



Congresso
Novas Fronteiras em Cardiologia
8 a 10 fevereiro.2013
Hotel Vila Galé Ericeira

Terapêutica “Eléctrica” da Insuficiência Cardíaca

- Guidelines da terapêutica da insuficiência cardíaca com dispositivos implantáveis: uma actualização -

Mário Oliveira, MD, PhD, FESC, FHRS

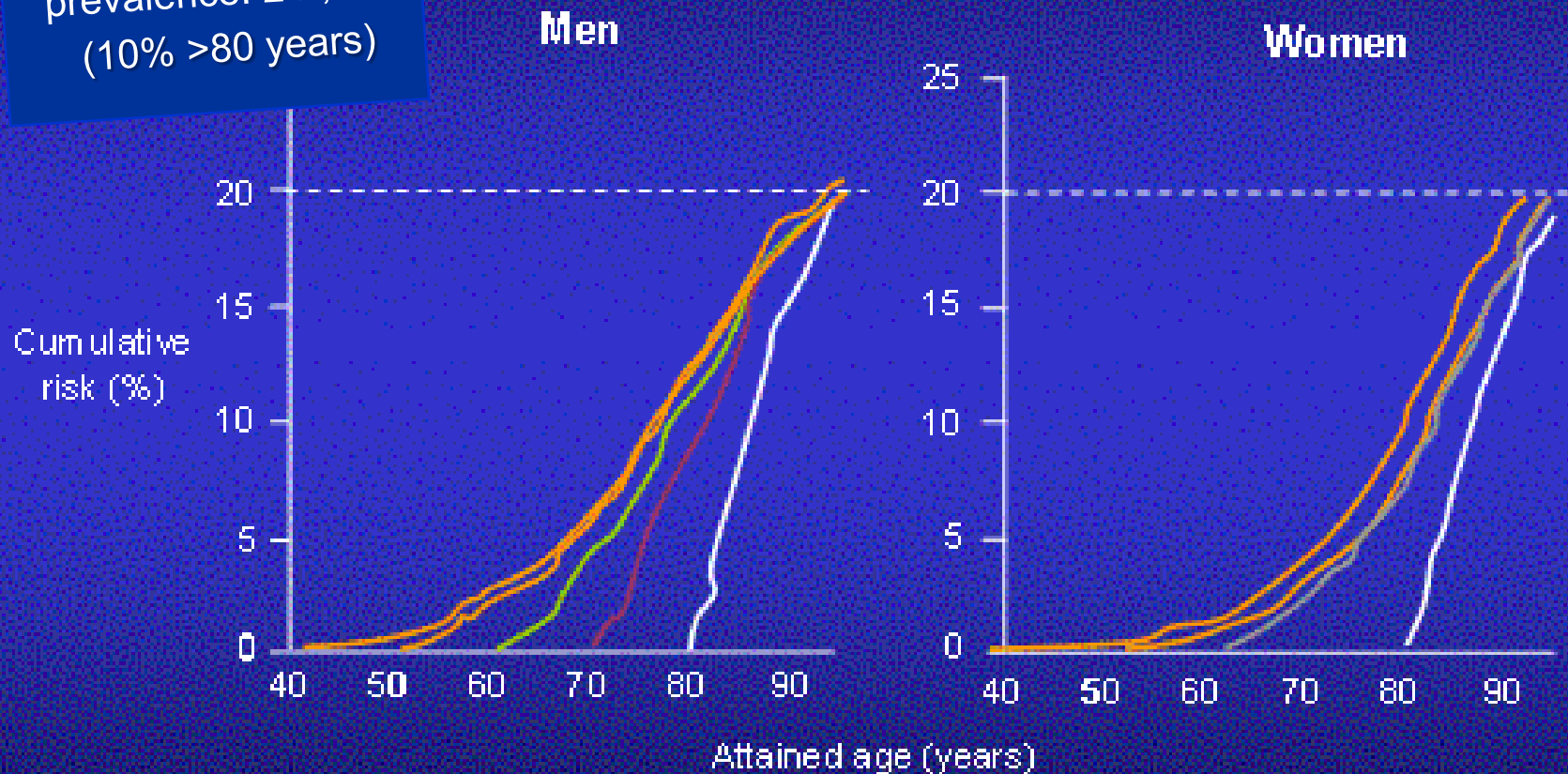
*Serviço de Cardiologia, Hospital de Santa Marta
Instituto de Fisiologia, Faculdade de Medicina de Lisboa*

CHF - Epidemiology

20% Lifetime risk for heart failure after age 40

Framingham Heart Study

prevalence: 2-2,5%
(10% >80 years)

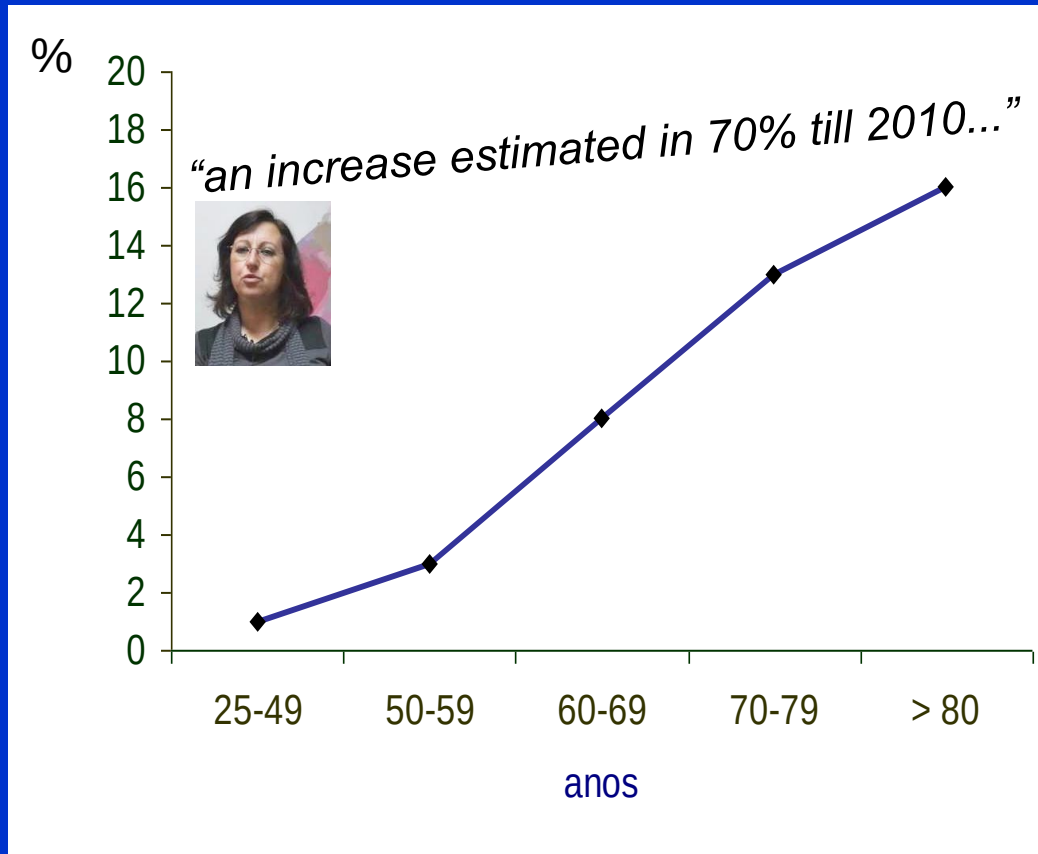


Lifetime risk for HF for given index age
is cumulative through age 94 years

Lloyd-Jones DM et al. *Circulation*. 2002;106:3068-72.

CHF in Portugal - Epidemiology

- prevalence: 4,36%
- systolic dysfunction: 1,3%



Congestive Heart Failure - scope of the problem

- Most common discharge diagnosis >65 years
- Single largest expense for Medicare
- 3 million pts in the US have had prior MI with LVEF <30%

>500.000 new cases/year

14 million in Europe

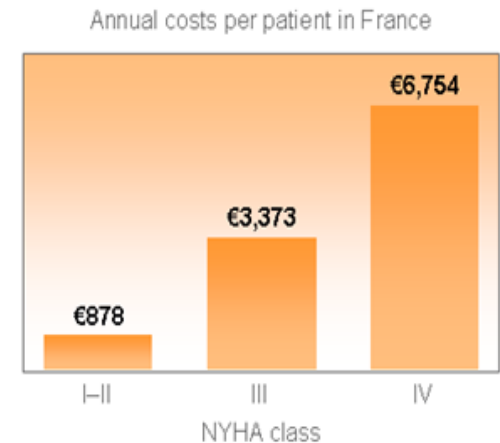
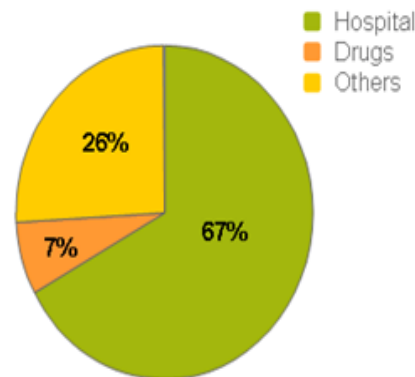
5,7 million in USA

>22 million individuals worldwide

■ HF costs approximately €10.4 billion in Europe
(~ Austria's healthcare budget)

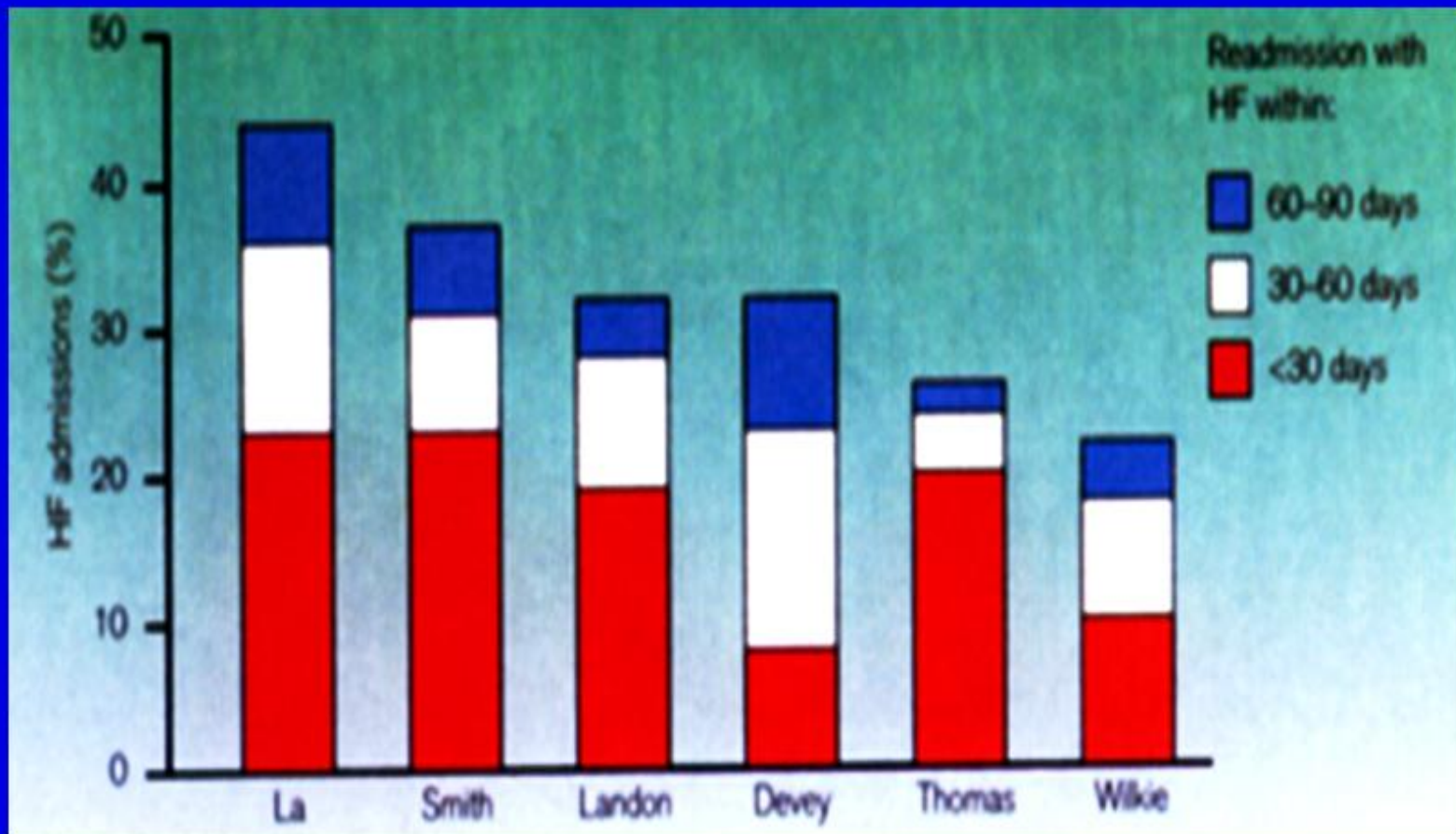
■ **> 67%** of total costs are **hospital costs**

