TRAITEMENTS INTERVENTIONNELS DE L'INSUFFISANCE CARDIAQUE:

Quant proposer une resynchronisation électrique ?

Maxime GUENOUN
Marseille FRANCE

APPAC 2014

APPAC:CNCF session commune 6 juin 2014

Relations avec l'industrie

Maxime GUENOUN 2011 – 2013:

Consulting scientifique, Conférences, Invitations:

- Astra-Zeneca, Biopharma, BMS, Boehringer-Ingelheim, Daiichi-Sankyo, Eli-Lilly,
- Merck-Serono, MSD-Schering, Novartis, Pfizer, Pierre Fabre, Sanofi-Aventis, Servier, Bayer Healthcare, Ipsen,
- Medtronic, Sorin Group, Saint Jude Médical, Boston Scientific.

2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

www.escardio.org/guidelines

European Heart Journal 2013;34:2281-2329
Europace 2013;15:1070–1118

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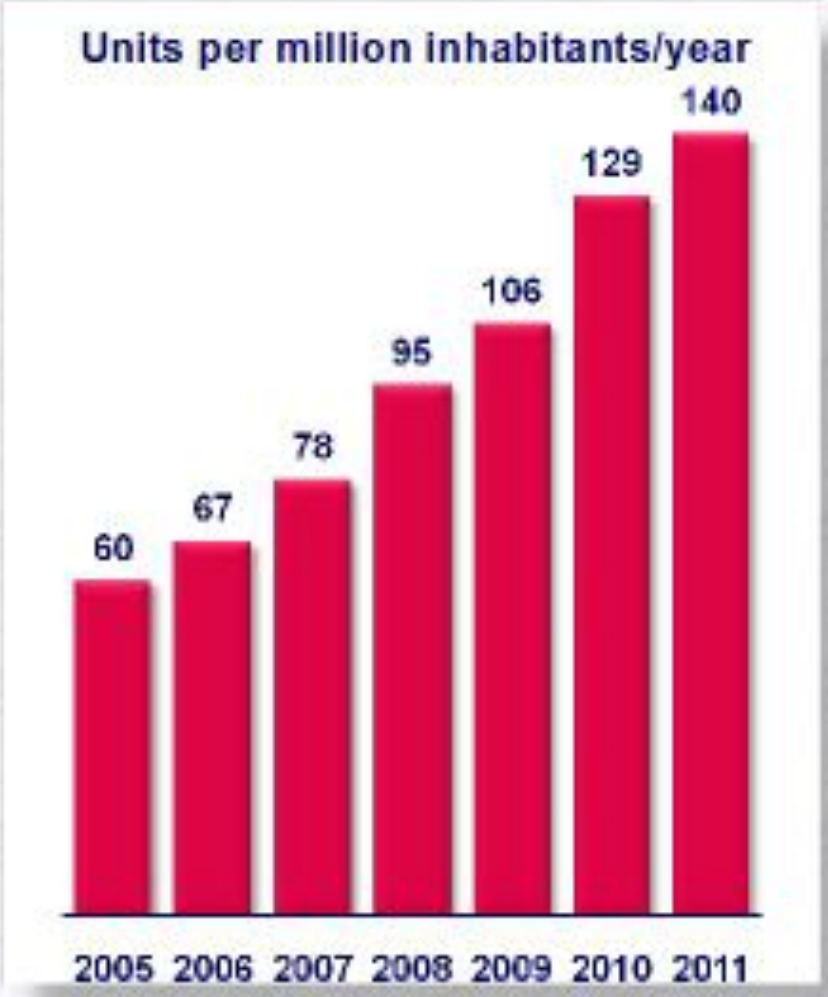
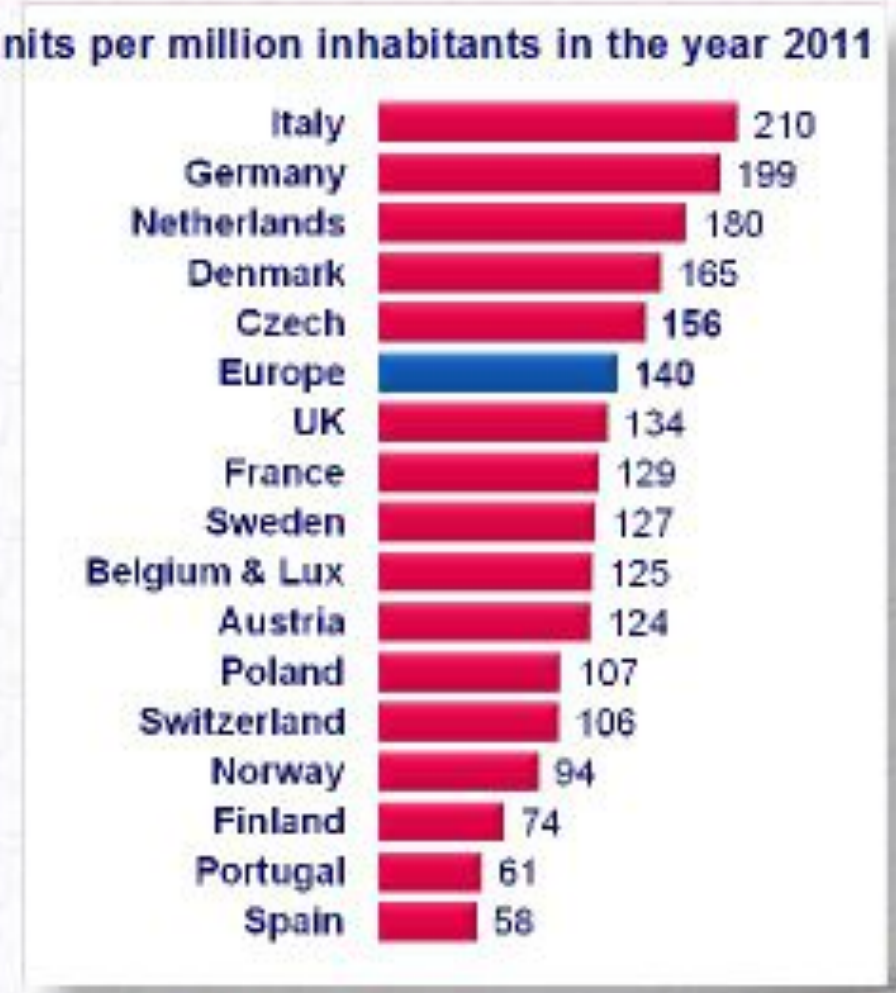
Cardiac Resynchronization Therapy





Source: Eucomed (www.eucomed.org/medical-technology/facts-figures)

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Indications (Class I A) until 2013

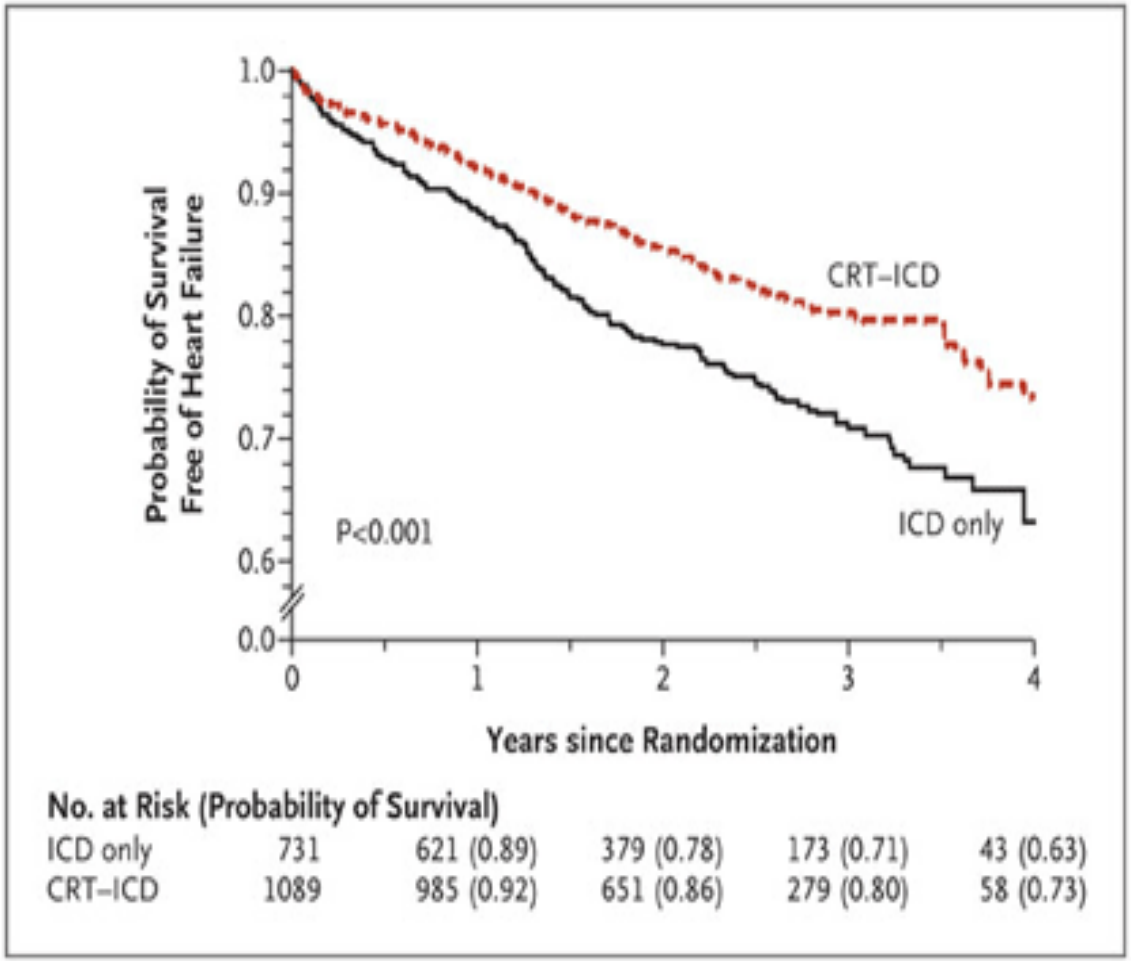
NYHA class III–IV

- Adequate medical treatment
- HF symptoms, sinus rhythm,
- poor LVEF ≤35%
- and prolonged QRS ≥120 ms.

