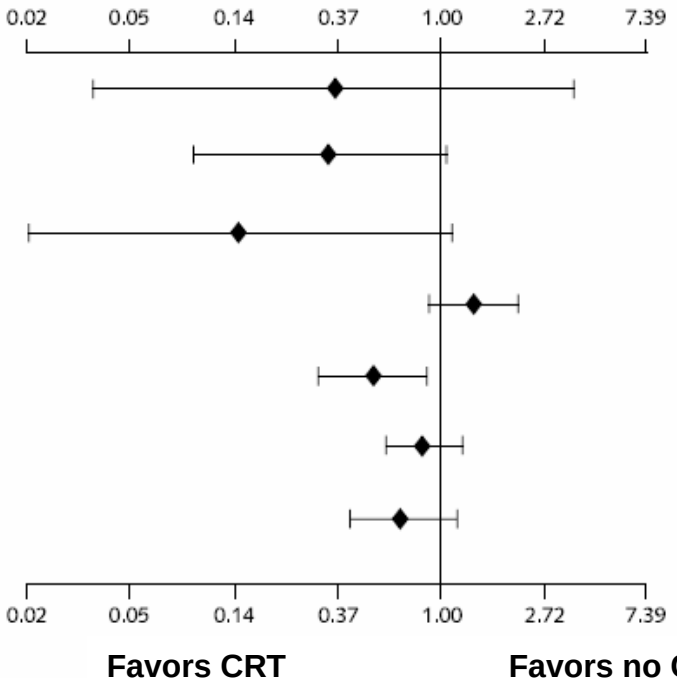


Favors CRT Favors no CRT

McAlister FA. Ann Intern Med 2004;141:381-390

CHF Hospitalizations with CRT

Study, Year (Reference)	Heart Failure Hospitalizations: CRT Group, *n/n*	Control Group, *n/n*	RR (95% CI)
MUSTIC-AF, 2002 (18)	1/25	2/18	0.36 (0.04–3.67)
MUSTIC-SR, 2002 (12)	3/29	9/29	0.33 (0.1–1.11)
RD-CHF, 2003 (22)	1/22	7/22	0.14 (0.02–1.07)
CONTAK-CD, 2003 (15)	32/245	39/245	1.39 (0.91–2.11)
MIRACLE, 2002 (13)	18/228	34/225	0.52 (0.3–0.9)
MIRACLE-ICD, 2003 (14)	47/272	58/282	0.84 (0.59–1.19)
Overall			0.68 (0.41–1.12)

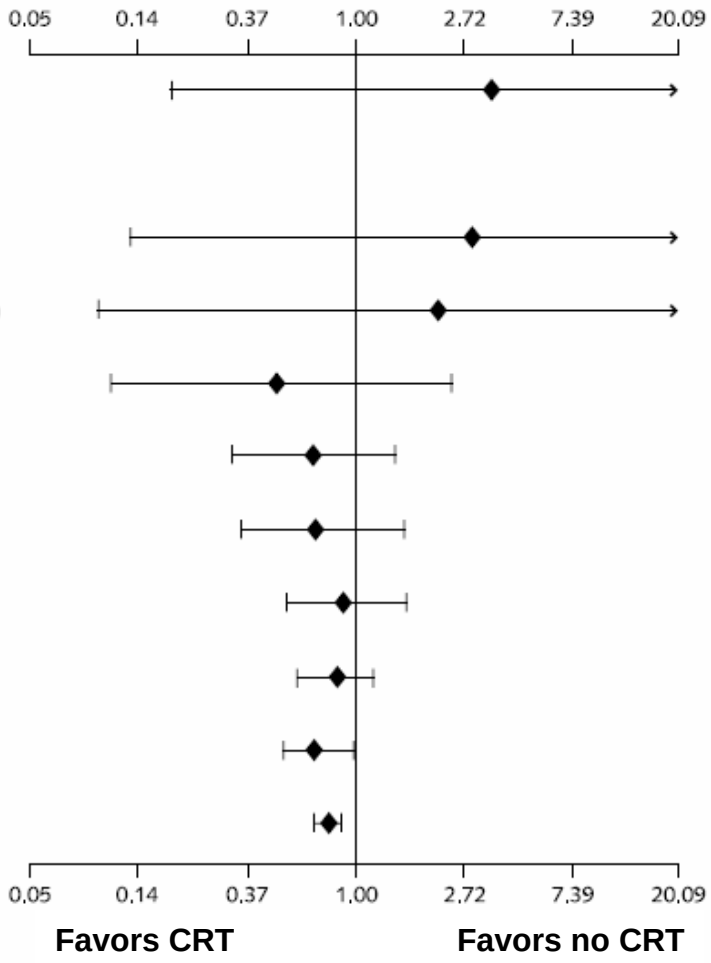


McAlister FA. Ann Intern Med 2004;141:381-390

Does CRT Prevent Death?