■ Costs increase with severity of disease ⇔ **hospitalization**



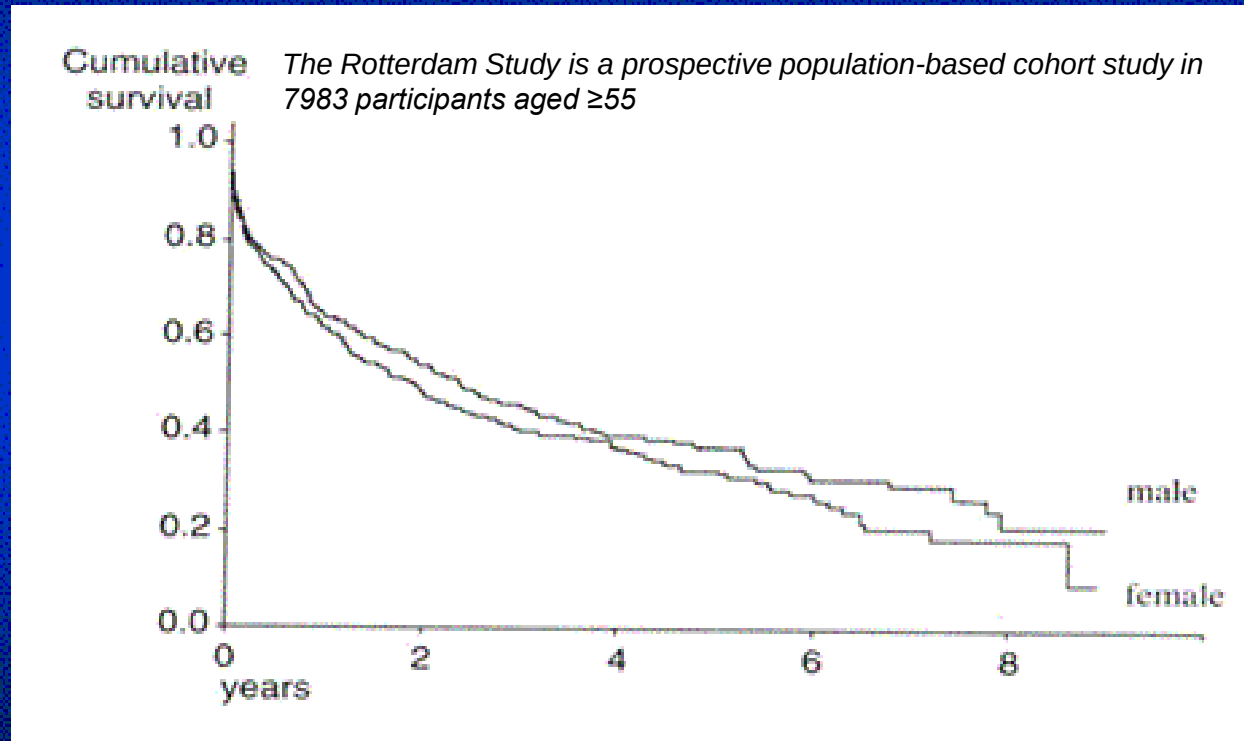
1. AHA. 2002 Heart and Stroke Statistical Update; 2001
2. Hunt SA, et al. ACC/AHA Guidelines for the Evaluation and Management of Chronic Heart Failure in the Adult. 2001
3. American Heart Association. Heart disease and stroke statistics—2011 update. Dallas, TX: American Heart Association; 2011

HOSPITAL READMISSIONS IN PATIENTES WITH CHF



rehospitalization rates are 2% at 2 days, 20% at 1 month, and 50% at 6 months!

Survival rates for elderly patients with HF typically average less than 35% at five years



Bleumink et al, 2004

- **5-year mortality ranges from 15% in asymptomatic pts with LV dysfunction, to ~35% among pts with mild to moderate HF, to more than 50% among advanced HF pts**

Heart Failure - treatment objectives

↑ survival

↓ morbidity

↑ functional capacity

↑ quality of life

↓ neurohormonal abnormalities

↓ HF (ventricular dysfunction) progression

↓ symptoms



Treatment

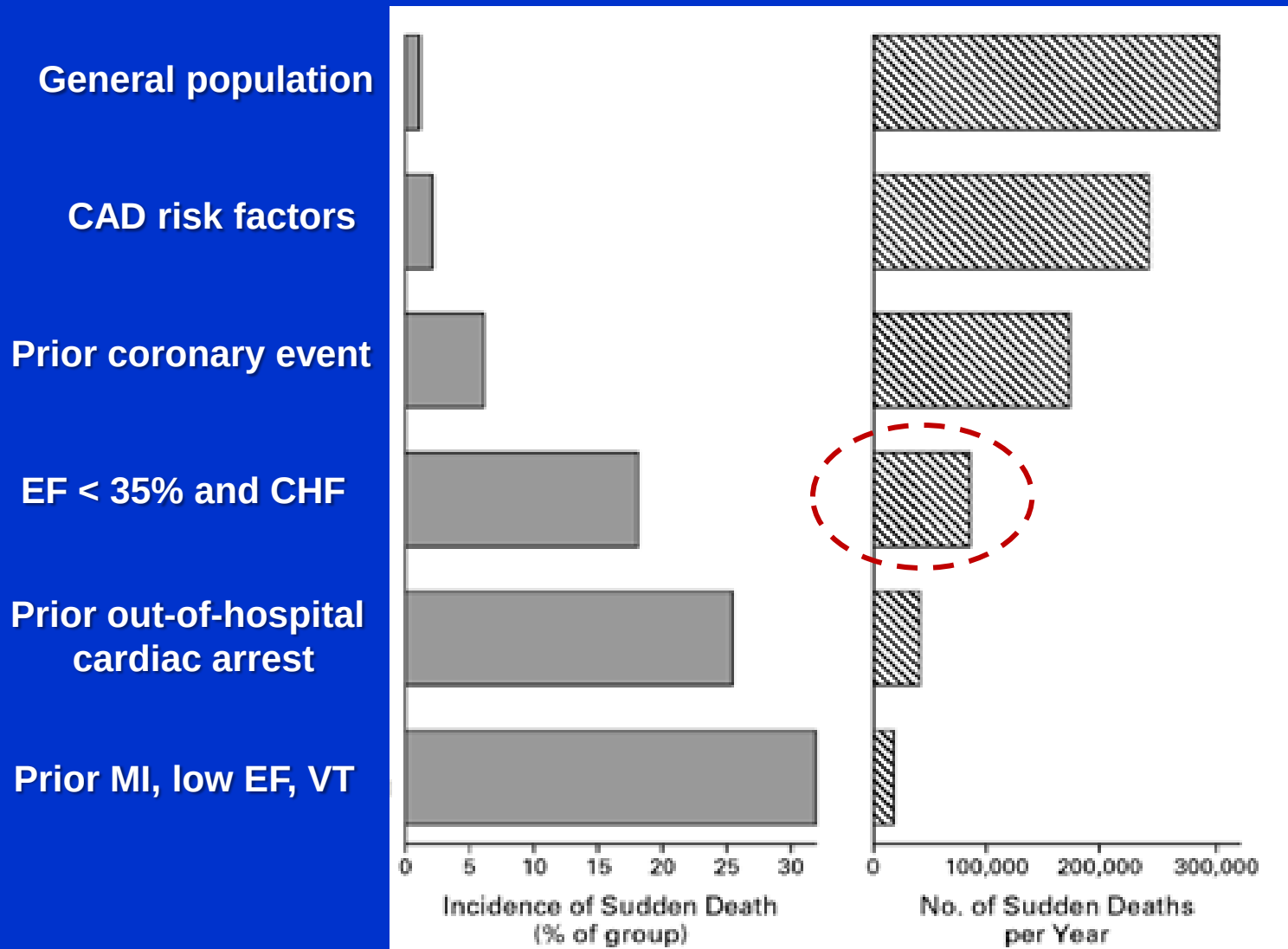
All

- Prevention. Control of risk factors. Life style
- Treat etiologic cause / aggravating factors*
(elderly patients with HF should be offered pneumococcal and influenza vaccines...)
- Drug therapy (... a large % of patients still symptomatic despite maximum tolerable dosages)
- Personal care. Team work

selected patients

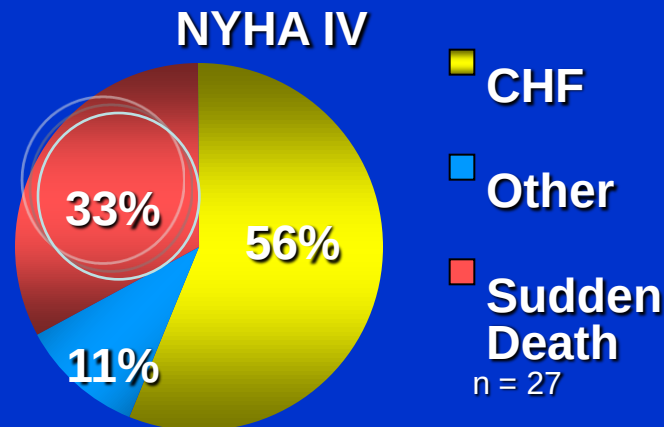
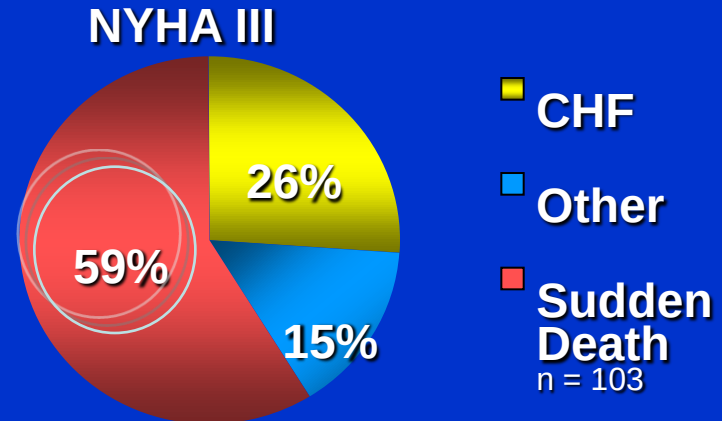
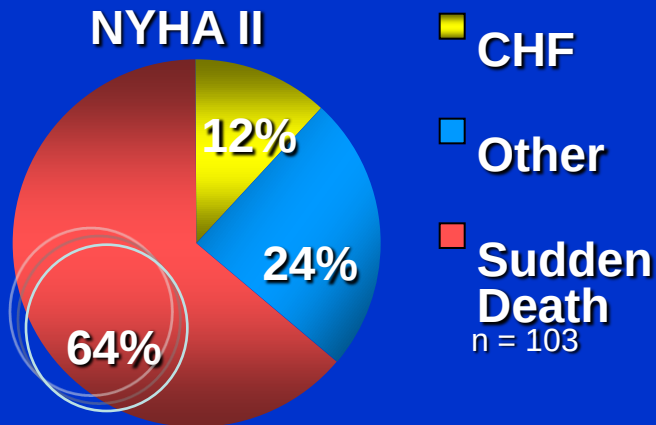
- Revascularization if ischemia causes HF
- ICD (Implantable Cardiac Defibrillator)
- Cardiac resynchronization (... what is the % of candidates for CRT?)
- Ventricular assist devices
- Heart transplant
- Artificial heart
- Autonomic Modulation (cardiac rehabilitation, vagal stimulation, BAT...)
- Neoangiogenesis, Gene therapy