NYHA II: QRS > 150 ms

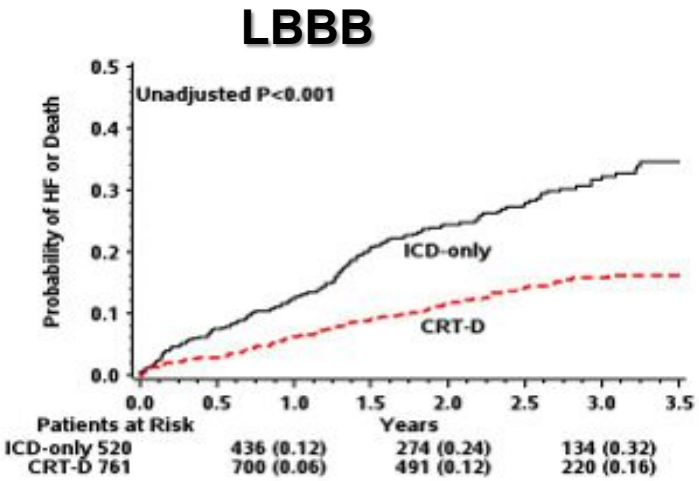
MADIT-CRT 2009

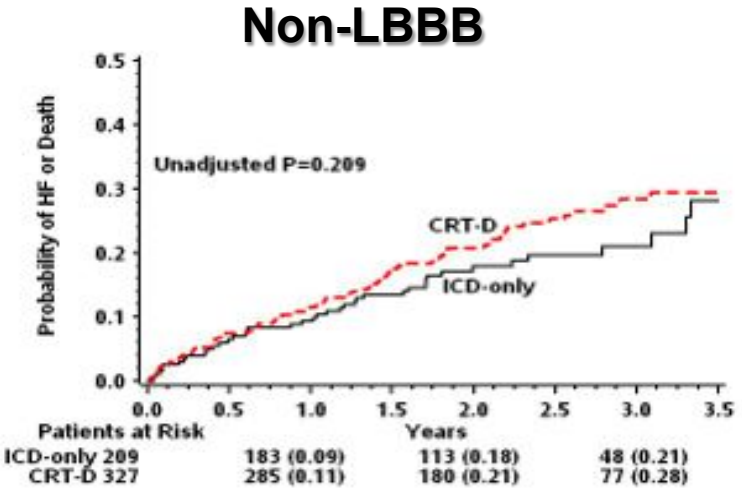
- **1820 ICM/NICM pts:**
  - **EF ≤ 30%**
  - **QRS ≥ 130 msec**
  - **NYHA I/II**
- **Randomization:**
  - **CRT-D vs. ICD-only**
  - **3:2 ratio**
- **Mean Follow-up:**
  - **2.4 yrs**
- **Outcome:**
  - **HR=0.66 (p=0.001)**

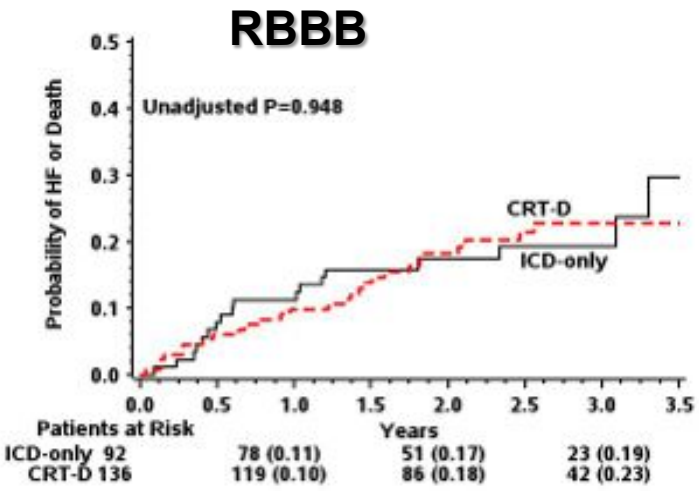


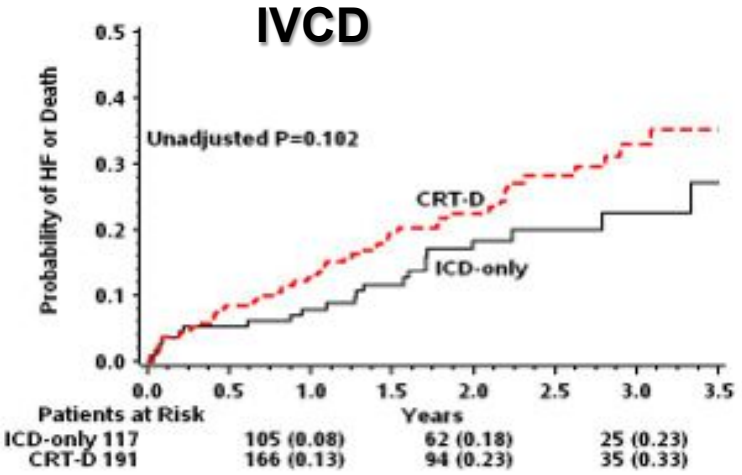
MADIT-CRT: QRS MORPHOLOGY

Zareba et al. Circulation , 2011

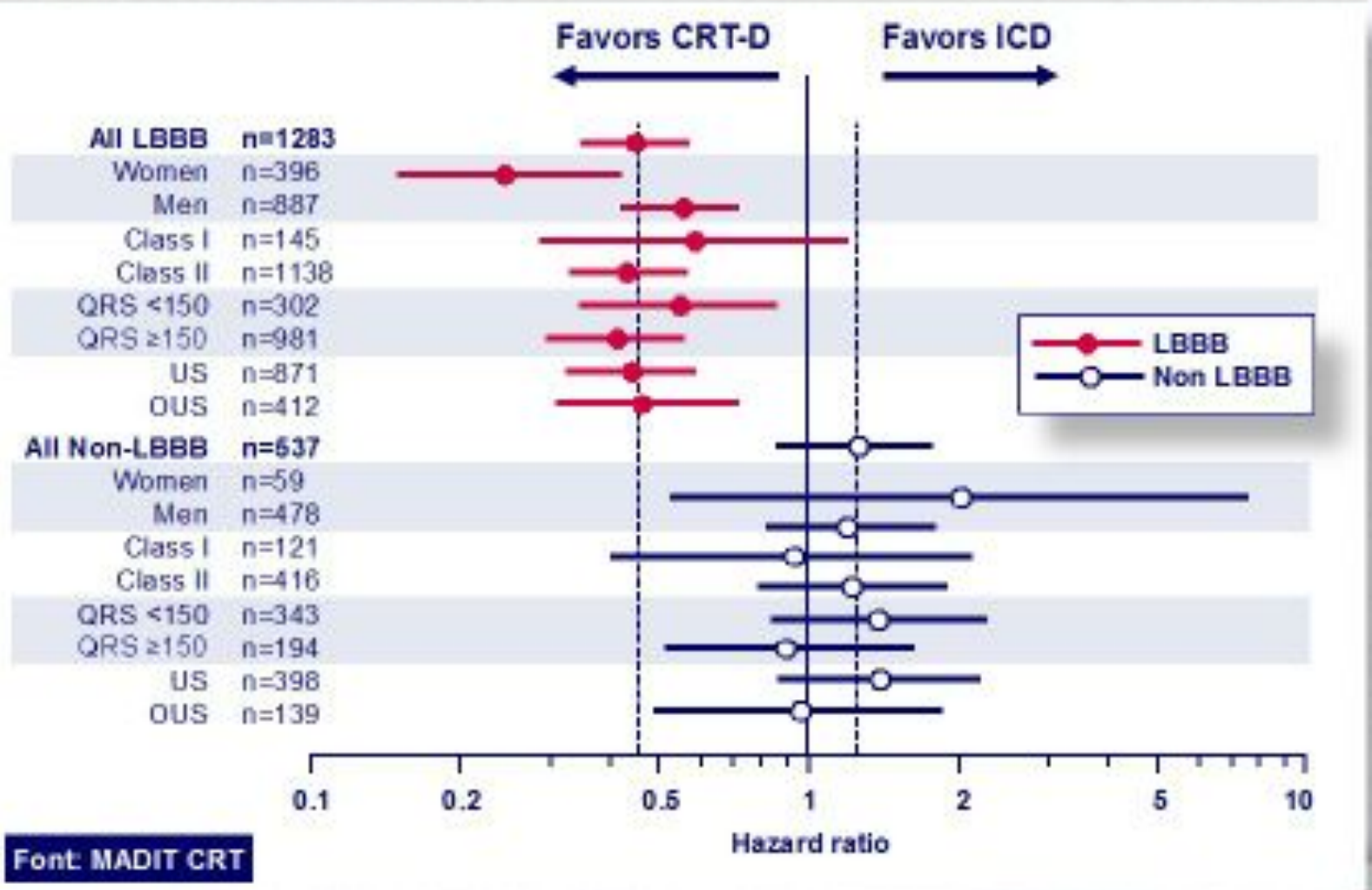








Challenging indications for CRT: the "Entry criterium"



European Heart Journal 2013;34:2281-2329
Europace 2013;15:1070–1118

2013

QRS MORPHOLOGY

European Heart Journal
doi:10.1093/eurheartj/ehs150

ESC GUIDELINES

2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

The Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the Heart Failure Association (HFA) of the ESC

Authors/Task Force Members: Michele Brignole (Italy), Angelo Auricchio (Switzerland), Gonzalo Baron-Esquivias (Spain), Pierre Bordachar (France), Giuseppe Boriani (Italy), Ole-A Breithardt (Germany), John Cleland (UK), Jean-Claude Deharo (France), Victoria Delgado (Nertherlands), Perry M. Elliott (UK), Bulent Gorenek (Turkey), Carsten W. Israel (Germany), Christophe Leclercq (France), Cecilia Linde (Sweden), Lluís Mont (Spain), Luigi Padeletti (Italy), Richard Sutton (UK), Panos E. Vardas (Greece).