All Cause Mortality and CRT

Study, Year (Reference)	All-Cause Mortality: CRT Group, *n/n*	Control Group, *n/n*	RR (95% CI)
PATH-CHF, 2002 (19)	2/24	0/17	3.6 (0.18–70.54)
Garrigue et al., 2002 (20)	0/6	0/7	Excluded
MUSTIC-SR, 2001 (12)	1/29	0/29	3 (0.13–70.74)
MUSTIC-AF, 2002 (18)	1/25	0/18	2.19 (0.09–50.93)
RD-CHF, 2003 (22)	2/22	4/22	0.5 (0.1–2.45)
CONTAK-CD, 2003 (15)	11/245	16/245	0.69 (0.33–1.45)
MIRACLE, 2002 (13)	12/228	16/225	0.74 (0.36–1.53)
MIRACLE-ICD, 2003 (14)	24/272	27/282	0.92 (0.55–1.56)
COMPANION, 2004 (21)	131/617	39/154	0.84 (0.61–1.14)
COMPANION-CD, 2004 (21)	105/595	38/154	0.72 (0.52–0.99)
Overall			0.79 (0.66–0.96)



McAlister FA. Ann Intern Med 2004;141:381-390

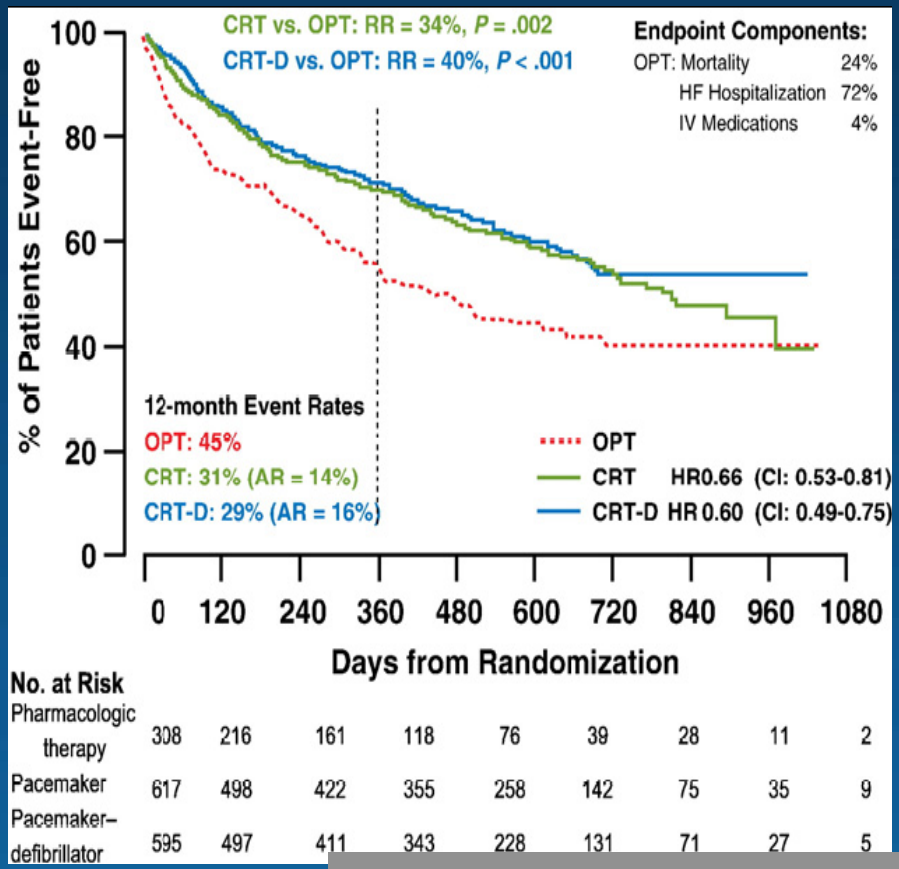
The COMPANION Trial

- 1520 patients* enrolled at 30 centers
- NYHA FC III/IV, LVEF ≤0.35, QRS ≥120 ms
- Optimal medical therapy vs. CRTp vs. CRTd with optimal medical therapy