Incidence of SD in specific populations



Severity of Heart Failure

Modes of Death

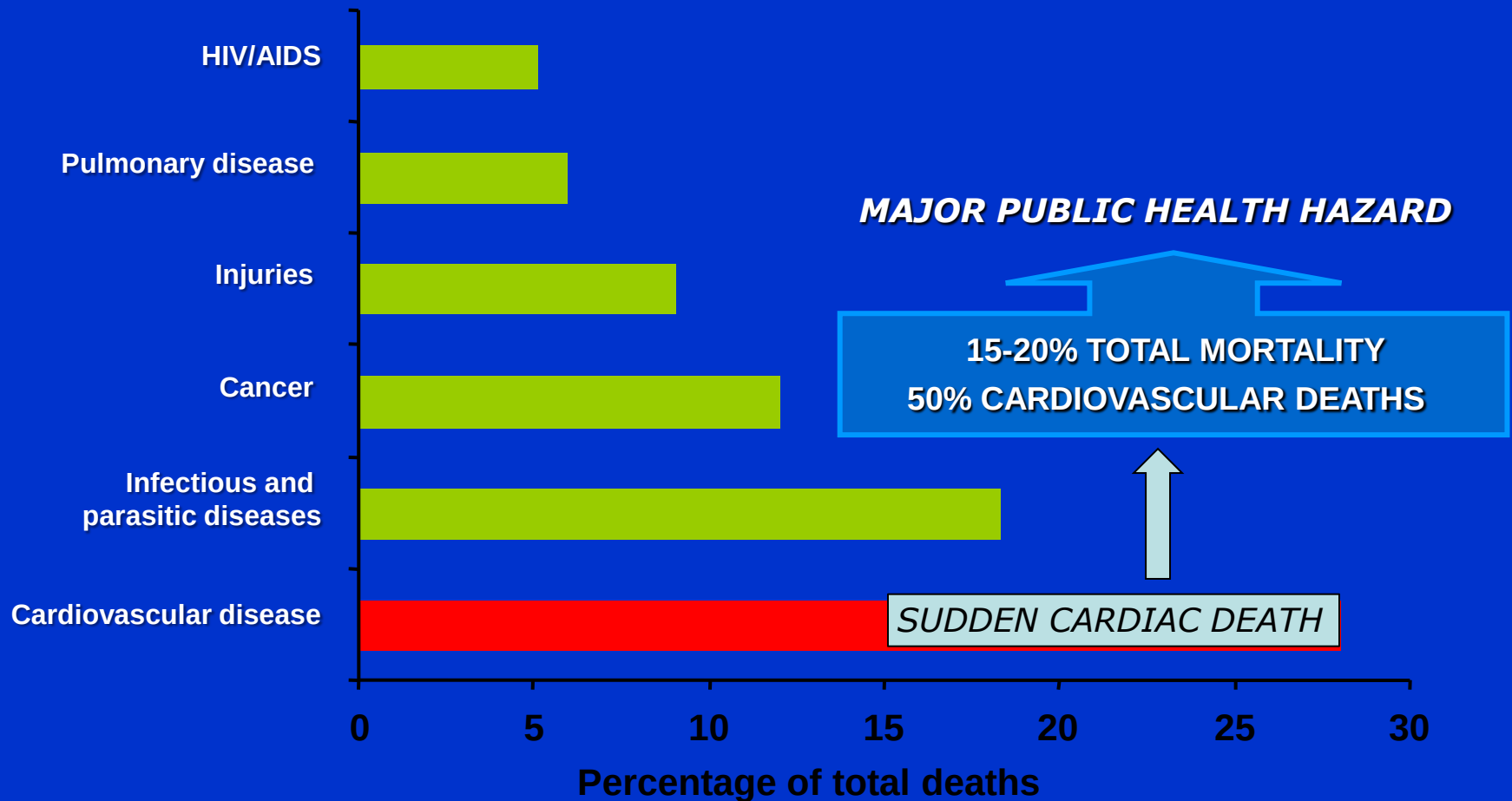


Congestive Heart Failure

- risk of SD ↑ 5-9x

Mosterd et al, Eur Heart J 2001
Sweeney MO, PACE 2001

Cardiovascular Disease is the Leading Cause of Death Worldwide



β - blockers

- »» $\downarrow$ cardiac catecholamines effects, $\downarrow$ QT variability index, $\downarrow$ TWA
- »» $\uparrow$ HRV, $\uparrow$ BRS

ACEI

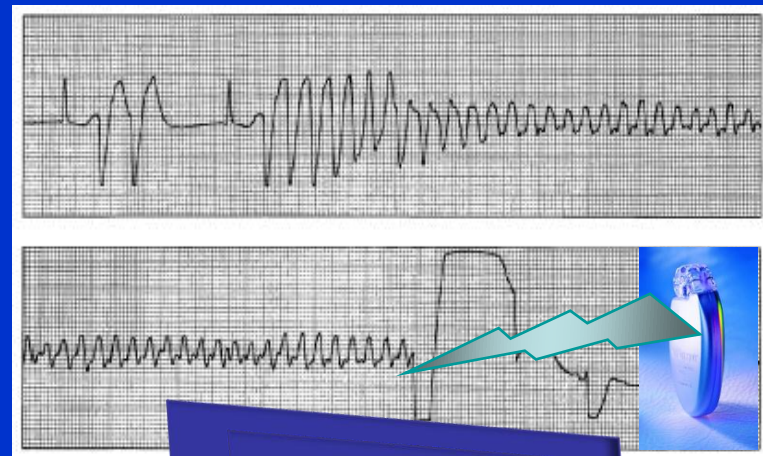
- »» $\downarrow$ SCD in post-AMI/HF patients

ARB

- »» Val-HeFT 2003
- »» CHARM 2004

Aldosterone-antagonists

- »» RALES 1999, EPHESUS 2006, EMPHASIS-HF 2010

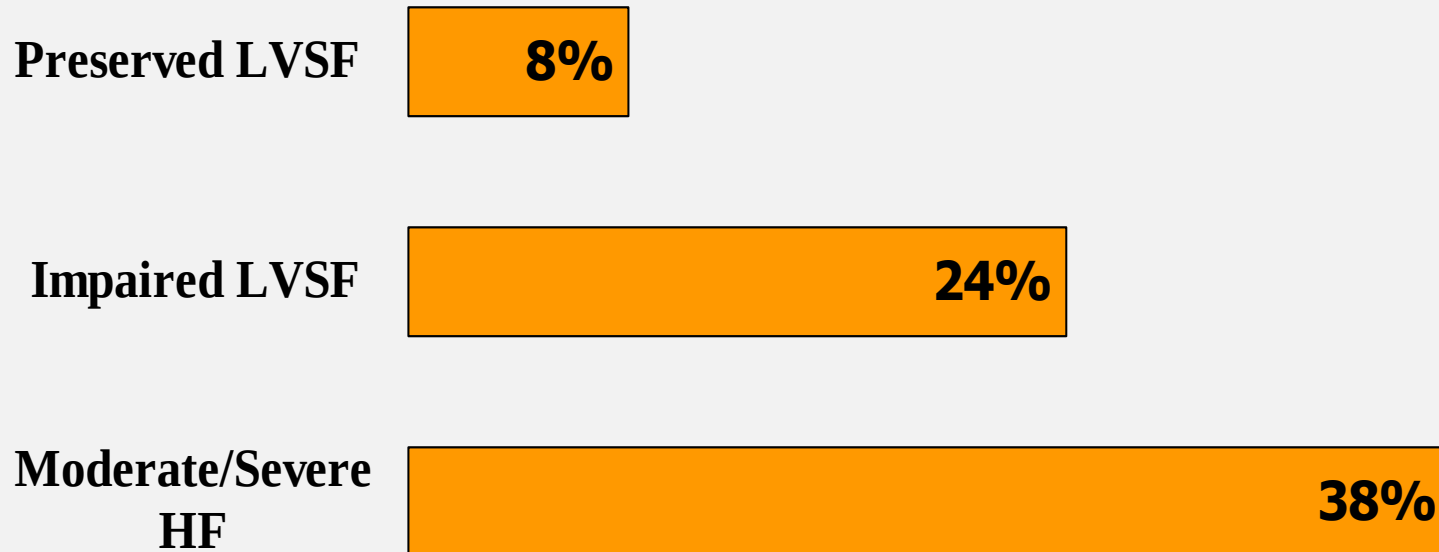


ICD
CRT

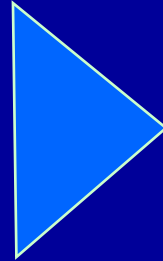
Prevalence of Ventricular Dyssynchrony in Heart Failure

WHAT IS THE PERCENTAGE OF HF PATIENTS CANDIDATES FOR CRT?

Left Bundle Branch Block More Prevalent with Impaired LV Systolic Function

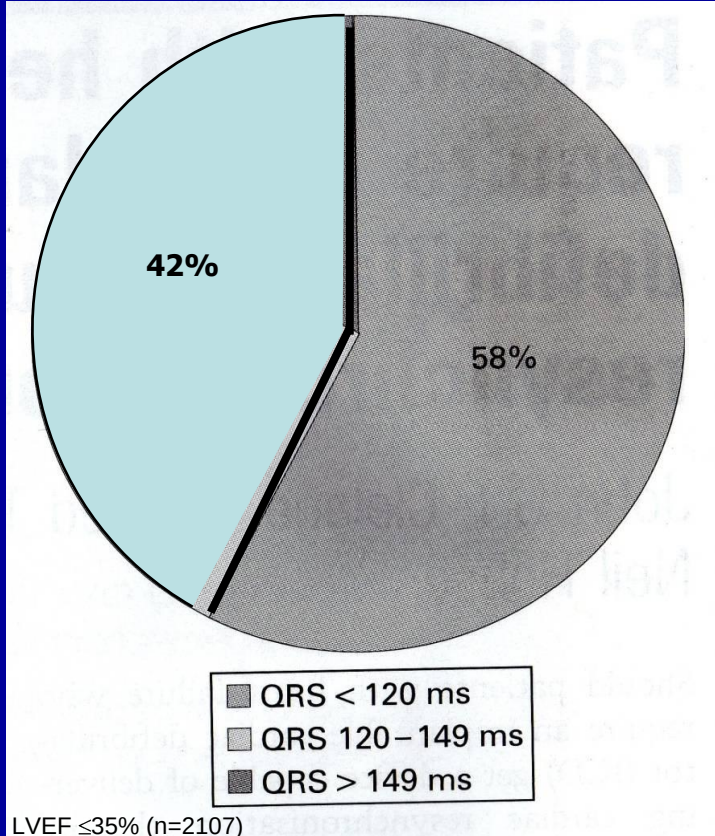


**LV dilatation
systolic dysfunction
heart failure**



- **interatrial conduction delay** >>> **interatrial and AV dyssynchrony**
- **PR** ↑↑↑ >>> **changes LV filling / diastolic MR**
- **QRS** ↑↑↑ >>> **ventricular dyssynchrony**