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Indications for CRT in patients in sinus rhythm	Class	Level
1) LBBB with QRS duration >150 ms.	I	A
2) LBBB with QRS duration 120-150 ms.	I	B
3) Non-LBBB with QRS duration >150 ms.	IIa	B
4) Non-LBBB with QRS duration 120-150 ms.	IIb	B

Echocardiography Guided Cardiac Resynchronization Therapy in Patients with Symptomatic Heart Failure and Narrow QRS Complex

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Clinic for Cardiology - University Hospital Zurich,
University of Zurich, Zurich, Switzerland

on behalf of the
EchoCRT Executive Committee and Investigators

EchoCRT

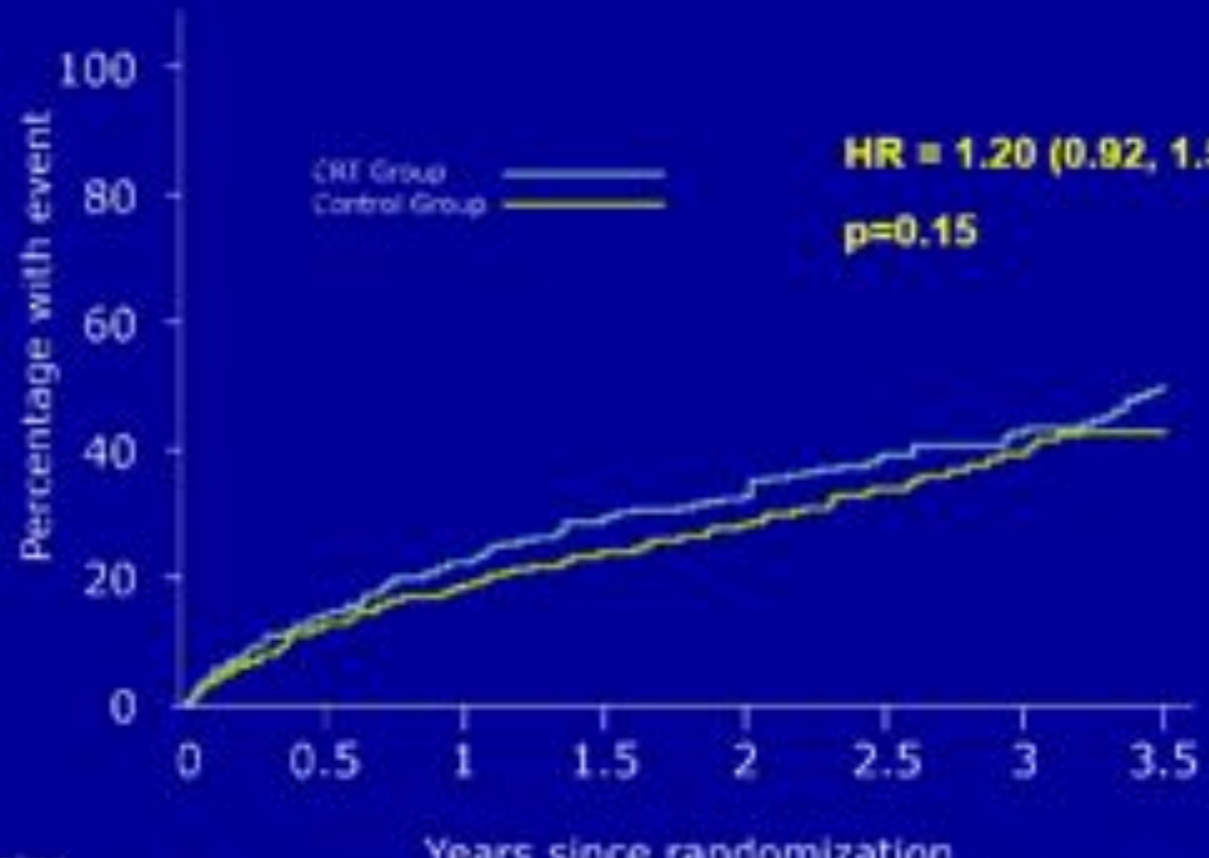
Primary Inclusion & Exclusion Criteria

- NYHA class III-IV within the last three months prior to enrollment and at baseline
- Stable optimal pharmacologic therapy
- LV systolic dysfunction and dilation
  - EF ≤35%; LVEDD ≥ 55 mm
- QRS <130 ms
- Ventricular Dyssynchrony confirmed by echo core lab:
  - Delay in peak systolic velocity of opposing walls (4-chamber view or apical long-axis view) ≥ 80 ms on TDI
  - Speckle-tracking radial strain anteroseptal-posterior wall delay ≥ 130 ms
- Patients with AF or requiring pacing excluded

EchoCRT

Primary Efficacy Composite Endpoint

First hospitalization for worsening heart failure or all-cause mortality

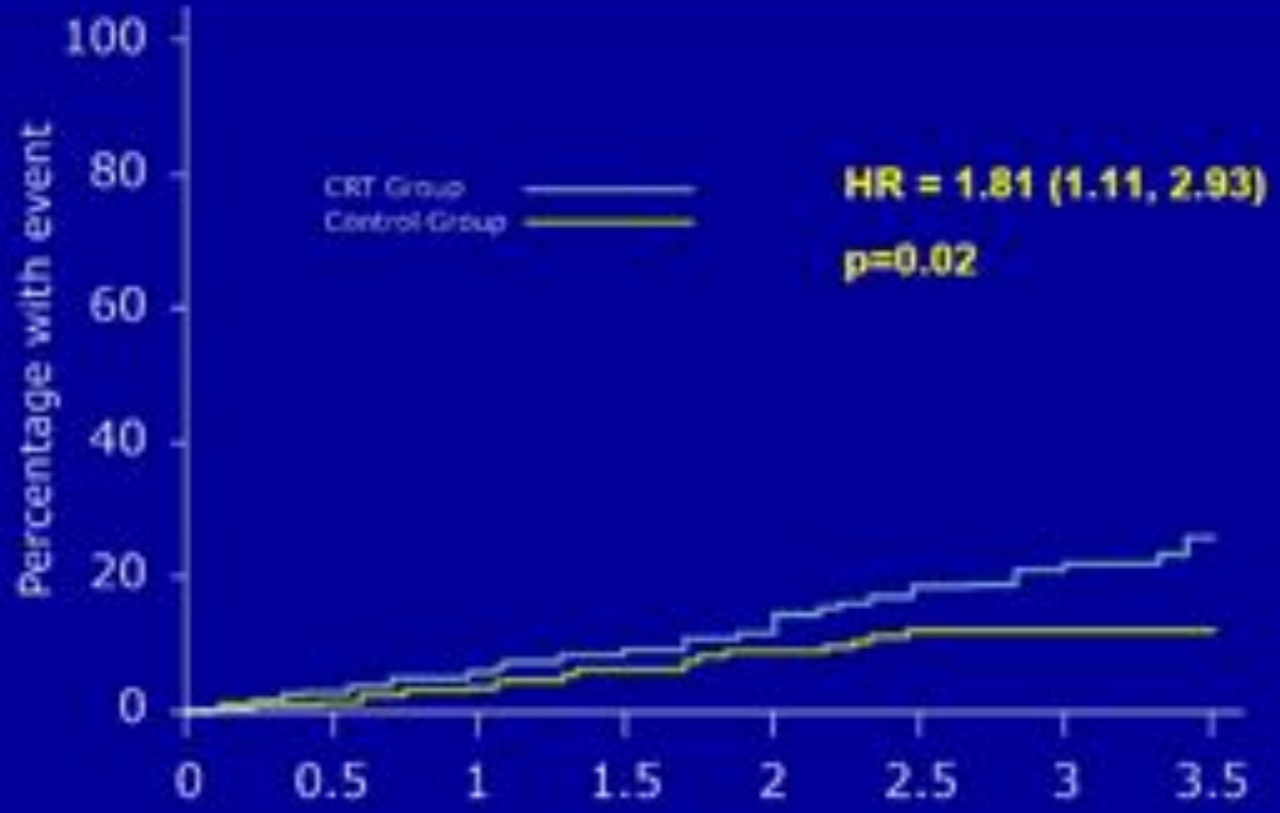


Numbers

CRT Group	404	297	223	155	103	65	42	19
Control Group	405	302	236	166	119	71	44	15

EchoCRT

All-Cause Mortality



Numbers at risk

CRT Group	404	334	267	199	132	84	56	25
Control Group	405	335	269	195	141	87	62	27

EchoCRT

4 deaths in the control group and 1 death in CRT group were after (LVAD/ Transplant and were excluded from analysis.