**stopped early by DSMB; 2200 planned*

COMPANION: 1^0 Endpoint

Death, Hospitalization or Outpatient Medication

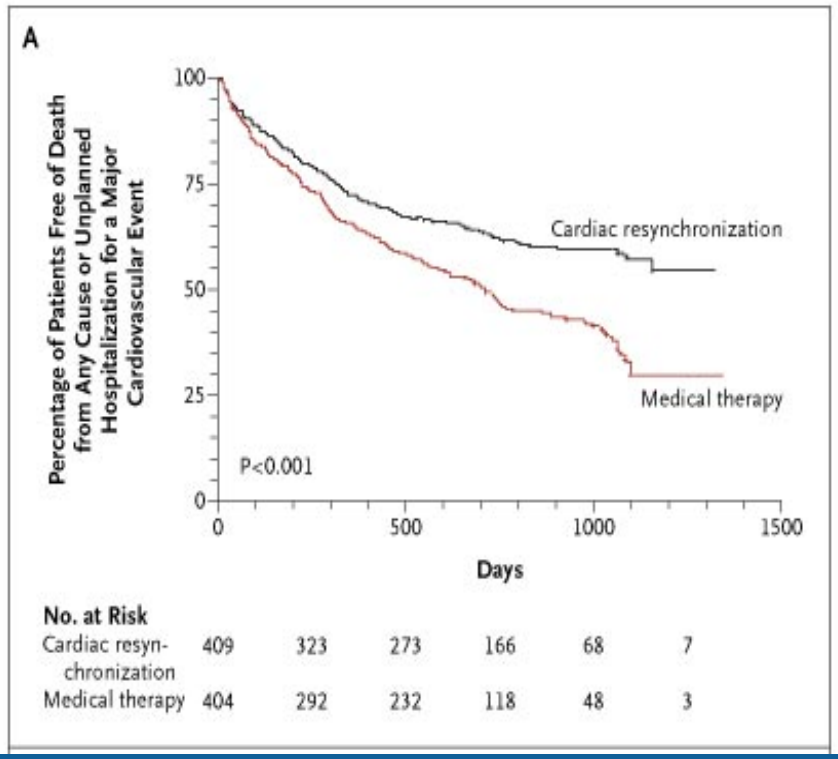


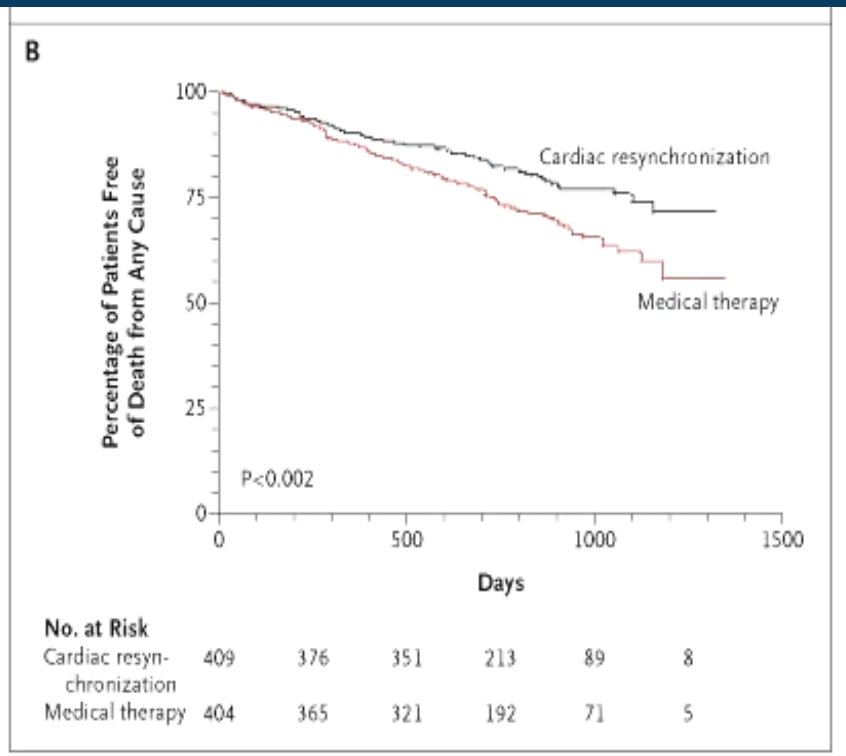
Bristow M N Engl J Med 2004;350:2140-2150

CARE – HF Study

Maybe CRTp is all that is needed

36% reduction in all-cause mortality,
10% absolute risk reduction





Cleland JGF N Engl J Med 2005;352:1539-1549

PROSPECT - Predictors of Response to CRT

(*Circulation.* 2008;117:2608-2616

- 53 European, American and Hong Kong centers
- 498 pts with standard CRT indications
- Twelve echo parameters of dyssynchrony were evaluated.
- Outcomes - improved clinical composite score and >=15% reduction in LVESV at 6 months
- AUC<0.62

PROSPECT - Predictors of Response to CRT

(*Circulation.* 2008;117:2608-2616

- ***Conclusion***
  - Given the modest sensitivity and specificity in this multicenter setting despite training and central analysis, no single echocardiographic measure of dyssynchrony may be recommended to improve patient selection for CRT beyond current guidelines.

Recommendation in patients with heart failure in NYHA function class III/IV

Recommendation	Patient Population	Class	LoE
CRT-P/CRT-D* is recommended to reduce morbidity and mortality	**NYHA function class III/IV** LVEF≤35%, QRS≥120 ms, SR Optimal medical therapy Class IV patients should be ambulatory**	I	A

*Reasonable expectation of survival with good functional status for >1 year for CRT-D. Patients with a secondary prevention indication for an ICD should receive a CRT-D.