V.Beeumen, AJC 2007

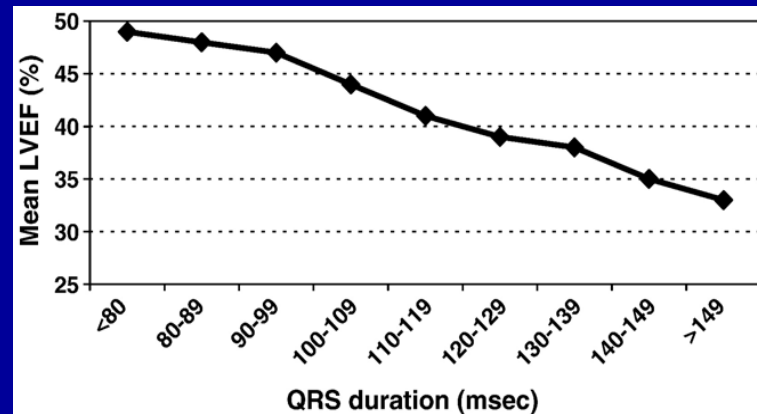


>>>> LBBB



⇒ interventricular and intraventricular dyssynchrony

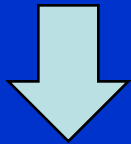
INDEPENDENT MARKER OF PROGNOSIS



Euro Heart Failure Survey , 2007

Deleterious Effects of Ventricular Dyssynchrony on Cardiac Function

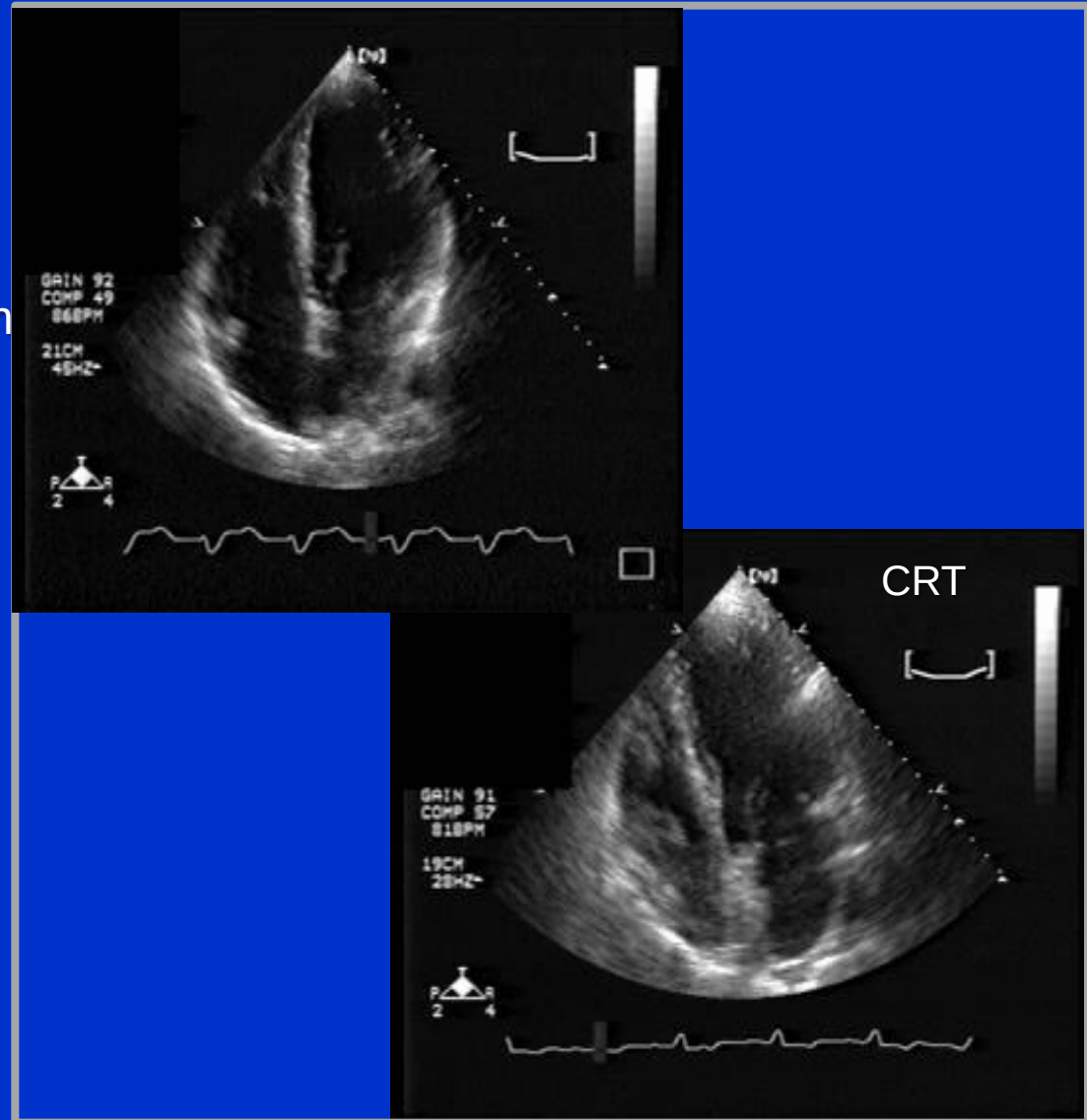
- ✓ Reduced diastolic filling time
- ✓ Weakened contractility
- ✓ Protracted mitral regurgitation
- ✓ Post systolic regional contraction
- ✓ Diminished stroke volume



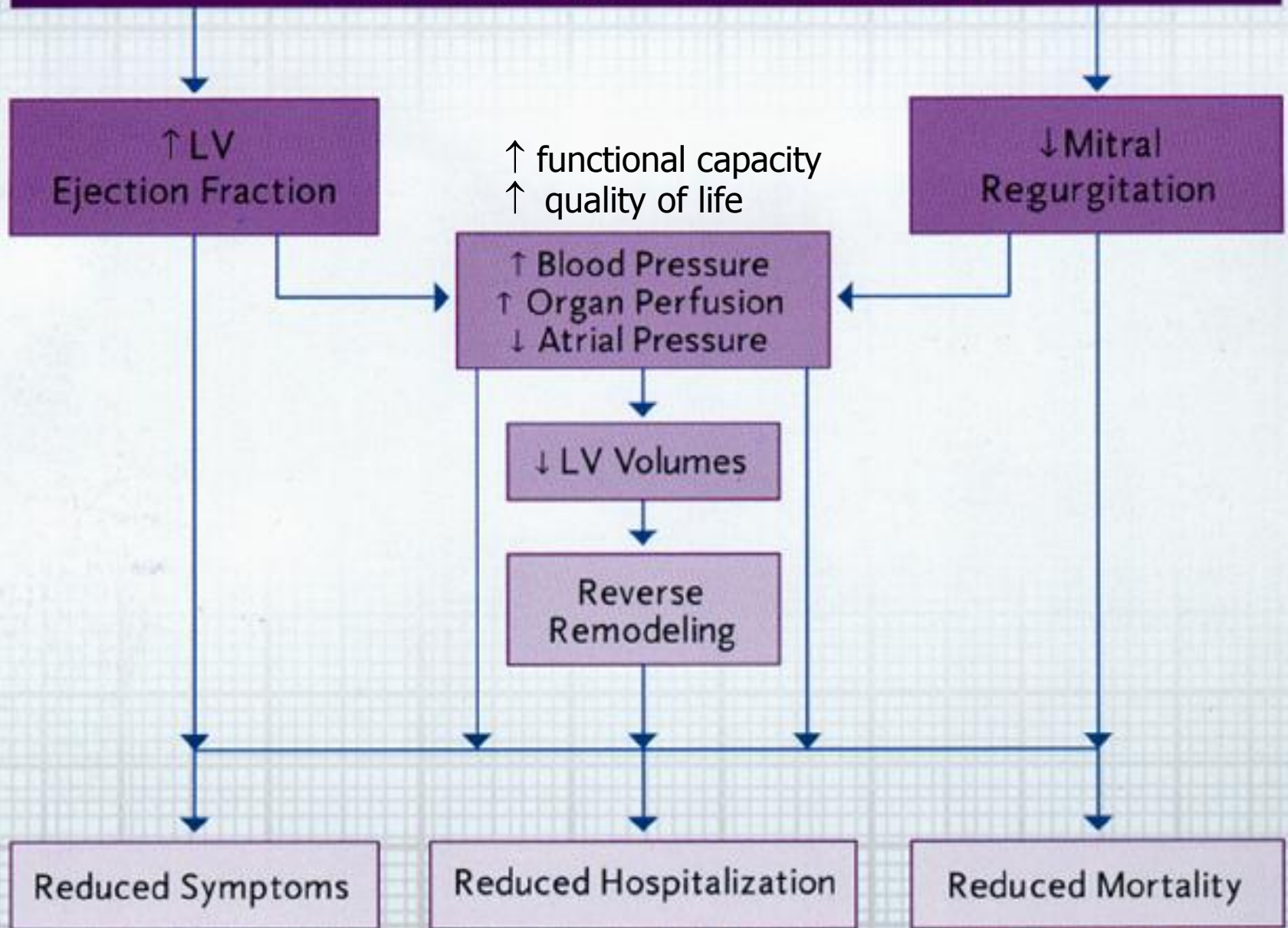
haemodynamic deterioration
LV remodeling
> CHF



↑ MORTALITY



Cardiac Resynchronization Therapy





Cardiac Resynchronization Trials

Meta-analysis: Cardiac Resynchronization Therapy for Patients With Less Symptomatic Heart Failure

Nawaf, et al. *Ann Intern Med.* 2012

- CRT improves LVEF and reduces all-cause mortality and HF hospitalization in pts with NYHA class I/II, LV systolic dysfunction, and prolonged QRS duration (*98% of the control pts had an ICD...*)
 - »»» benefits were greatest if QRS duration >150 ms.
 - »»» 85% had NYHA II (in NYHA I is inconclusive)
- <1% of participants in CRT trials had AF,
 - »»» but 20-25% of all CRT devices are implanted in AF pts
- Studies in pts with NYHA class I/II and class III/IV have shown that an ischemic cause of HF is associated with less benefit from CRT.