Narrow QRS

Indications for CRT in patients in sinus rhythm	Class	Level
5) QRS duration <120 ms. CRT in patients with chronic HF with QRS duration <120 ms is not recommended	III	B

Indications for CRT in patients in sinus rhythm

Recommendations	Class	Level
1) LBBB with QRS duration >150 ms is recommended in chronic HF patients and LVEF ≤35% who remain in NYHA functional class II, and ambulatory IV despite adequate medical treatment. (*)	I	A
2) LBBB with QRS duration 120-150 ms should be considered in chronic HF patients and LVEF ≤35% who remain in NYHA functional class II, and ambulatory IV despite adequate medical treatment. (*)	I	B
3) Non-LBBB with QRS duration >150 ms should be considered in chronic HF patients and LVEF ≤35% who remain in NYHA functional class II, and ambulatory IV despite adequate medical treatment. (*)	IIa	B
4) Non-LBBB with QRS duration 120-150 ms may be considered in chronic HF patients and LVEF ≤35% who remain in NYHA functional class II, and ambulatory IV despite adequate medical treatment. (*)	IIb	B
5) QRS duration <120 ms CRT in patients with chronic HF with QRS duration <120 ms is not recommended.	III	B

* Patients should generally not be implanted during admission for acute decompensated HF. In such patients, guideline-indicated medical treatment should be optimized and the patient reviewed as an out-patient after stabilization. It is recognized that this may not always be possible.

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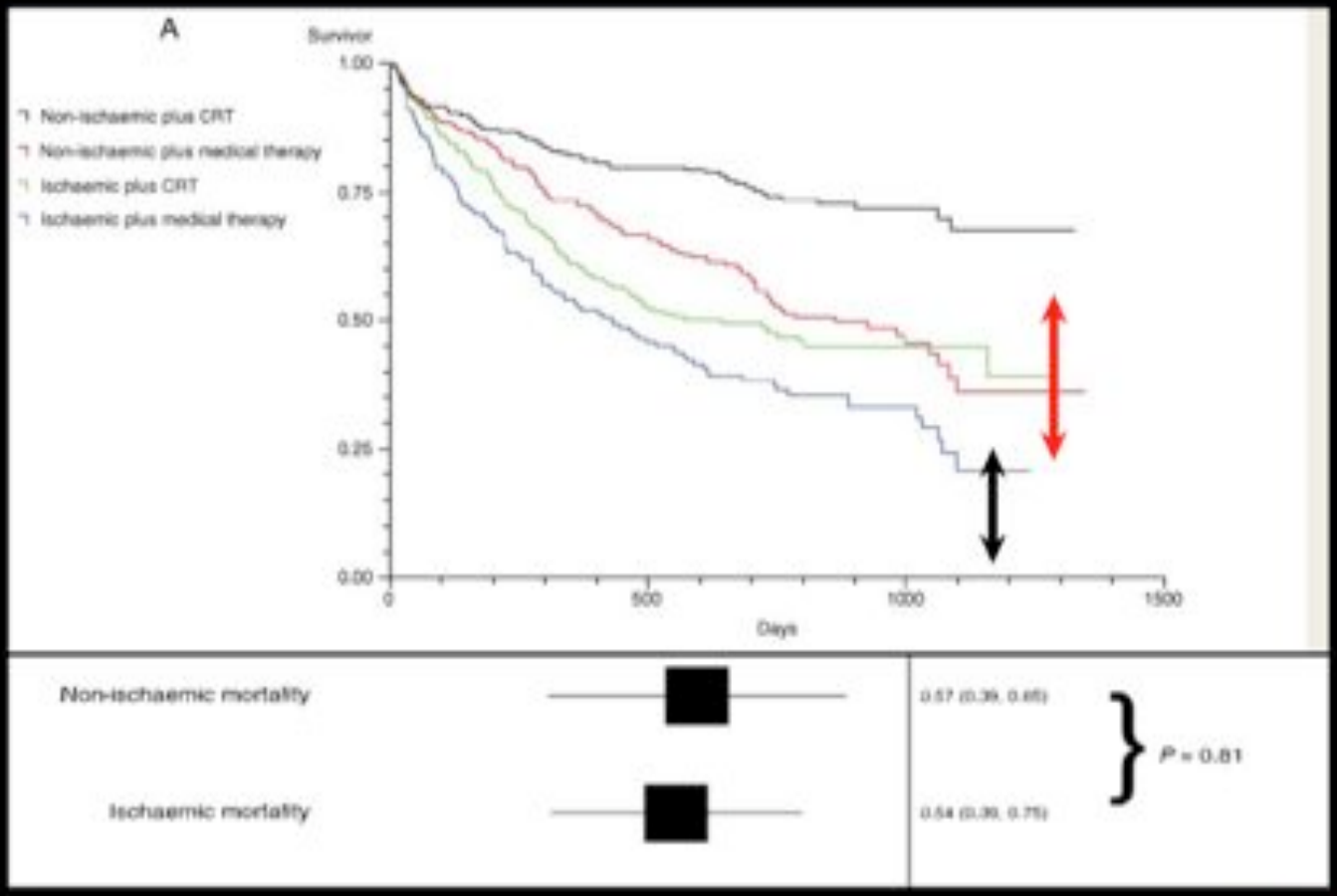
CRT indications: What else ?

Etiology of cardiomyopathy and response to CRT

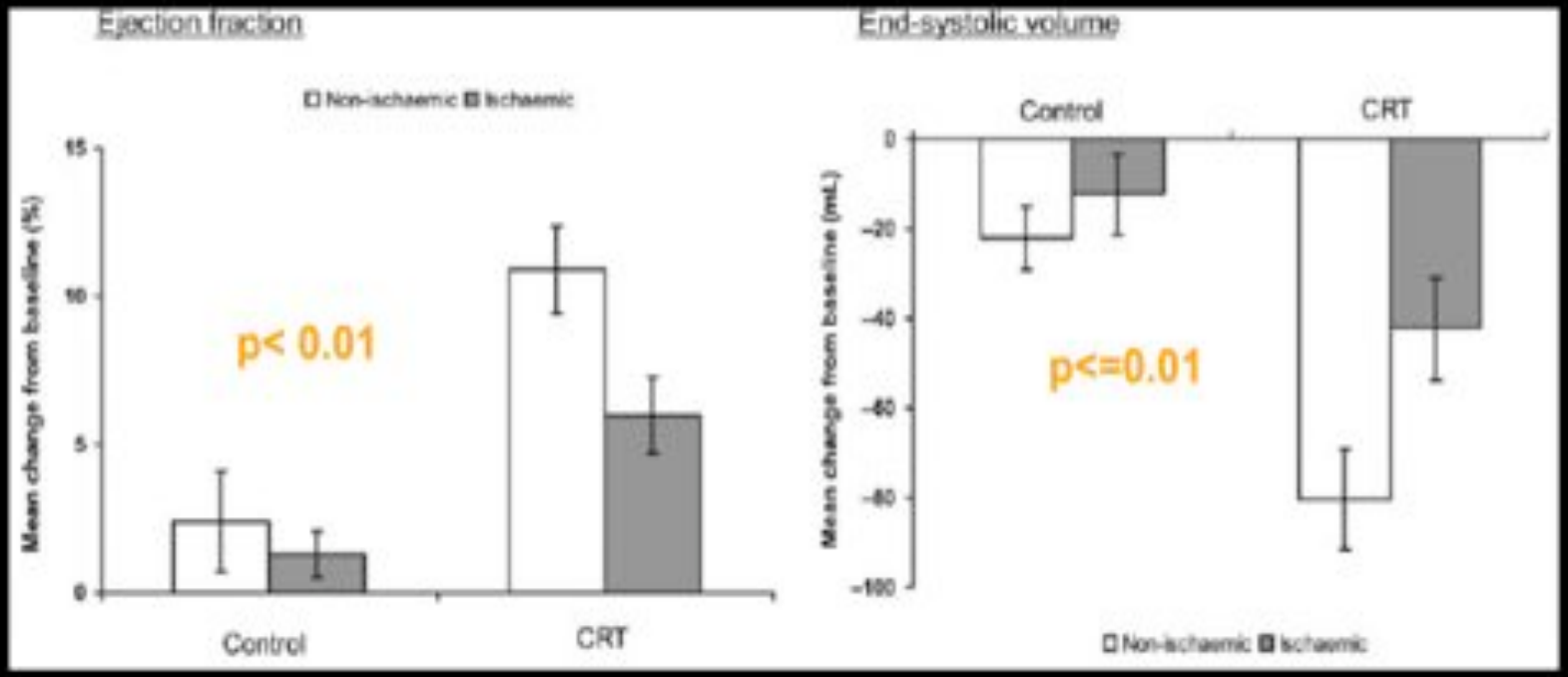
Wikstrom G et al EHJ 2009



CRT indications: What else ?