** No admissions for HF during the last month and a reasonable expectation of survival >6 months.

European Heart Journal
doi:10.1093/eurheartj/ehq337

CRT-P/CRT-D in patients with heart failure in NYHA function class III/IV

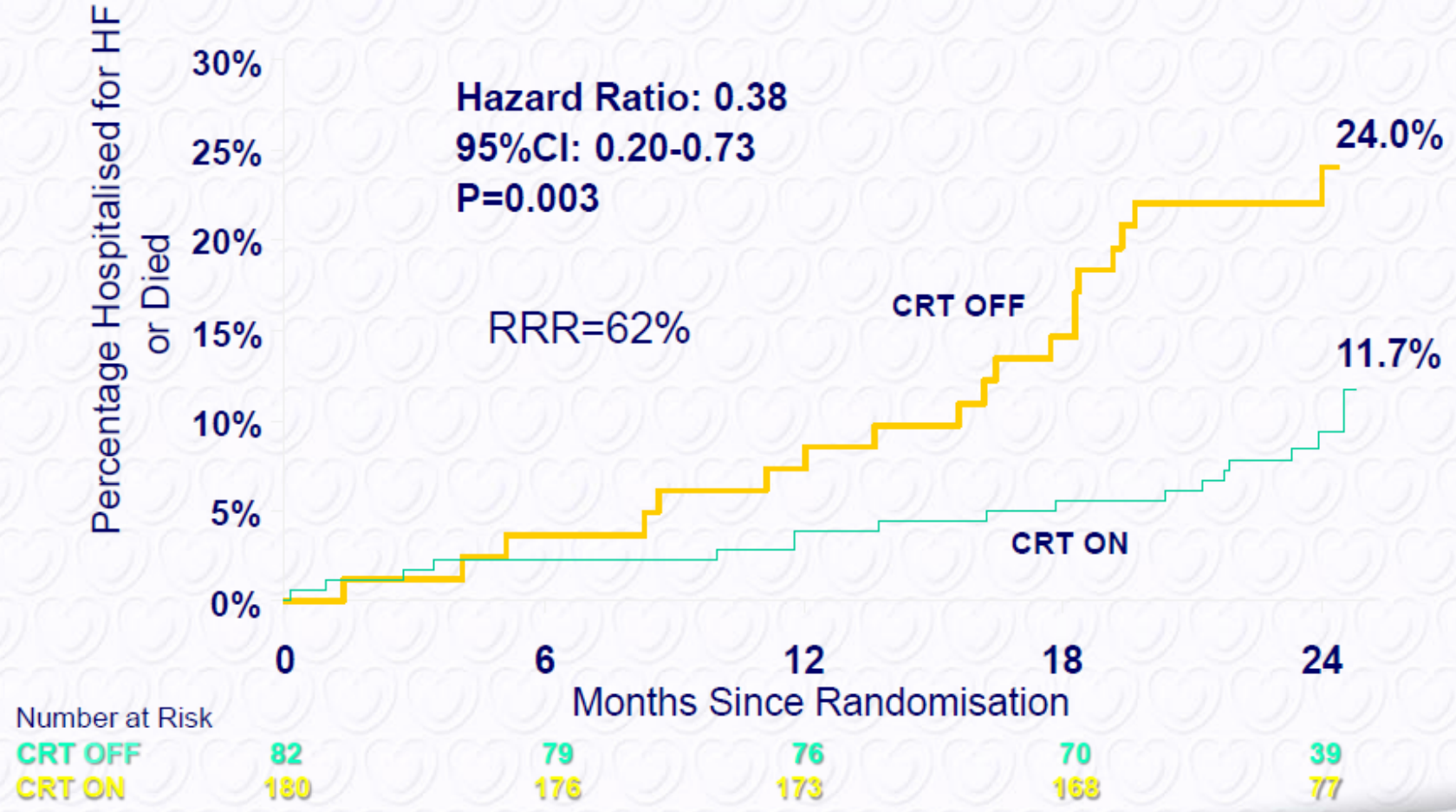
Key points:

- New: LV dilatation no longer required
- New: Class IV patients should be ambulatory
- New: Reasonable expectation of survival with good functional status for >1 year for CRT-D
- Evidence is strongest for patients with typical LBBB
- Similar level of evidence for CRT-P and CRT-D

European Heart Journal
doi:10.1093/eurheartj/ehq337

REVERSE 24-months analysis:

Reductions in risk of first HF hospitalisation or death



Daubert et al. JACC 2009;54:1837-1846

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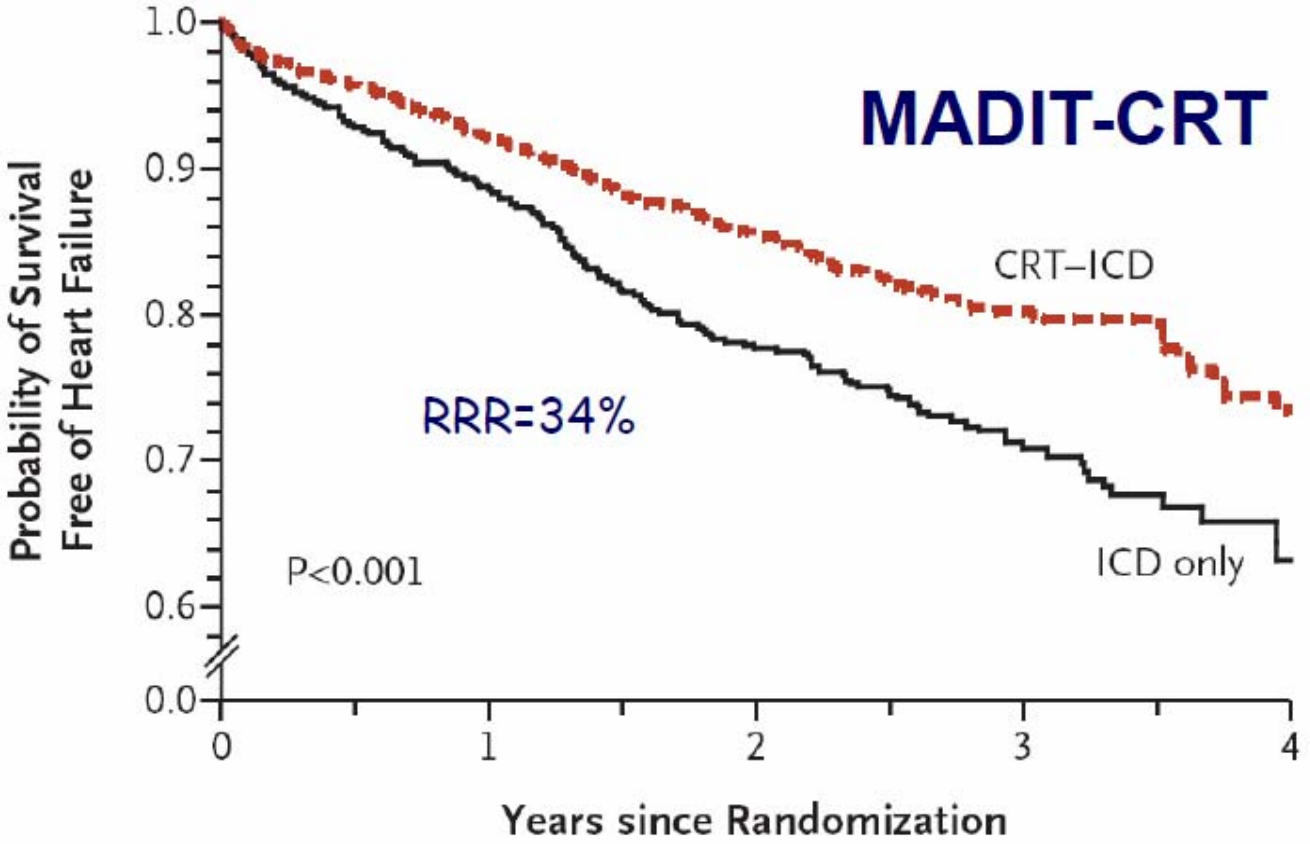
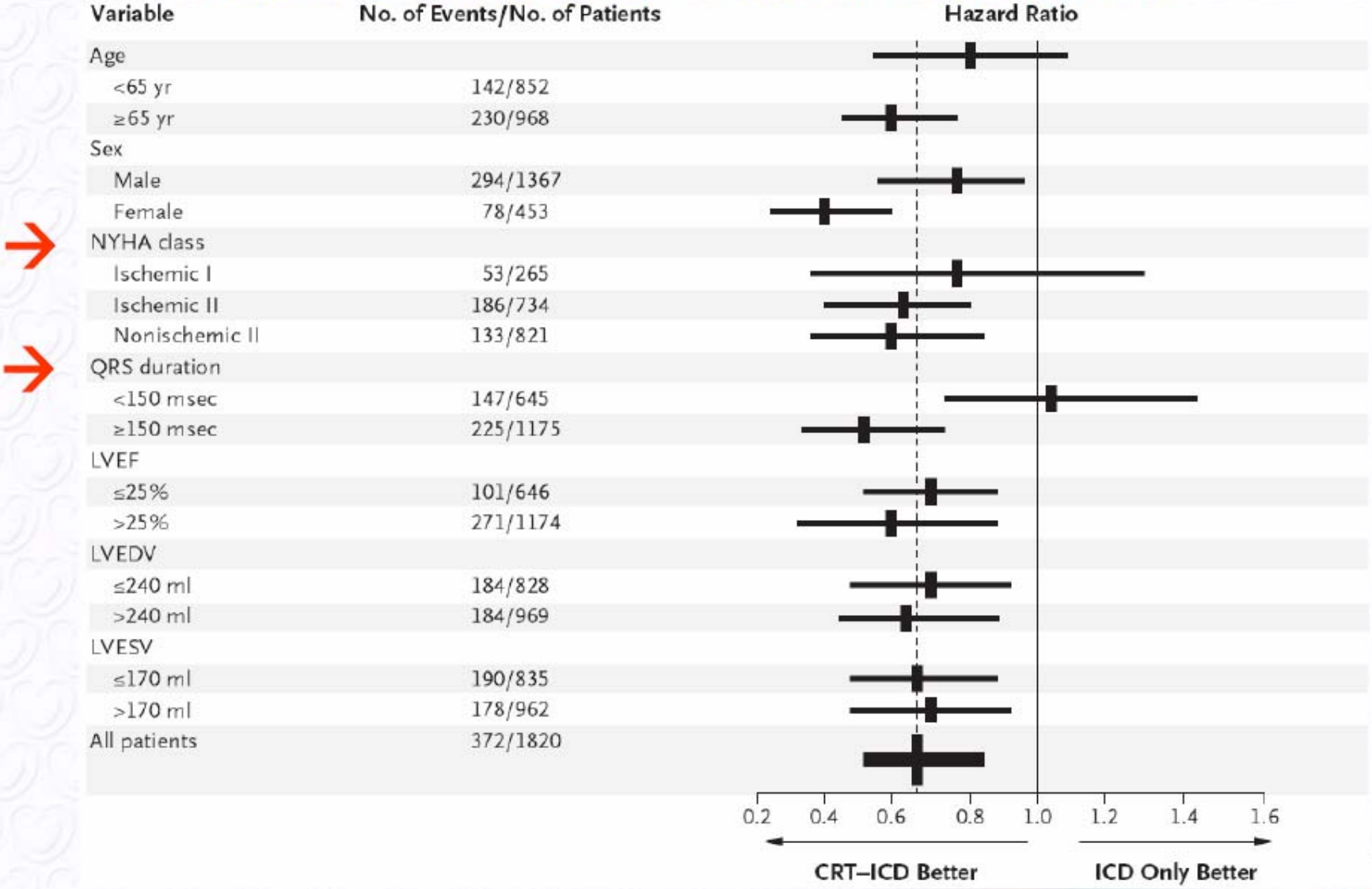
Probability of Survival Free of Heart Failure



No. at Risk (Probability of Survival)					
ICD only	731	621 (0.89)	379 (0.78)	173 (0.71)	43 (0.63)
CRT–ICD	1089	985 (0.92)	651 (0.86)	279 (0.80)	58 (0.73)

N Engl J Med 2009;361

MADIT-CRT: Risk of death or heart failure



Moss et al. N Engl J Med 2009;361:1329-38

Recommendation in patients with heart failure in NYHA function class II

Recommendation	Patient Population	Class	Level
CRT preferentially by CRT-D is recommended to reduce morbidity or to prevent disease progression*	**NYHA function class II** LVEF≤35%, QRS≥150 ms, SR Optimal medical therapy	I	A

* The guideline indication has been restricted to patients with HF in NYHA function class II with a QRS width ≥150 ms, a population with a high likelihood of a favourable response.