Impact of QRS Duration on Clinical Event Reduction With Cardiac Resynchronization Therapy: Meta-analysis of Randomized Controlled Trials (5 trials; n=5813)

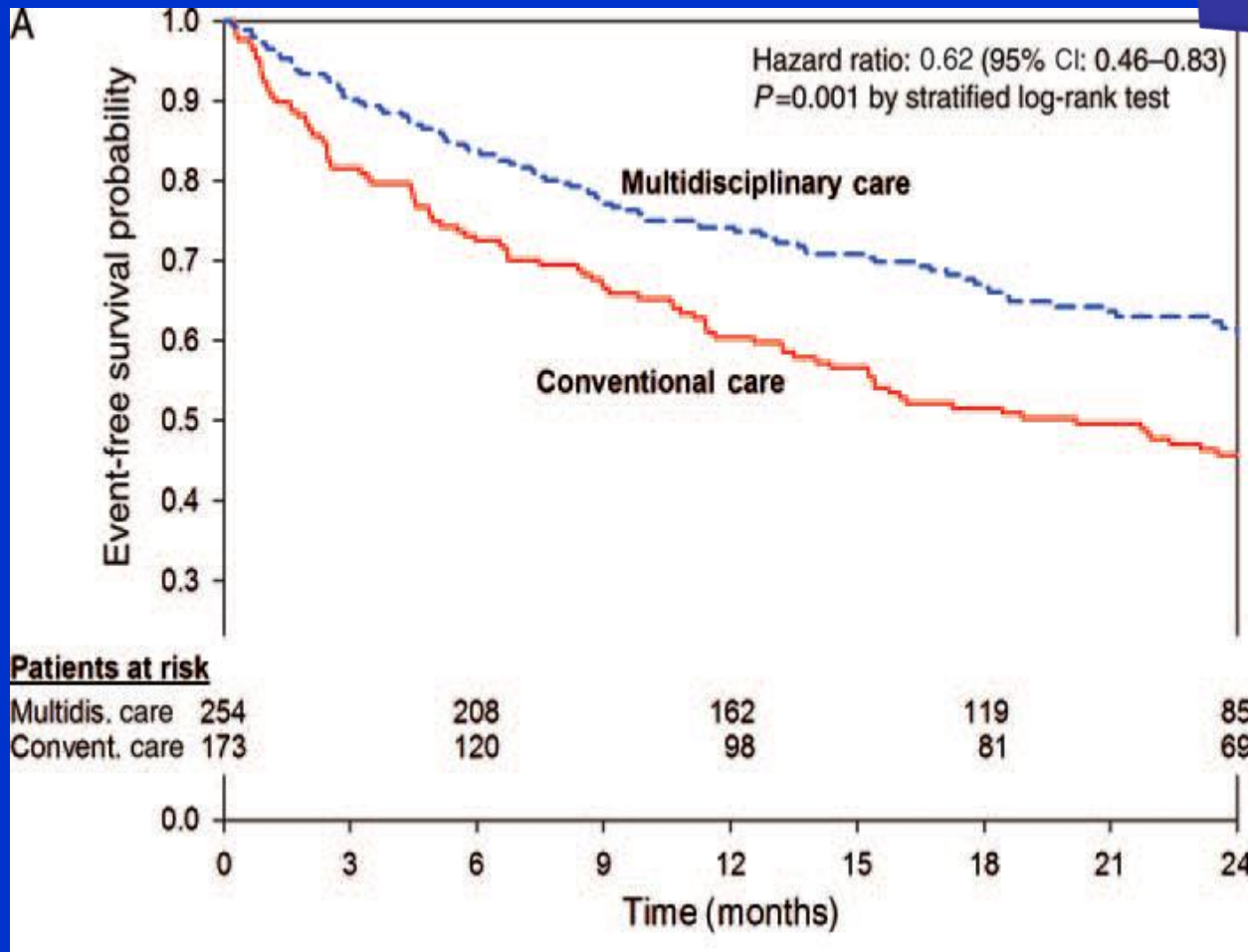
Sipahi, et al. *Arch Intern Med.* 2011

CRT was effective in reducing adverse clinical events (*death, hospitalizations*) in pts with HF and a baseline QRS ≥ 150 ms, but did not reduce events in pts with a QRS of < 150 ms.

Multidisciplinary approach to care in HF

- Ensure an integrated approach to care delivery by a multidisciplinary team
- **HF & EP & Echo Specialists / Nurses / Rehabilitation service**

CRT



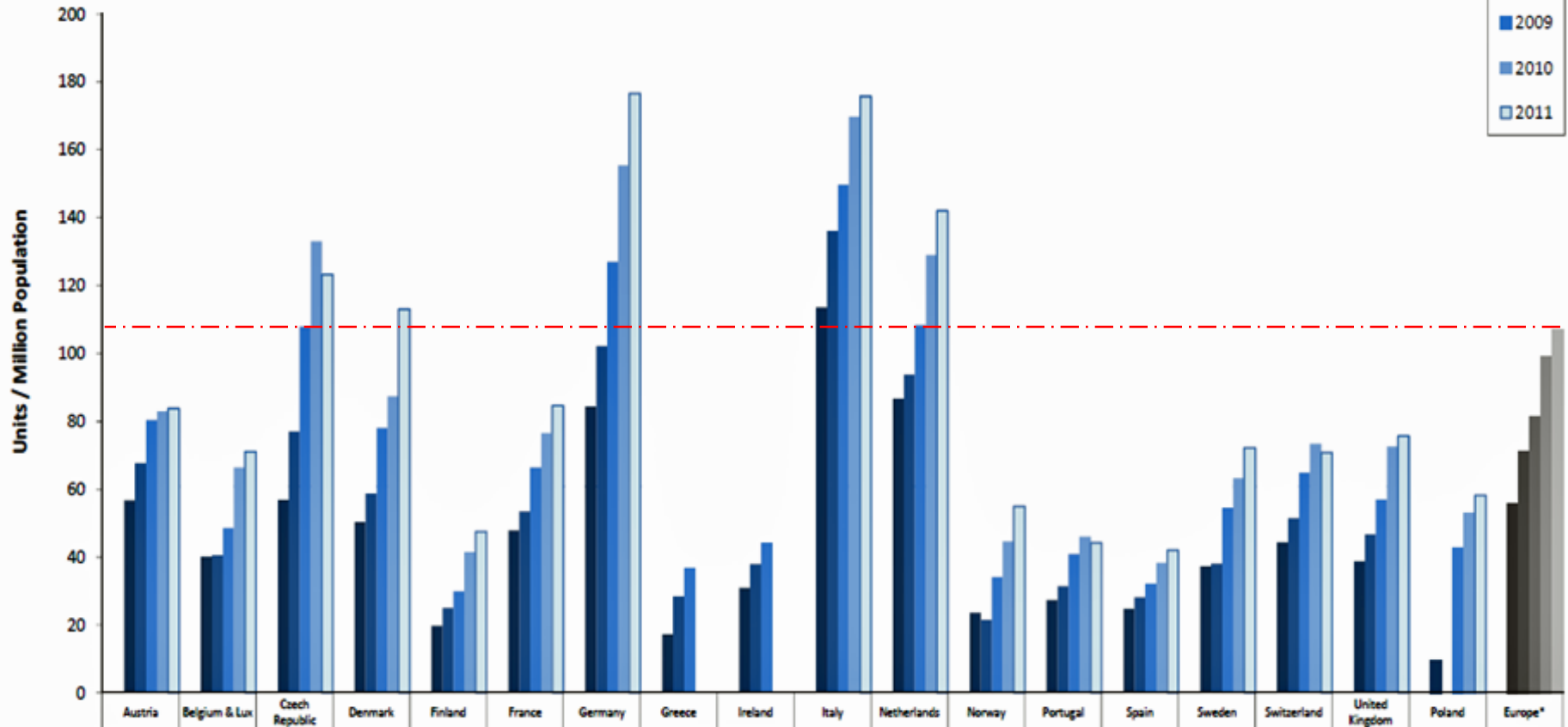
Review of the ICD Registry



	Year				
	2006	2007	2008	2009	2006–2009
Total implants (N, for each year and cumulative for 2006–2009)	92,897	120,668	131,086	141,374	486,025
Single chamber ICD (%)	23.4	21.9	20.5	18.9	20.9
Dual chamber ICD (%)	39.1	39.1	39.8	39.3	39.3
Biventricular ICD (%)	37.4	38.9	39.6	41.7	39.6
Adverse procedure-related event (%) (for new ICD implants only)	3.77	3.34	3.01	2.87	3.22
Death in laboratory	0.02	0.02	0.03	0.02	0.02
Cardiac perforation	0.09	0.08	0.09	0.06	0.08
Hematoma	1.18	0.96	0.8	0.71	0.89
Lead dislodgement	1.11	1.08	1.02	1.01	1.05
Hemo/pneumothorax	0.66	0.54	0.50	0.466	0.53
Transient ischemic attack/stroke	0.10	0.08	0.07	0.07	0.08
Other	0.61	0.58	0.50	0.53	0.57

Hammill C, et al. Heart Rhythm 2010;7:1340-1345

CRT-D - Units per million inhabitants



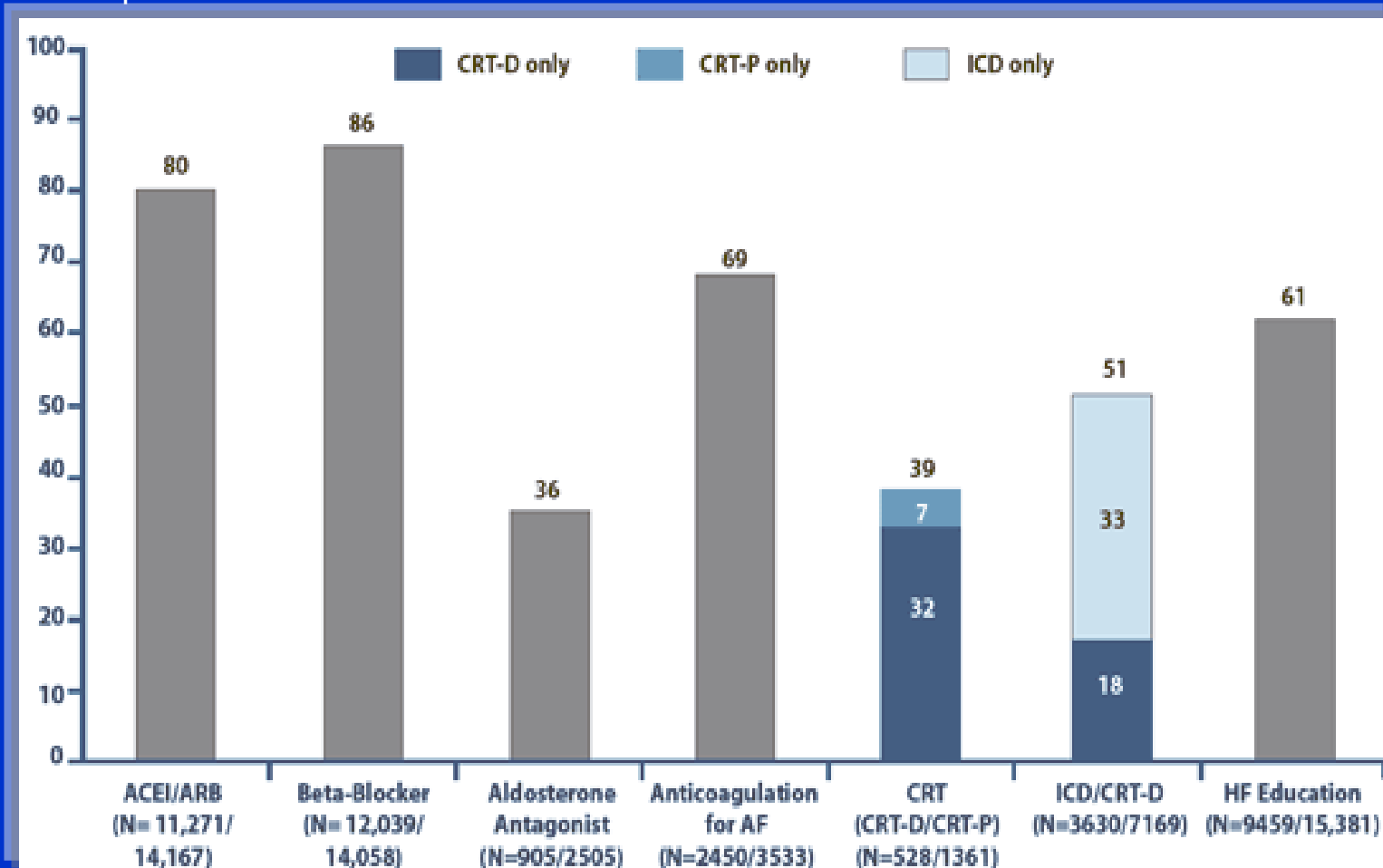
• great differences in implanting rates among EHRA members