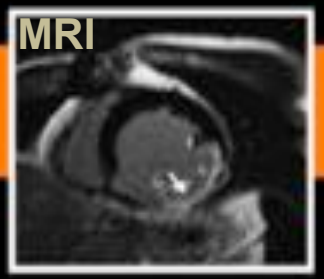
Effects on disease progression
Importance of etiology

Ghio S et al. EJHF 2009

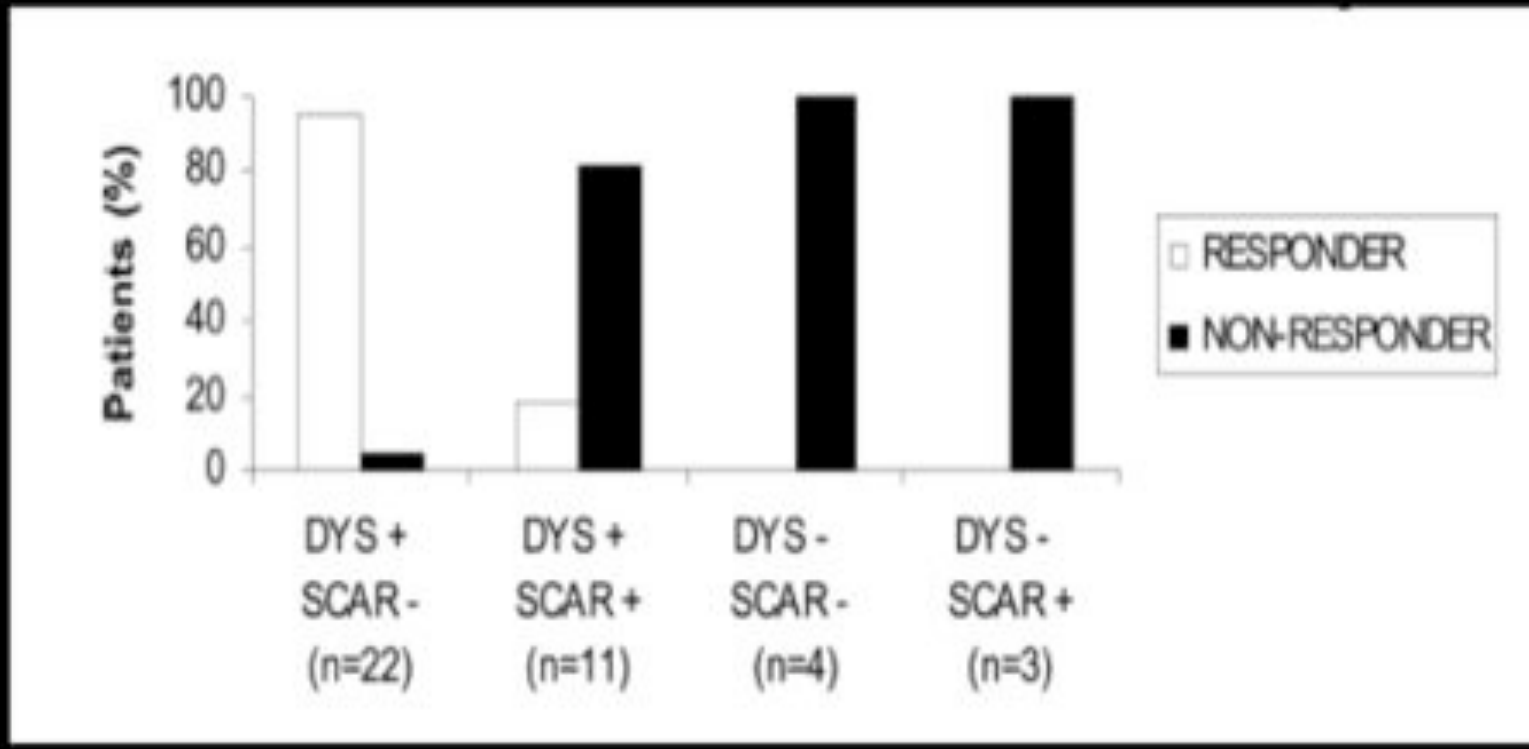


CRT indications: What else ?

Ischemic cardiomyopathy and CRT



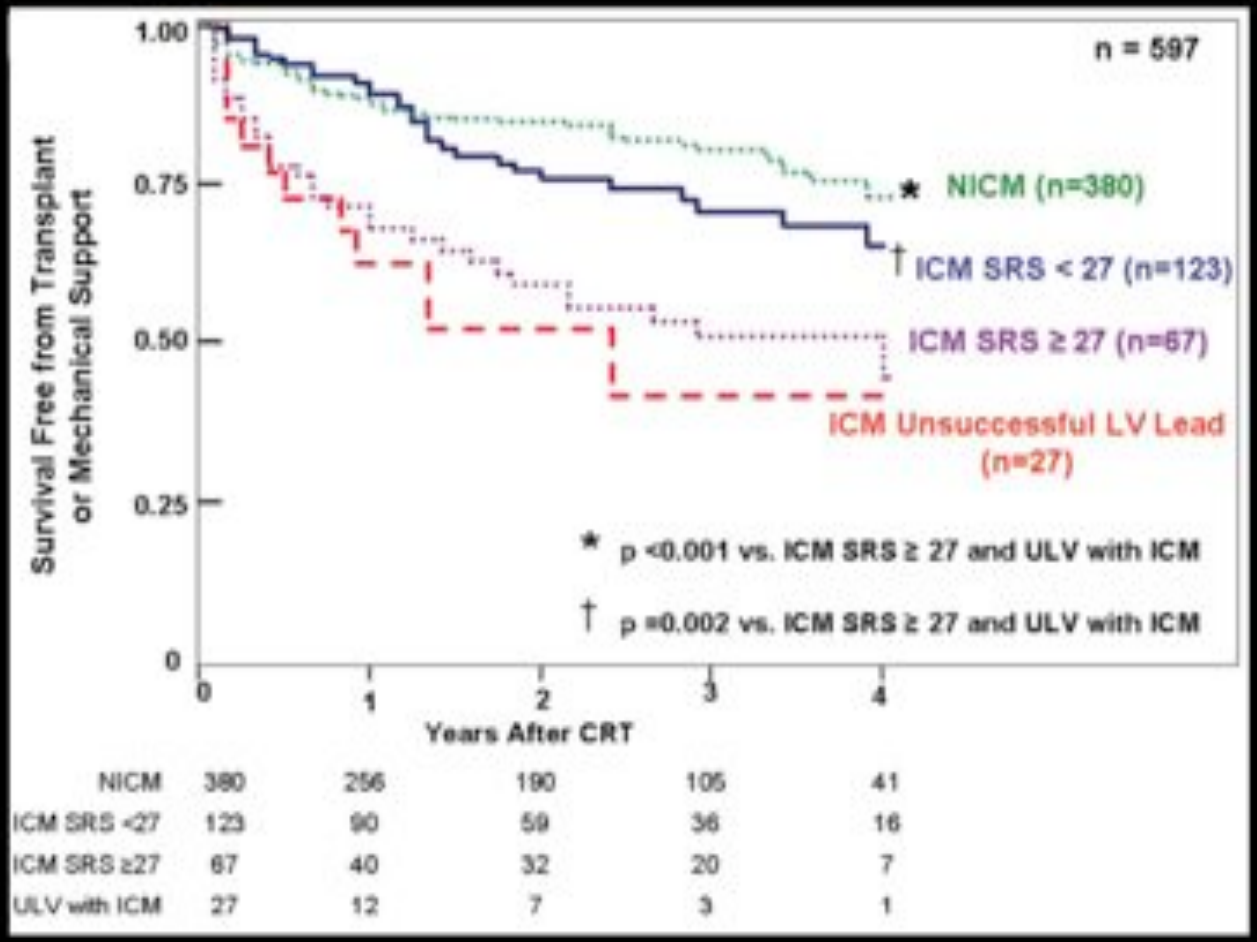
Bleeker GB et al. Circ 2006



CRT indications: What else ?

Importance of the magnitude of scar in ICM

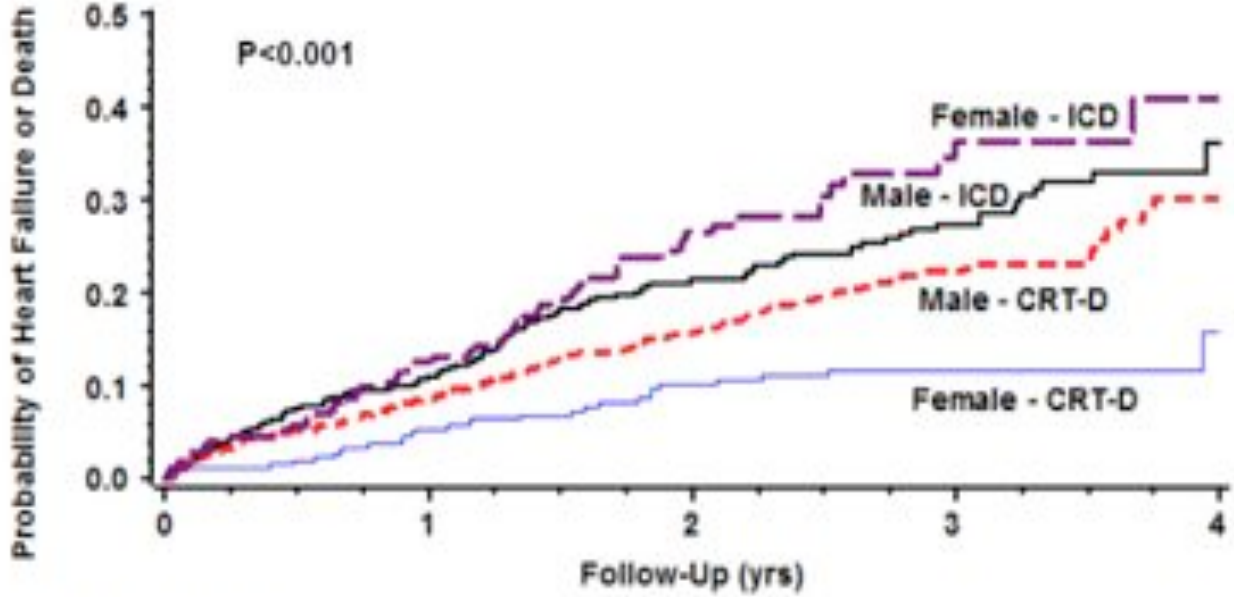
Aldestein EC et al. EHJ 2011



CRT indications: What else ?