European Heart Journal
doi:10.1093/eurheartj/ehq337

CRT-D in patients with heart failure in NYHA function class I/II

Key points:

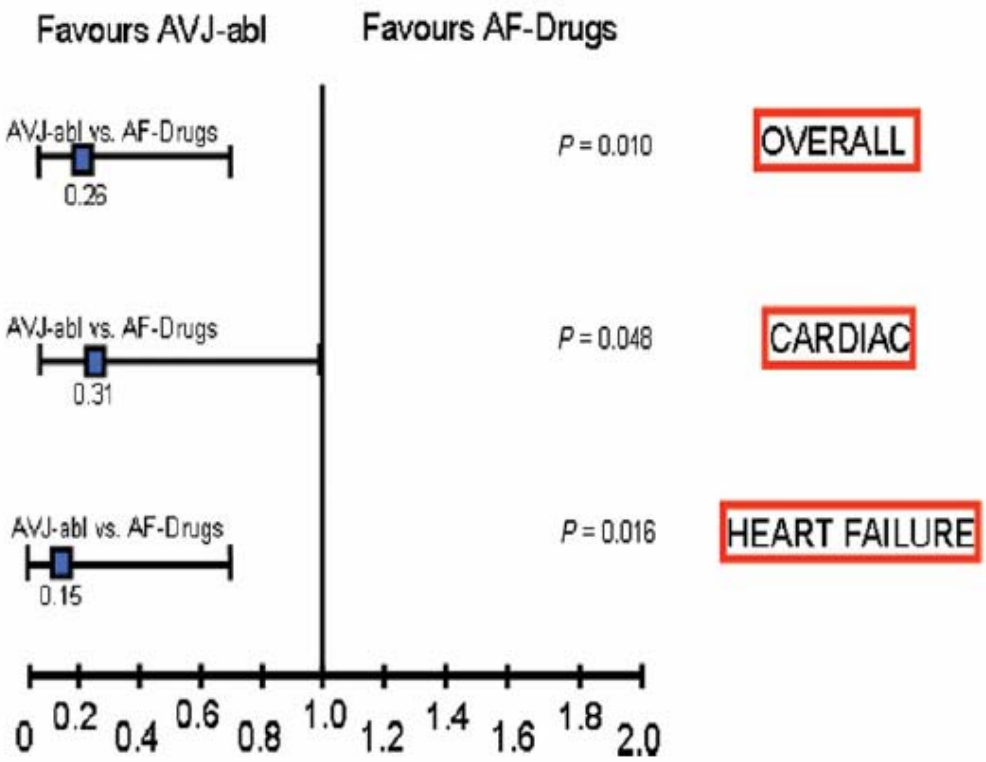
- 2 recent, randomised, prospective, multicentre trials in mild HF (MADIT-CRT and REVERSE) demonstrate reduced morbidity
- 18% of patients in REVERSE and 15% of patients in MADIT-CRT were in NYHA I class at baseline
- Improvement primarily seen in patients with QRS≥150 ms and/or typical LBBB
- Women with LBBB showed a particularly favourable response
- Survival advantage not established
- In MADIT-CRT the extent of reverse remodelling was concordant with and predictive of improvement in clinical outcomes

European Heart Journal
doi:10.1093/eurheartj/ehq337

Adjusted hazard ratios for death
AV ablation vs. AF drug therapy

Atrial Fibrillation

Hazard ratio estimates on the mode of death were adjusted for centre, age, gender, aetiology, NYHA class, QRS width, left ventricular ejection fraction, and device type.



Gasparini et al. Eur Heart J 2008;29:1644-1652

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Recommendations in patients with heart failure and permanent atrial fibrillation

Recommendations	Patient Population	Class	Level
CRT-P/CRT-D* should be considered to reduce morbidity	**NYHA function class III/IV** LVEF≤35%, QRS≥130 ms Pacemaker dependency induced by AV nodal ablation	**IIa**	**B**
CRT-P/CRT-D* should be considered to reduce morbidity	**NYHA function class III/IV** LVEF≤35%, QRS≥130 ms Slow ventricular rate and frequent pacing**	**IIa**	**C**

*Reasonable expectation of survival with good functional status for >1 year for CRT-D. Patients with a secondary prevention indication for an ICD should receive a CRT-D.

** Frequent pacing is defined as ≥95% pacemaker dependency

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CRT-P/CRT-D in patients with heart failure and permanent atrial fibrillation

Key points:

- Approximately 1/5 of CRT implantations in Europe are in patients with permanent AF
- NYHA class III/IV symptoms and an LVEF ≤35% are well-established indications for ICD
- Frequent pacing is defined as ≥95% pacemaker dependency
- AV nodal ablation may be required to assure adequate pacing
- Evidence strongest for patients with an LBBB pattern
- Insufficient evidence for mortality recommendation

European Heart Journal
doi:10.1093/eurheartj/ehq337

Recommendations in patients with heart failure and a concomitant class I pacemaker indication

Recommendations	Patient Population	Class	Level
CRT-P/CRT-D* is recommended to reduce morbidity	**NYHA function class III/IV** LVEF≤35%, QRS ≥120 ms	**I**	**B**
CRT-P/CRT-D* should be considered to reduce morbidity	**NYHA function class III/IV** LVEF≤35%, QRS<120 ms	**IIa**	**C**
CRT-P/CRT-D* may be considered to reduce morbidity	**NYHA function class II** LVEF≤35%, QRS<120 ms	**IIb**	**C**

* Reasonable expectation of survival with good functional status for >1 year for CRT-D. Patients with a secondary prevention indication for an ICD should receive a CRT-D.