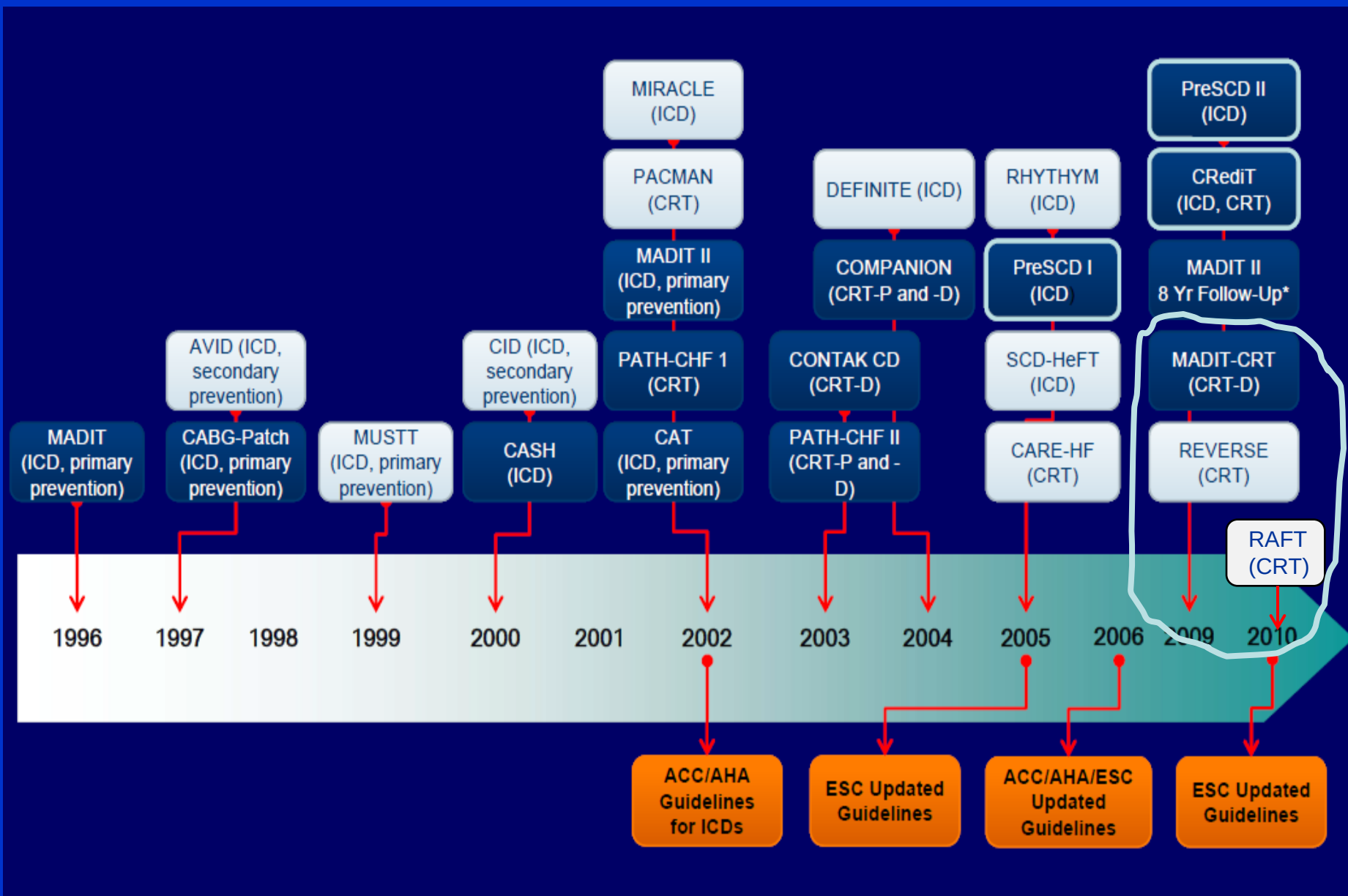
• the number of implants is increasing in almost all countries

IMPROVE-HF

Registry to improve the use of evidence-based HF therapies

15,381 patients





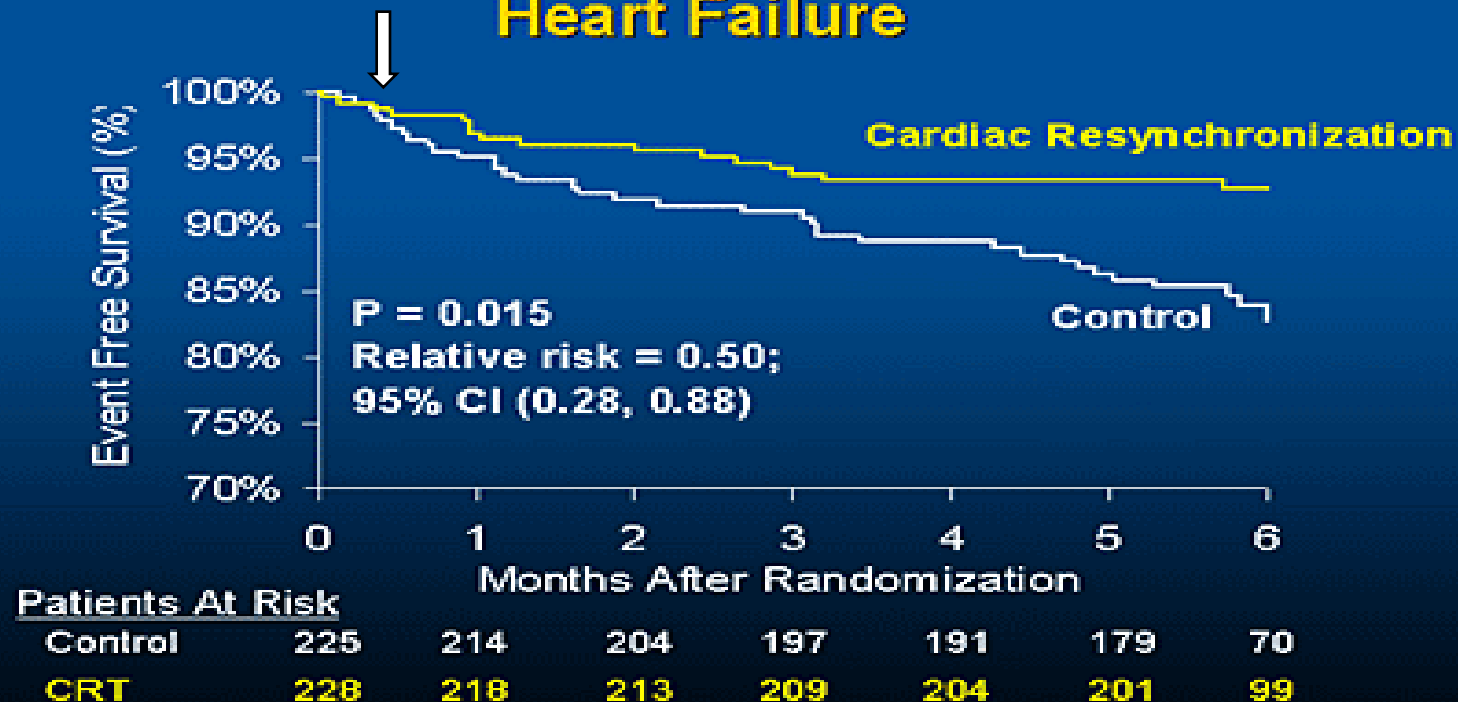
Cardiac Resynchronization – clinical experience

	PATH-CHF I	InSync	InSync It	MUSTIC	MIRACLE	VIGOR-CHF
N	42	103	190	67	266	73
NYHA	+	+	+	+	+	+
QOL	+	+	+	+	+	+
6-min	+	+	+	+	+	+
VO2 máx.	+	/	+	+	+	/
Hospitalization	+	/	+	+	+	/
Mortality	/	/	/	/	/	/

“ CRT significantly improves exercise tolerance, quality of life, NYHA functional class in patients with chronic HF and interventricular conduction delay.”