CRT-D Women benefit more from CRT
Mortality and HF events

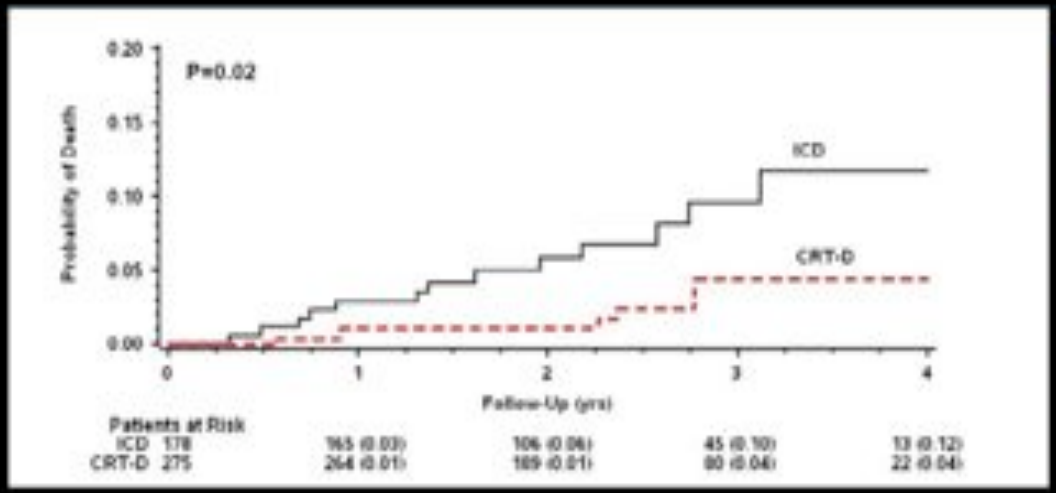
Arshad A et al. JACC 2011



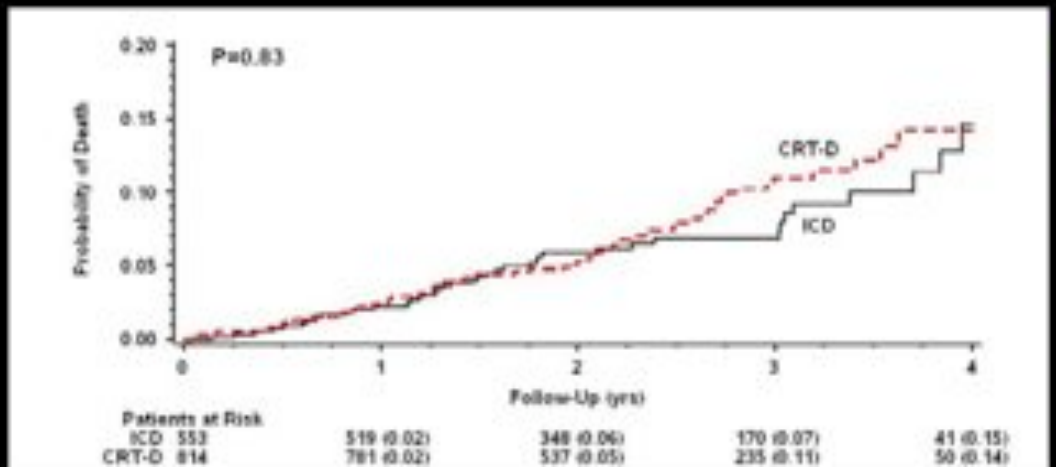
Patients at Risk					
Male - ICD	553	472 (0.11)	293 (0.21)	137 (0.27)	34 (0.36)
Male - CRT-D	814	732 (0.09)	478 (0.16)	206 (0.22)	40 (0.30)
Female - ICD	178	148 (0.13)	84 (0.27)	37 (0.36)	10 (0.41)
Female - CRT-D	275	253 (0.05)	175 (0.10)	72 (0.12)	18 (0.16)

CRT indications: What else ?

Women benefit more from CRT mortality



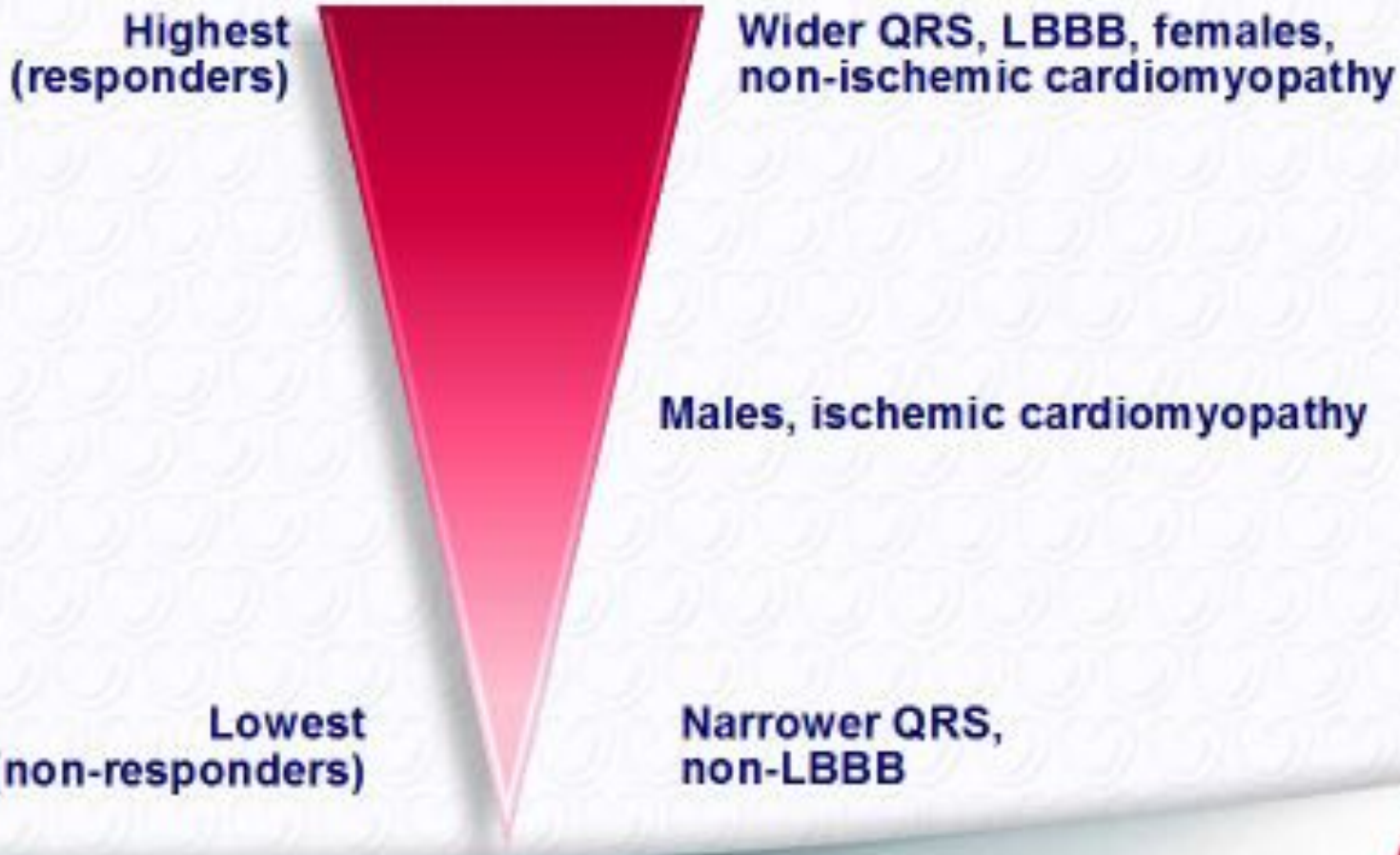
Women



Men

Arshad A et al.
JACC 2011

Indications for CRT in patients in sinus rhythm



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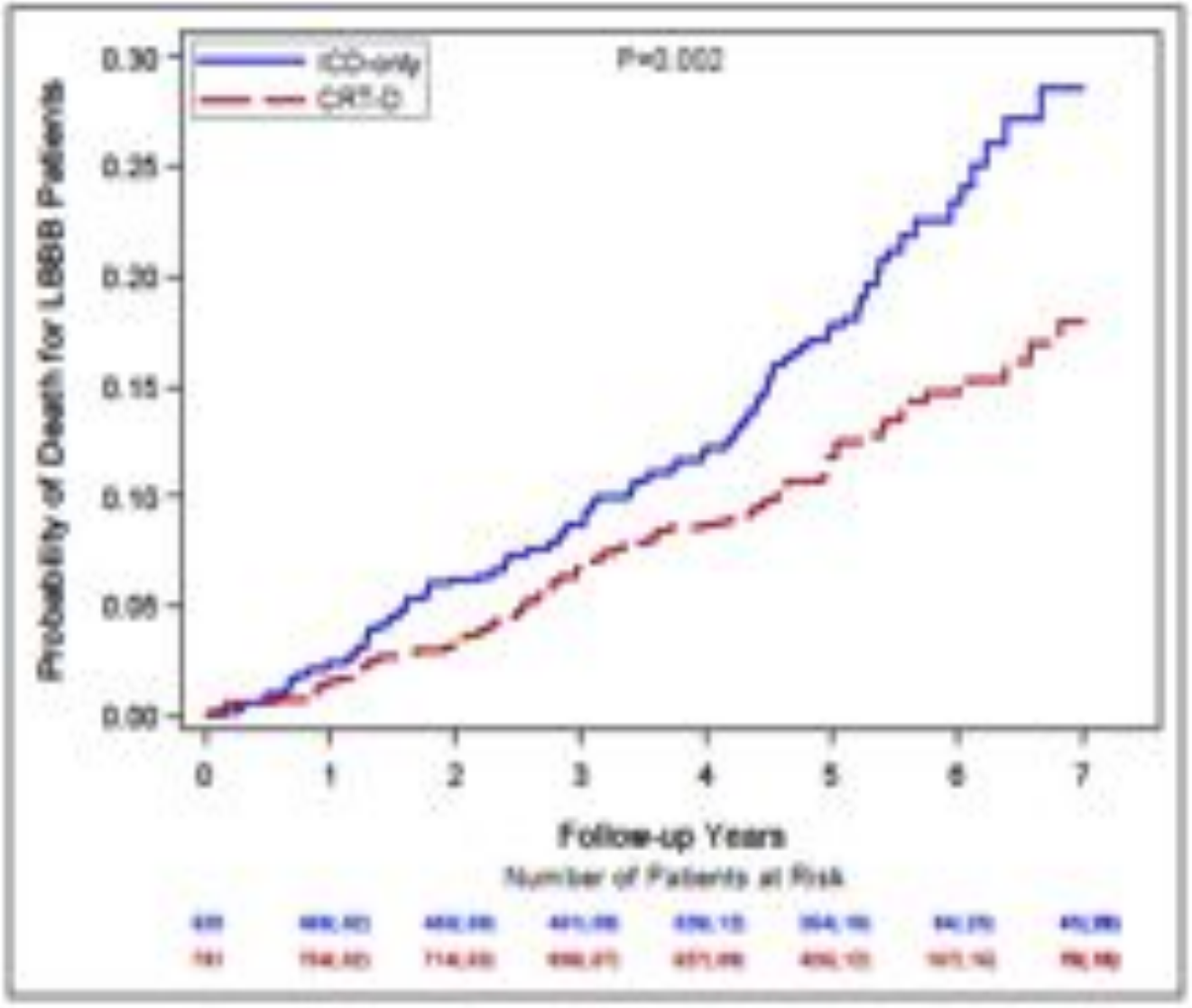
LONG-TERM SURVIVAL WITH CARDIAC RESYNCHRONIZATION THERAPY IN MILD HEART FAILURE PATIENTS ACC 2014