European Heart Journal
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CRT-P/CRT-D in patients with heart failure and a conventional pacemaker indication

Key points:

- In patients with a conventional indication for pacing, NYHA III/IV symptoms, LVEF ≤35%, QRS width ≥120 ms, a CRT-P/CRT-D is indicated
- RV pacing will induce dyssynchrony
- Chronic RV pacing in patients with LV dysfunction should be avoided
- CRT may permit adequate uptitration of beta-blocker treatment

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doi:10.1093/eurheartj/ehq337

Evidence table 1: Inclusion criteria in RCTs evaluating CRT in heart failure

Trial	Patients	NYHA class	LVEF(%)	LVEDD (mm)	SR/AF	QRS (ms)	ICD
MUSTIC-SR (16)	58	III	≤35%	≥60	SR	≥150	No
MIRACLE (5)	453	III,IV	≤35%	≥55	SR	≥130	No
MUSTIC AF (35)	43	III	≤35%	≥60	AF	≥200	No
PATH CHF (6)	41	III,IV	≤35%	NA	SR	≥120	No
MIRACLE ICD (8)	369	III,IV	≤35%	≥55	SR	≥130	Yes
CONTAK CD (55)	227	II,IV	≤35%	NA	SR	≥120	Yes
MIRACLE ICD II (9)	186	II	≤35%	≥55	SR	≥130	Yes
PATH CHF II (56)	89	III,IV	≤35%	NA	SR	≥120	Yes/No
COMPANION (10)	1520	III,IV	≤35%	NA	SR	≥120	Yes/No
CARE HF (11)	814	III,IV	≤35%	≥30	SR	≥120	No
CARE HF (17)	813	III,IV	≤35%	≥30	SR	≥120	No
REVERSE (21, 22)	610	I,II	≤40%	≥55	SR	≥120	Yes/No
MADIT CRT (20)	1800	I,II	≤30%	NA	SR	≥130 ms	Yes
RAFT (57)	1800 Canada	II,III	≤30%	>60	SR/AF	≥130 ≥200 *	Yes

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Evidence table 2: Endpoints, design and main findings of the RCTs evaluating CRT in heart failure

Trial	Endpoints	Design	Main findings
MUSTIC-SR (16)	6MWT, QoL, pVO_2, Hosp	Single-blinded, controlled, crossover, 6 months	CRT-P improved: 6MWT, QOL, pVO_2; reduced Hosp
MIRACLE (8)	NYHA class, QoL, pVO_2	Double-blinded, controlled, 6 months	CRT-P improved: NYHA, pVO_2, 6MWT
MUSTIC AF (35)	6MWT, QoL, pVO_2, Hosp	Single-blinded, controlled, crossover, 6 months	CRT-P improved all; reduction of Hosp
PATH CHF (6)	6MWT, pVO_2	Single-blinded, controlled, crossover, 12 months	CRT-P improved: 6MWT; pVO_2
MIRACLE ICD (8)	6MWT, QoL, Hosp	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved all from baseline (not ICD)
CONTAK CD (54)	All-cause death + HF Hosp, pVO_2, 6MWT, NYHA class, QoL, LVEDD, LVEF	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved: pVO_2, 6MWT; reduced LVEDD and increased LVEF
MIRACLE ICD II (9)	VE/CO_2, pVO_2, NYHA, QoL, 6MWT, LV volumes, LVEF	Double-blinded, ICD vs. CRT-D 6 months	CRT-D improved: NYHA, VE/CO_2; volumes, LVEF
COMPANION (10)	(1) All-cause death or Hosp	Double-blinded, controlled, OPT, CRT-D, CRT-P, about 15 months	CRT-P/CRT-D: reduced (1)
CARE-HF (11)	(1) All-cause death or CV event (2) All-cause death	Double-blinded, controlled, OPT, CRT-P, 29 months	CRT-P reduced (1) and (2)
REVERSE (21)	(1) % worsened by clinical composite endpoint, (2) LVESVi, (3) HF hosp, (4) all-cause death	Double-blinded, controlled, OPT, CRT-P $\pm$ICD, 12months	Primary endpoint NS CRT-P/CRT-D reduced (2) and (3) hosp but not (4)
MADIT–CRT (20)	(1) HFevent or death (2) All-cause death (3) LVESV	Controlled, CRTP, CRT-D, 2.4 years	CRT-D reduced (1) and (3c) but not (2)

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Summary of indications for CRT in patients with heart failure

Recommendations	Patient population	CoR	LoE
CRT-P/CRT-D* is recommended to reduce morbidity and mortality	**NYHA class III/IV symptoms** LVEF≤35%, QRS≥120 ms, SR Optimal medical therapy Class IV patients should be ambulatory**	I	A
CRT preferentially by CRT-D* is recommended to reduce morbidity or to prevent disease progression	**NYHA class II symptoms** LVEF≤35%, QRS≥150 ms, SR	I	A
CRT-P/CRT-D* should be considered to reduce morbidity	**Permanent Atrial Fibrillation** NYHA class III/IV LVEF≤35%, QRS≥130 ms **Pacemaker dependency induced by AV nodal ablation**	IIa	B
CRT-P/CRT-D* should be considered to reduce morbidity	**Permanent Atrial Fibrillation** NYHA class III/IV LVEF≤35%, QRS≥130 ms **Slow ventricular rate and frequent pacing*** **	IIa	C
CRT-P/CRT-D* is recommended to reduce morbidity	Class I indication for pacemaker **NYHA class III/IV** LVEF≤35%, QRS ≥120 ms	I	B
CRT-P/CRT-D* should be considered to reduce morbidity	Class I indication for pacemaker **NYHA class III/IV** LVEF≤35%, QRS<120 ms	IIa	C
CRT-P/CRT-D* may be considered to reduce morbidity	Class I indication for pacemaker **NYHA class II** LVEF≤35%, QRS<120 ms	IIb	C
LVAD may be considered as destination treatment to reduce mortality	**NYHA IIIB/IV symptoms** Ineligible for cardiac transplantation LVEF≤25%	IIb	B