MUSTIC Study, NEJM 2001; 344: 873-880

Risk of Hospitalization for Worsening Heart Failure



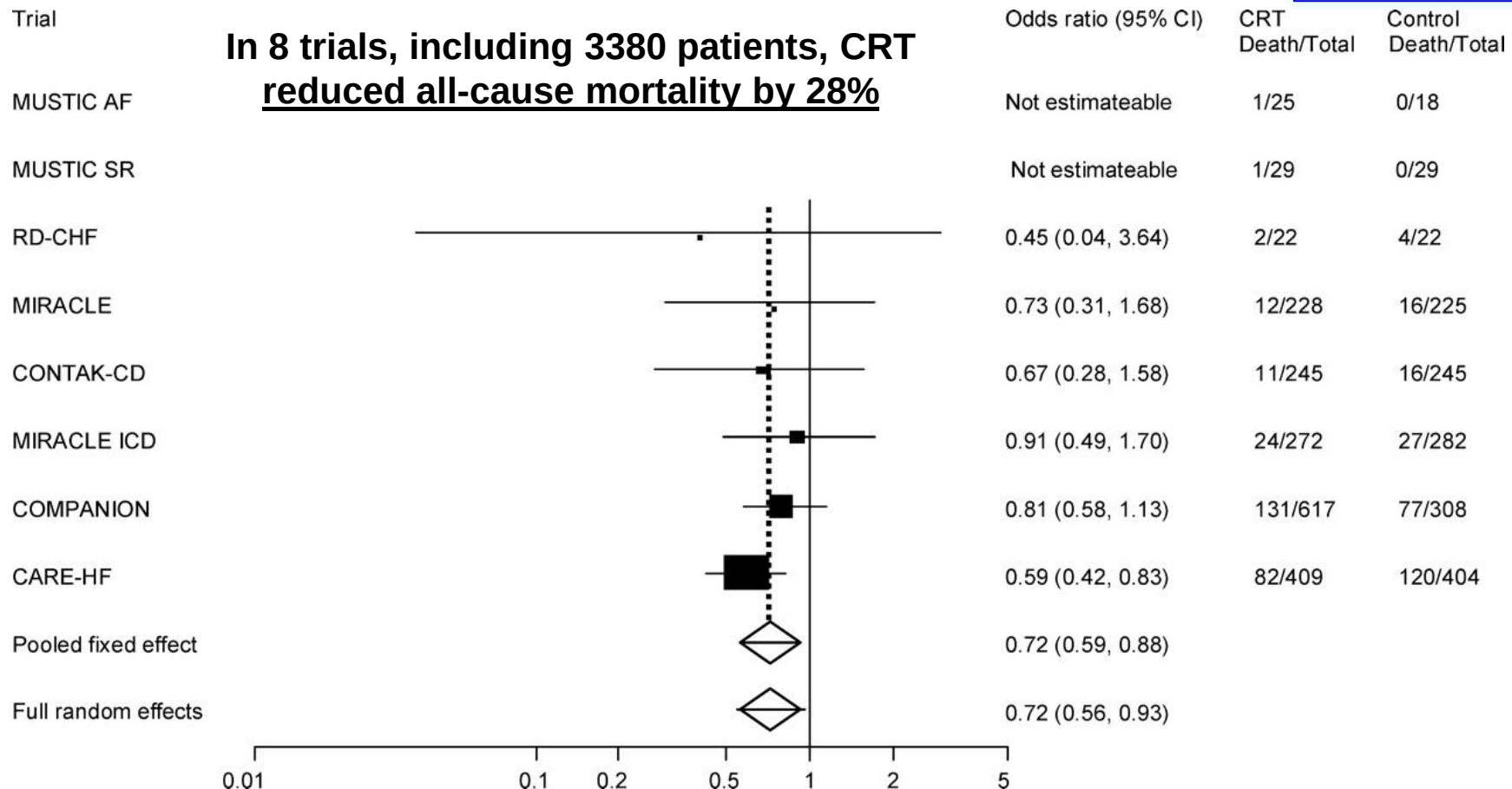
Abraham et al NEJM

Freemantle, EJHF 2006

Effects of CRT on all-cause mortality

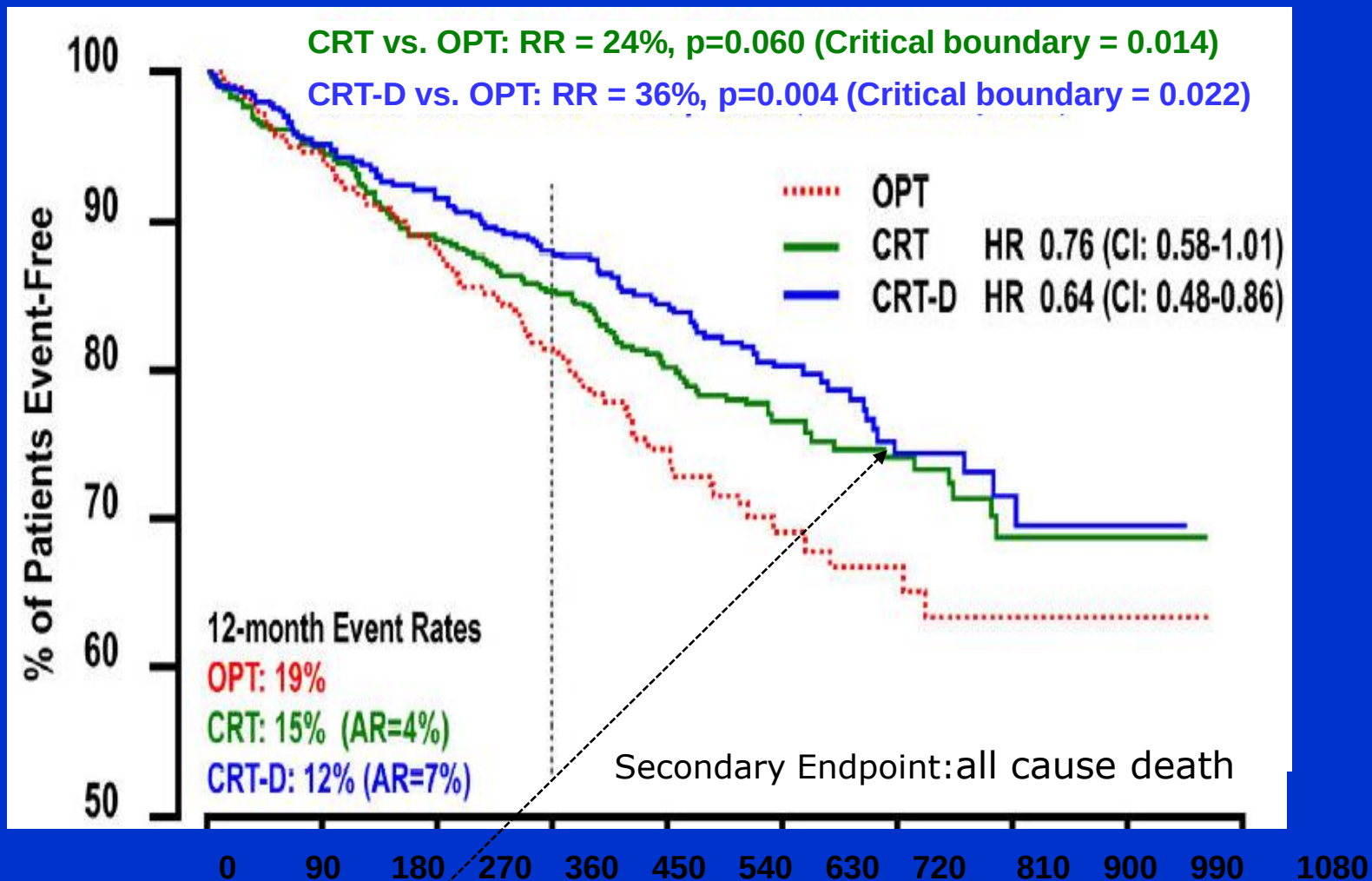
**38% reduction
in HF mortality**

**In 8 trials, including 3380 patients, CRT
reduced all-cause mortality by 28%**



Hohnloser S H , Prystowsky E N Eur Heart J Suppl 2007;9:G9-G16

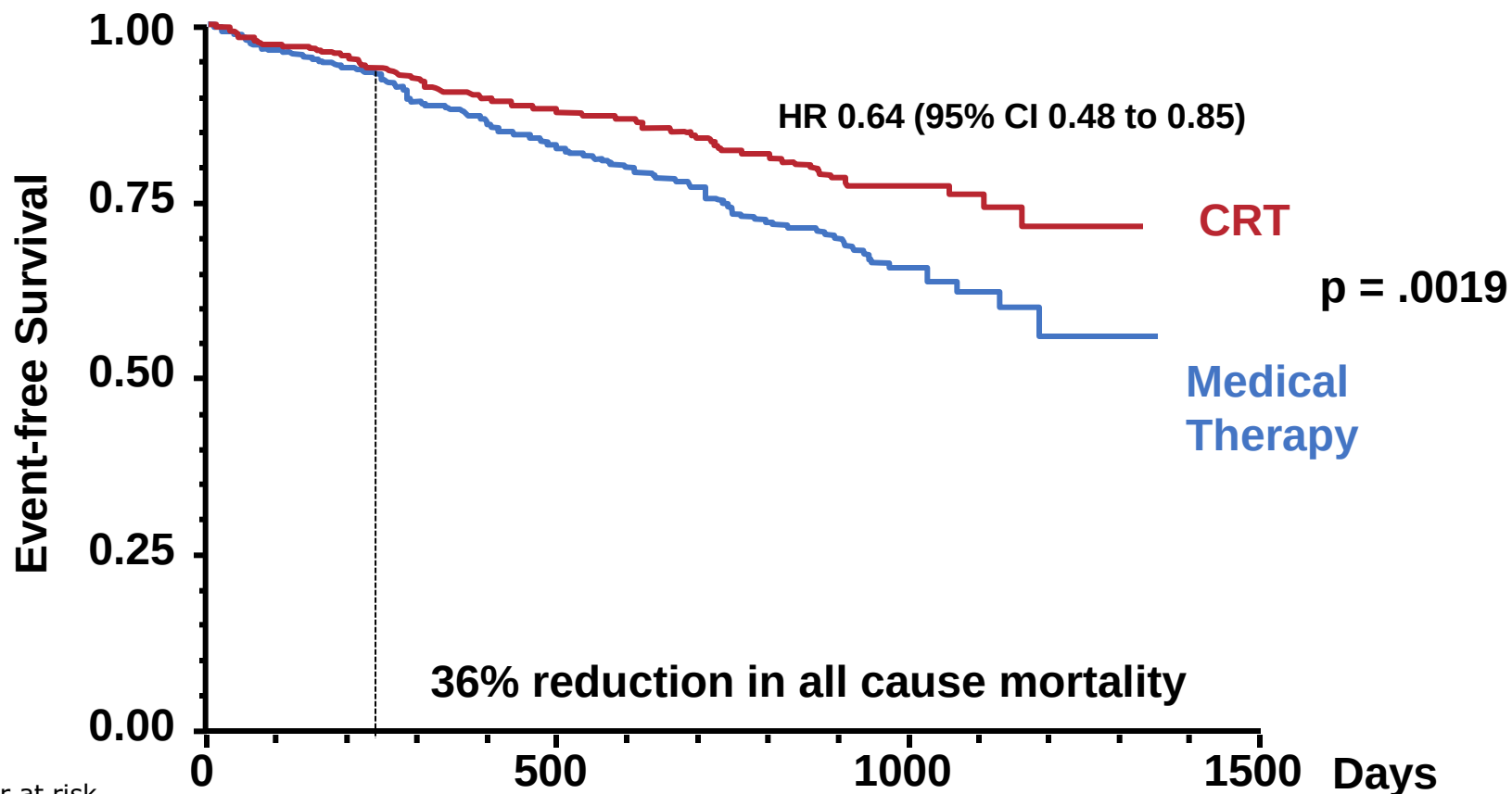
COMPANION



- ✓ Only CRT-D reduced SCD (OPT vs. CRT-D: HR 0.44, p=0,02) over a period of 12 months
- ✓ The impact of CRT on mortality takes time (reverse remodeling). ICD benefit is immediate

CARE-HF

Secondary Endpoint: death of all causes

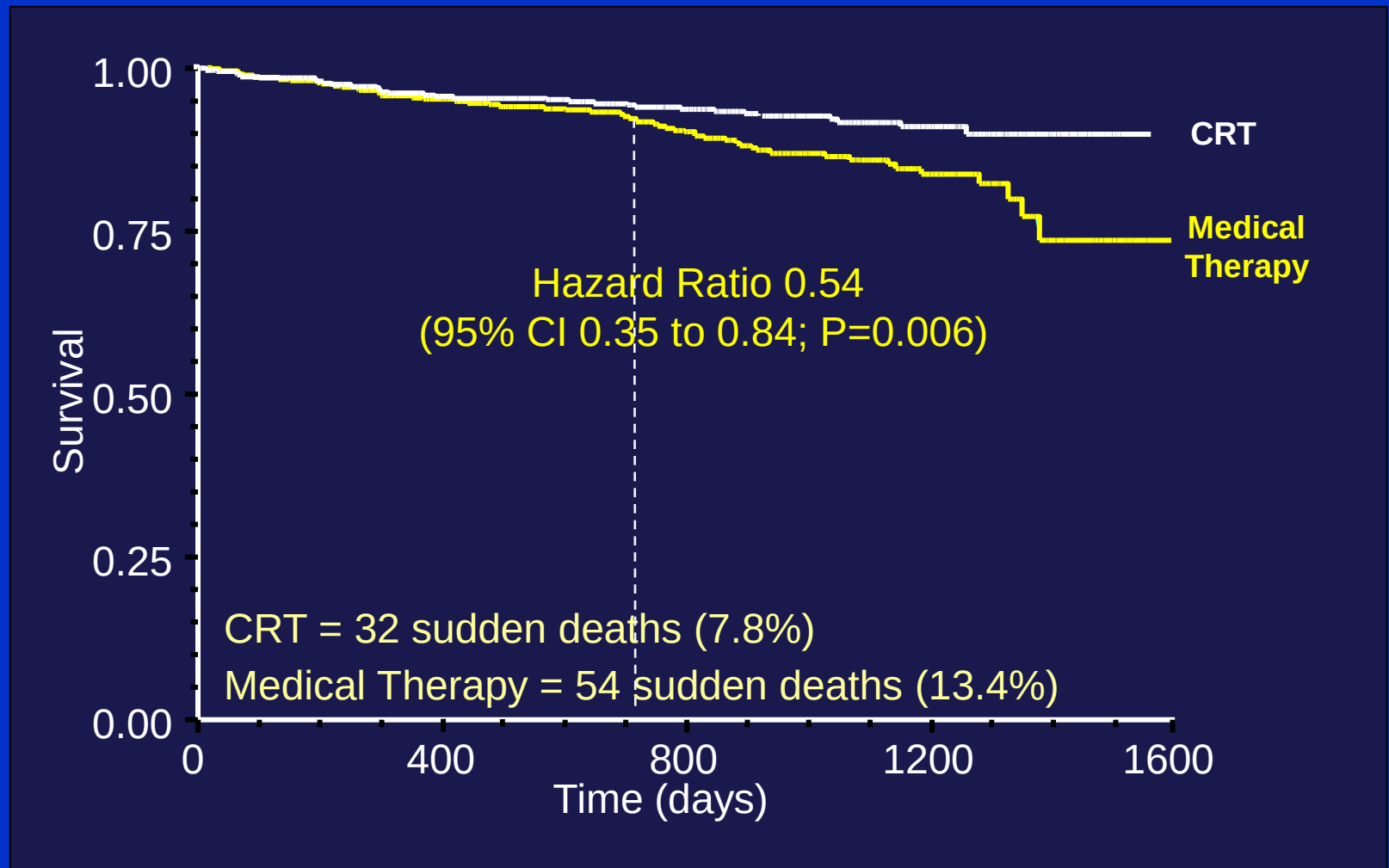


Number at risk

CRT	409	376	351	213	89	8
Medical Therapy	404	365	321	128	71	5

CARE-HF Extension Study

Time to Sudden Death



CRT-P reduces the risk of SCD (**CARE-HF Extended**), however more than 1/3 of the deaths of patients treated with CRT-P alone are due to SCD.