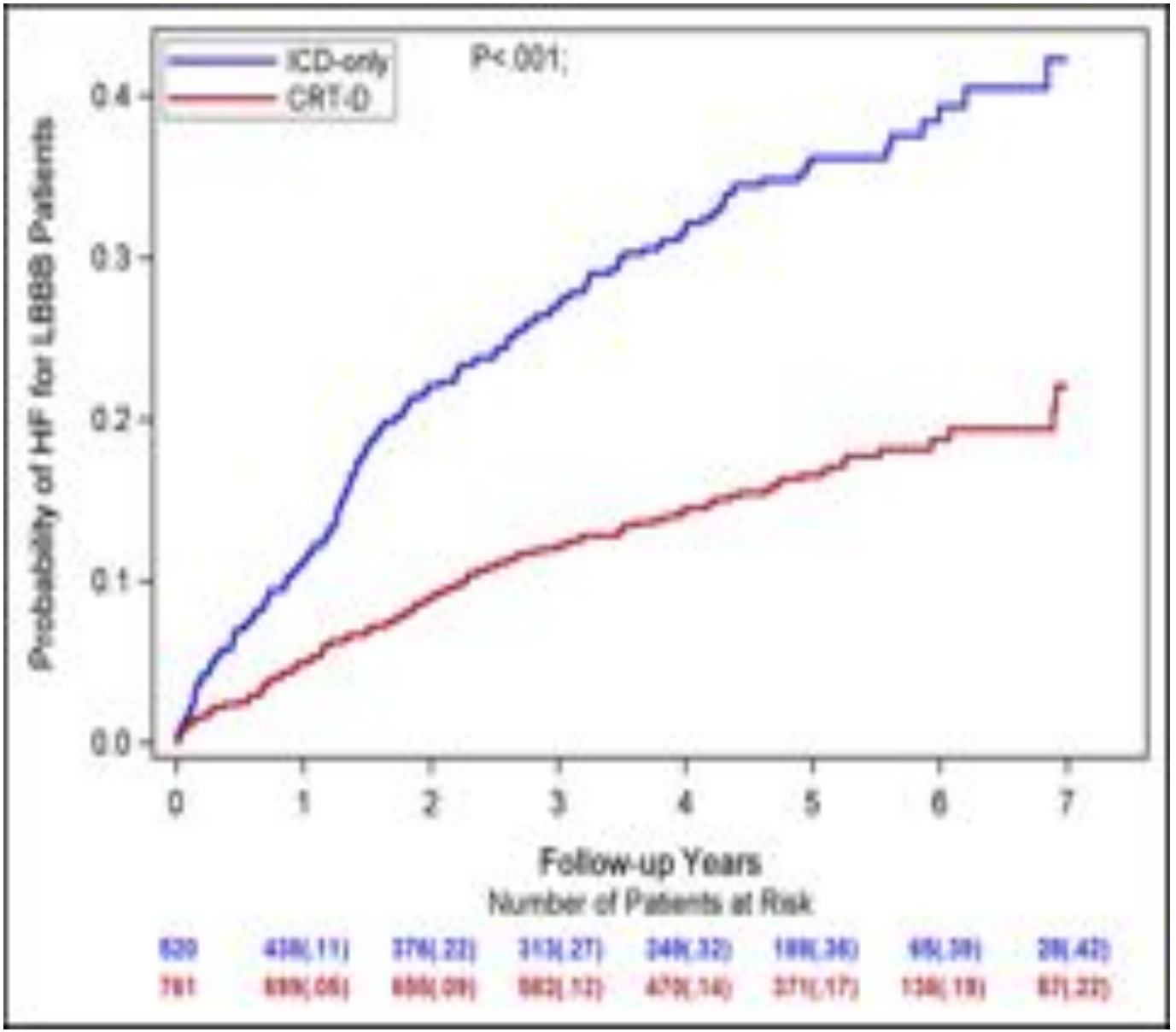
We hypothesized that the pronounced reduction in heart failure events associated with CRT during the in-trial period of MADIT-CRT would translate into a long-term survival benefit