Possible Risks for Implantable Devices

- Vascular complications
- Long-term risk of infections
- Leads may break/fracture
- Recalls

BUT:

Significant benefits –evaluate patients carefully

Devices are very reliable and improving constantly

The Importance of Patient Selection

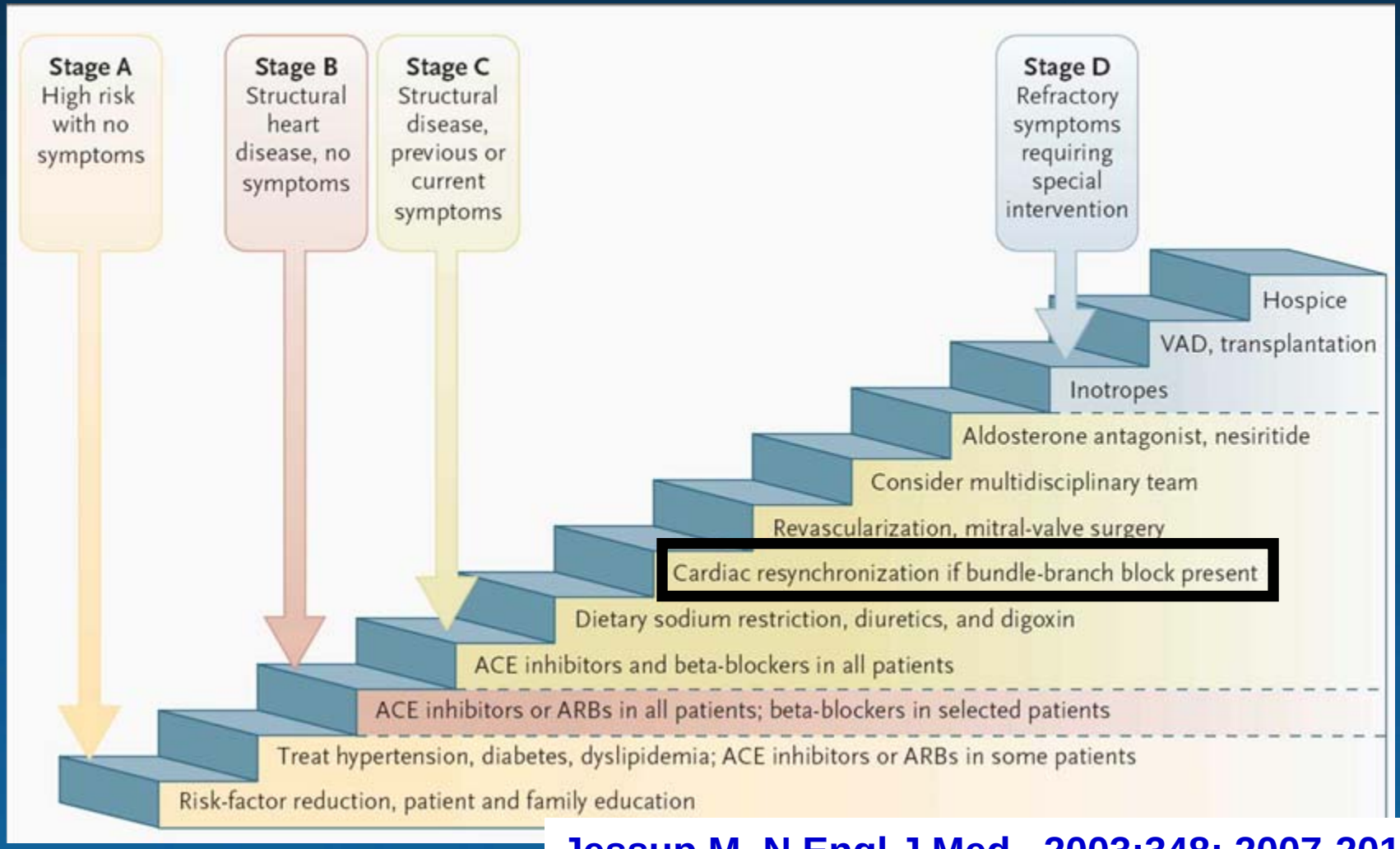
- Maintain relationship with EP/patient and family
- Need to understand:
  - Why treatment is indicated
  - What are the downsides
  - Will continue with medical therapy
  - Possibility of inappropriate shocks

IMPROVE HF: Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting

- 167 outpatient cardiology practices surveyed in the USA
- 15 381 pts with HF, previous MI/LV Dx
- Results for utilization of device therapy in eligible patients:
  - ICD/CRT-D 51%
  - CRT – 39%
- Median 27% of pts received all HF therapies for which they were potentially eligible on the basis of chart documentation.
- Use of guideline-recommended therapies by practices varied widely
- Need to translate outcomes of RCTs, guidelines into clinical practice

Fonarow G, Circ Heart Fail, 2008

Stages of Therapy



Jessup M. N Engl J Med. 2003:348;.2007-2018