CRT in patients with mild/moderate HF?

• REVERSE

n=610

LVEF <35%, wQRS >120 ms, SR

Follow-up: 2 years

- *time to first hospitalization is consistently delayed*
- *may help prevent HF progression*

JACC 2008,2009

• MADIT CRT

n=1820

LVEF <30%, wQRS >130 ms, SR

Follow-up: 2 years

End point	All patients	ischemic cardiomyopathy	nonischemic cardiomyopathy
Death or HF	0.66 (0.52-0.84) ^a	0.67 (0.52-0.88) ^b	0.62 (0.44-0.89) ^c
HF only	0.59 (0.47-0.74) ^a	0.58 (0.44-0.78) ^a	0.59 (0.41-0.87) ^c
Death	1.00 (0.69-1.44)	1.06 (0.68-1.64)	0.87 (0.44-1.70)

NEJM 2009

• RAFT

n=1798

LVEF ≤30%, LVEDD >60 mm, wQRS ≥120 ms, SR or AF

ICD indication

Follow-up: 5 years

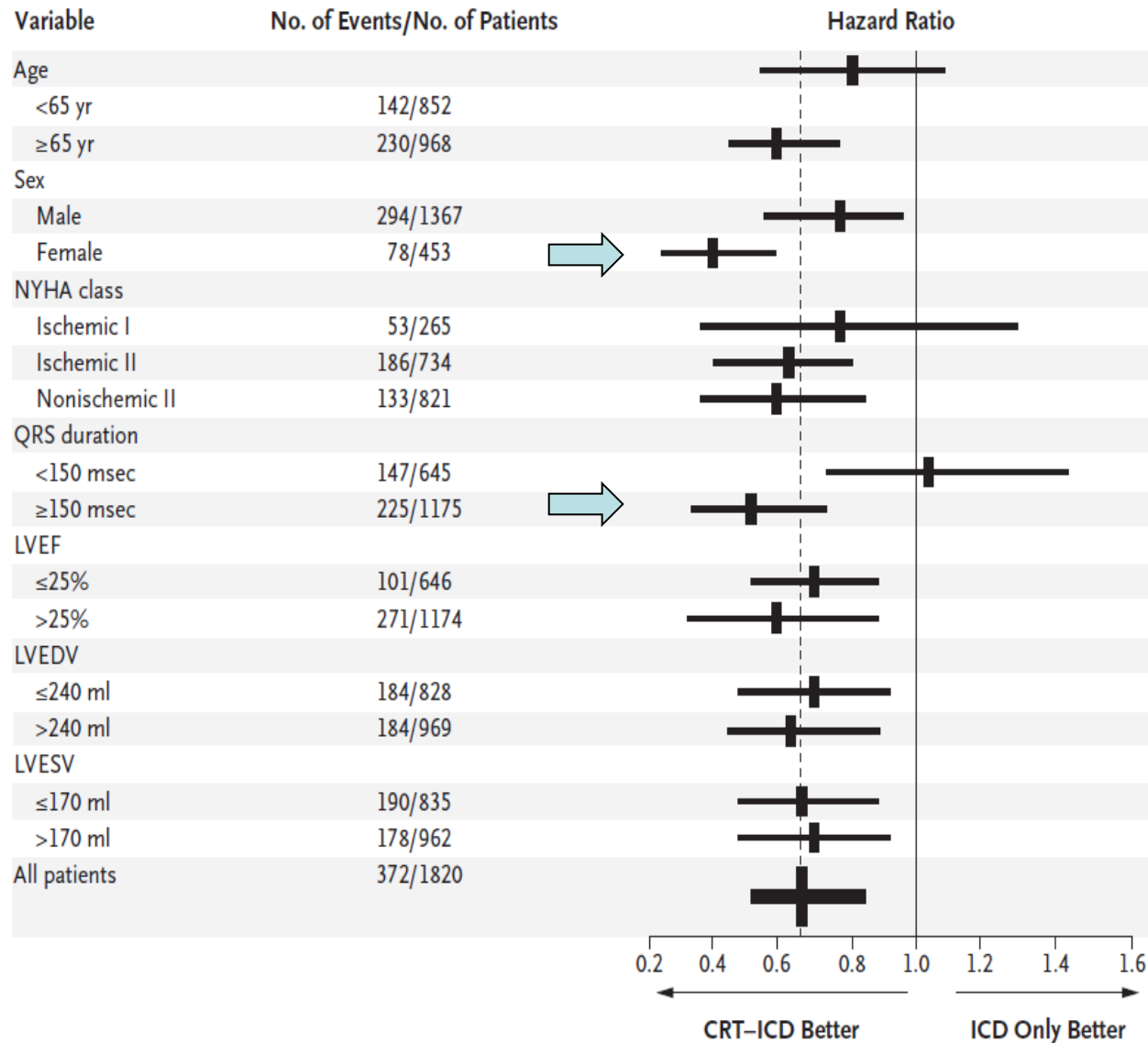
- *adding CRT to ICD improves survival in pts with moderate HF symptoms, wide QRS complex, and LV systolic dysfunction*

NEJM 2010

- there was a 25% reduction in all-cause mortality in RAFT ($p < 0.003$)
- for NYHA class I and II HF, all of the trials tested only CRT-D and not CRT-P...

Cardiac-Resynchronization Therapy for the Prevention of Heart-Failure Events

MADIT-CRT



In Madit-CRT “Women got twice as good a result”

Arthur Moss, MD



Recommendation	Patient population	Class ^a	Level ^b	Ref. ^c
CRT-P/CRT-D is recommended to reduce morbidity and mortality ^d	NYHA function class III/IV LVEF $\leq 35\%$, QRS ≥ 120 ms, SR Optimal medical therapy Class IV patients should be ambulatory ^e	I	A	5–19

2010 Focused Update of ESC guidelines on device therapy in heart failure

- all-cause mortality (CRT vs. ICD) → 8% vs. 11.5% (p=0.04)
- HF hospitalization (CRT vs. ICD) → 11.6% vs. 18.2% (p<0.001)

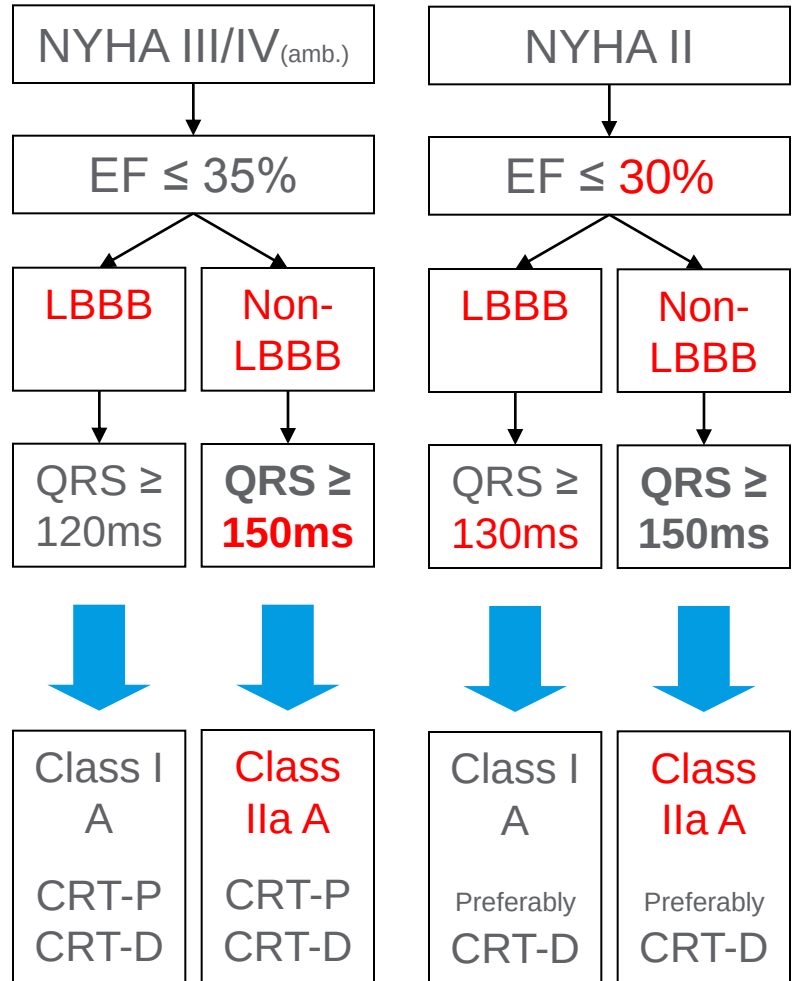
Recommendation	Patient population	Class ^a	Level ^b	Ref. ^c
CRT preferentially by CRT-D is recommended to reduce morbidity or to prevent disease progression ^d	NYHA function class II LVEF $\leq 35\%$, QRS ≥ 150 ms, SR Optimal medical therapy	I	A	9, 20–22

All primary prevention recommendations apply only to patients who are receiving optimal medical therapy and have reasonable expectation of survival with good functional capacity for >1 year.

ESC HF Guidelines 2012: CRT Summary

Eur Heart J. 19 May 2012

Sinus Rhythm



- There is less consensus about pts with RBBB, interventricular conduction delay or with AF.
- Another area of debate is pts without an indication for CRT who needs a conventional PM.
- If pts with wQRS <120 ms and 'mechanical dyssynchrony' benefit from CRT remains to be proven.

2012 Recommendations for CRT in Patients With Systolic Heart Failure

JACC Oct 2012

The most significant changes:

- 1) limitation of the Class I indication to pts with wQRS ≥ 150 ms and LBBB
- 2) expansion of Class I indication to NYHA class II, with LBBB + wQRS 150 ms
- 3) the addition of a Class IIb recommendation for pts who have LVEF 30%, ischemic etiology, SR, LBBB with a wQRS ≥ 150 ms, and NYHA class I symptoms.

CLASS IIa

CRT can be useful for pts who have LVEF $\leq 35\%$, SR, LBBB with a wQRS 120-149 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT (*Level of Evidence: B*)

New

CRT can be useful for pts who have LVEF $\leq 35\%$, SR, a non-LBBB pattern with a wQRS ≥ 150 ms, and NYHA class III/ambulatory class IV symptoms on GDMT (*Level of Evidence: A*)

New

CRT can be useful in pts with AF and LVEF $\leq 35\%$, on GDMT if: a) the pt requires ventricular pacing or otherwise meets CRT criteria, b) AV nodal ablation or pharmacologic rate control will allow near 100% ventricular pacing with CRT. (*Level of Evidence: B*)

CRT can be useful for pts on GDMT who have LVEF $\leq 35\%$, and are undergoing new or replacement device placement with anticipated requirement for $>40\%$ ventricular pacing. (*Level of Evidence: C*)

“Guidelines are composed of recommendations on the basis of the best available medical science; however, implementation of these recommendations will be impacted by the financial, cultural, and societal differences among individual countries.”



Find the differences...

OBRIGADO!



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