LBBB: ALL-CAUSE MORTALITY

NNT = 9

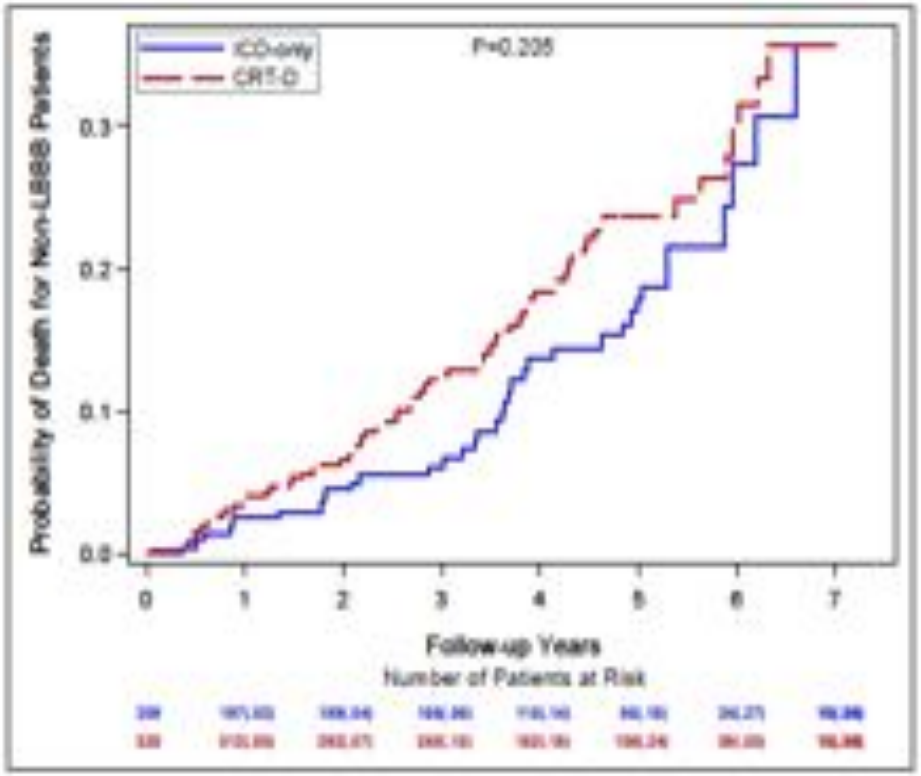


LBBB: NON-FATAL HF EVENTS

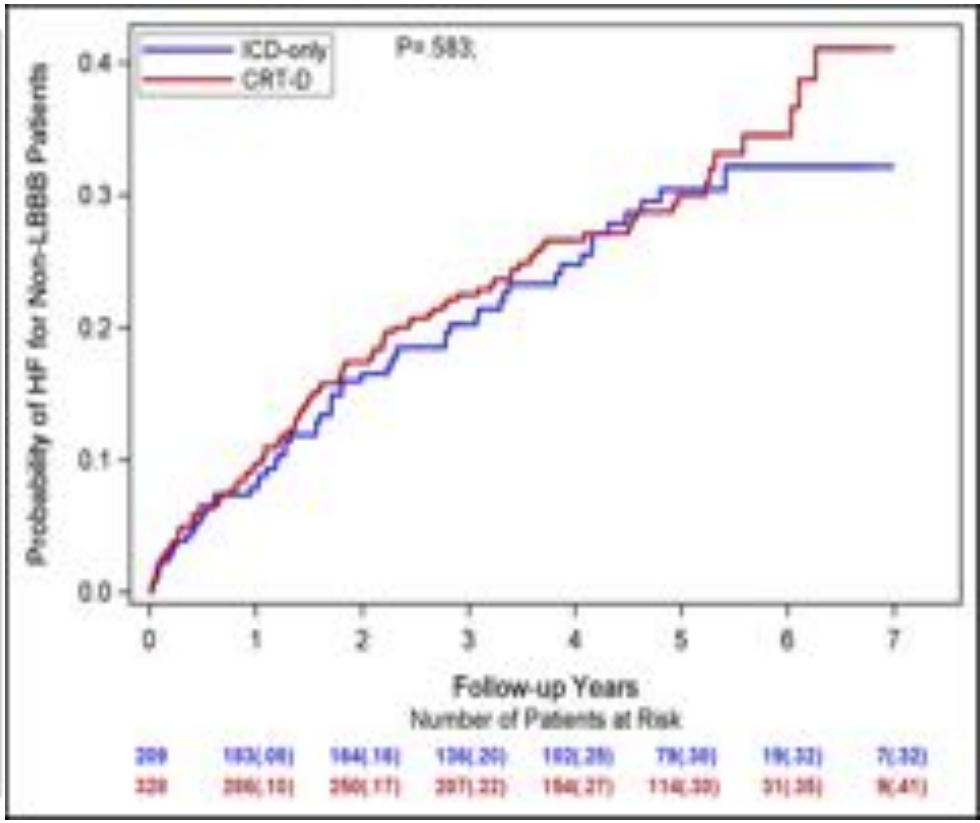


NLBBB

ALL-CAUSE MORTALITY



NON-FATAL HF EVENTS



Indication for CRT in patients with permanent AF

Recommendations	Class	Level
1) Patients with HF, wide QRS and reduced LVEF:		
1a) should be considered in chronic HF patients, intrinsic QRS ≥120 ms and LVEF ≤35% who remain in NYHA functional class III and ambulatory IV despite adequate medical treatment (*), provided that a biventricular pacing as close to 100% as possible can be achieved.	IIa	B
1b) AV junction ablation should be added in case of incomplete biventricular pacing.	IIa	B
2) Patients with uncontrolled heart rate who are candidates for AV junction ablation. CRT should be considered in patients with reduced LVEF who are candidates for AV junction ablation for rate control.	IIa	B

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Choice of pacing mode (and CRT optimization)

Recommendations	Class	Level
1) The goal of should be to achieve biventricular pacing as close to 100% as possible since the survival benefit and reduction in hospitalization are strongly associated with an increasing percentage of biventricular pacing.	IIa	B
2) Apical position of the LV lead should be avoided when possible.	IIa	B
3) LV lead placement may be targeted at the latest activated LV segment.	IIb	B

Clinical perspectives

- The usual (standard) modality of CRT pacing consists of simultaneous biventricular pacing (RV and LV) with a fixed 100-120 ms AV delay with LV lead located in a posterolateral vein, if possible. …Current evidence does not strongly support the performance of AV and VV optimization routinely in all patients receiving CRT.
- LV pacing alone… seems to be non-inferior to biventricular pacing for improving soft end-points (quality of life, exercise capacity and LV reverse remodelling) and might be considered to lower the costs and complexity of the procedure and to increase the longevity of the device. LV pacing alone seems particularly appealing in children and young adults.

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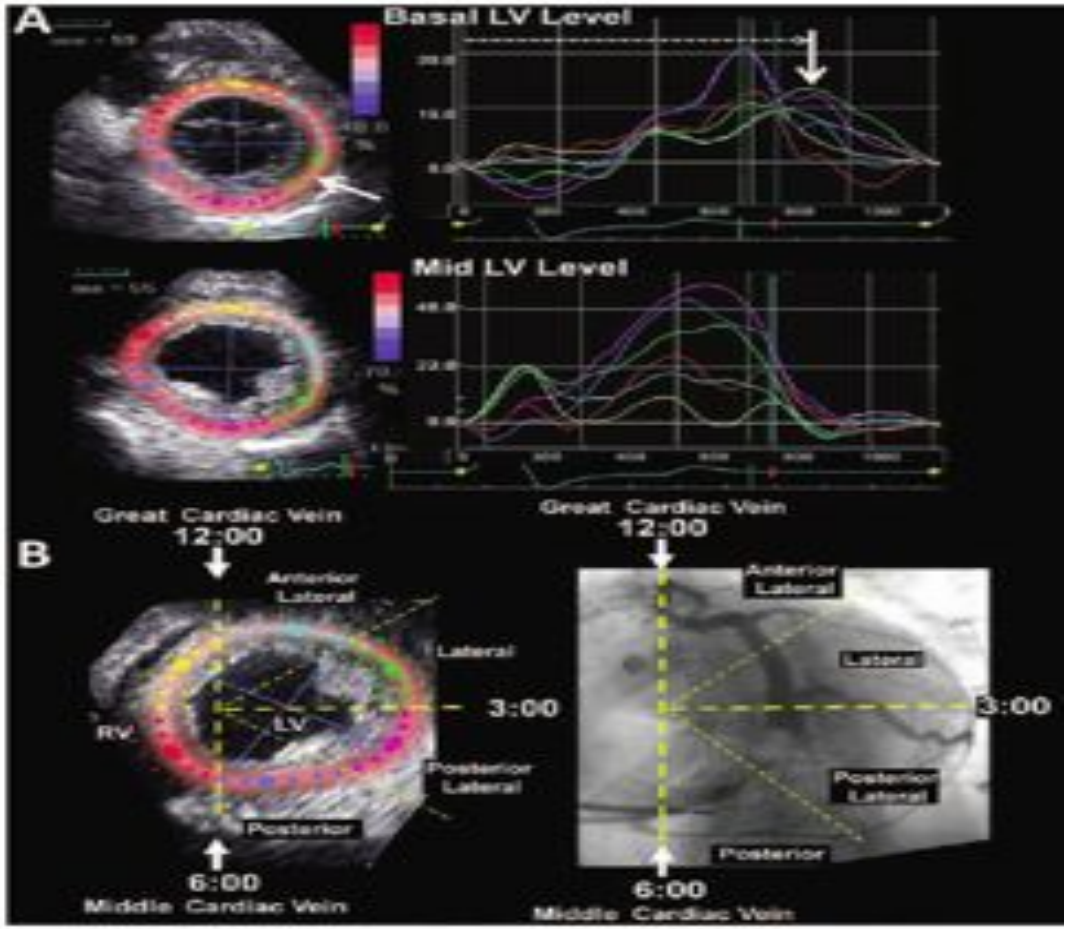


Figure 1. A, Top: Short-axis echocardiographic speckle tracking images at basal and mid-left ventricular (LV) levels with 6 color-coded time-strain curves per image to the left. Site of latest mechanical activation (**arrows right top**) was determined to be basal lateral (**left top**). **B, Bottom:** Segmentation of mid-LV short-axis view on left for coregistration with coronary venous anatomy from the left anterior oblique projection on right. A clock-face analogy with the great cardiac vein at 12.00 and the middle cardiac vein at 6.00. The LV free wall was divided into 4 segments according to coronary venous anatomy (with corresponding speckle tracking software labels listed first): Anterior, anterolateral; lateral, lateral; posterior, posterolateral; inferior, posterior. RV indicates right ventricle. Also, LV length was divided into thirds from the right anterior oblique fluoroscopic projection.

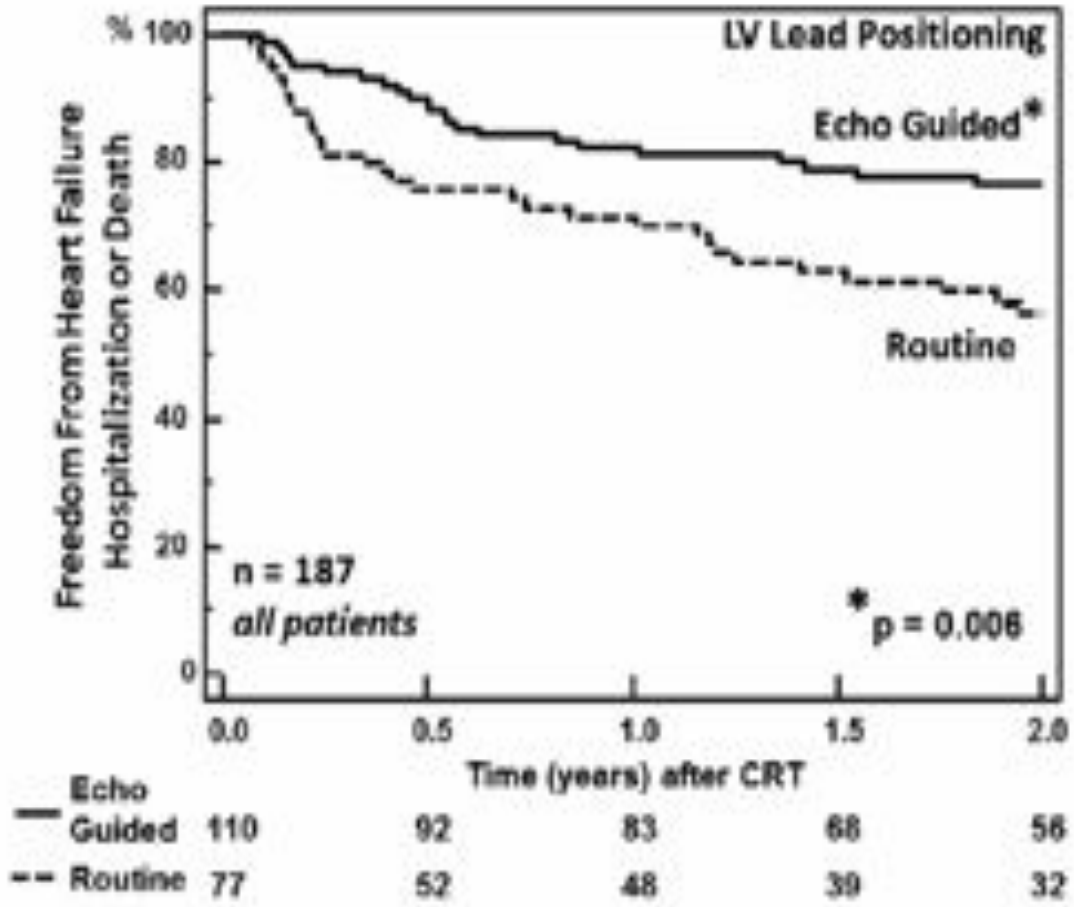
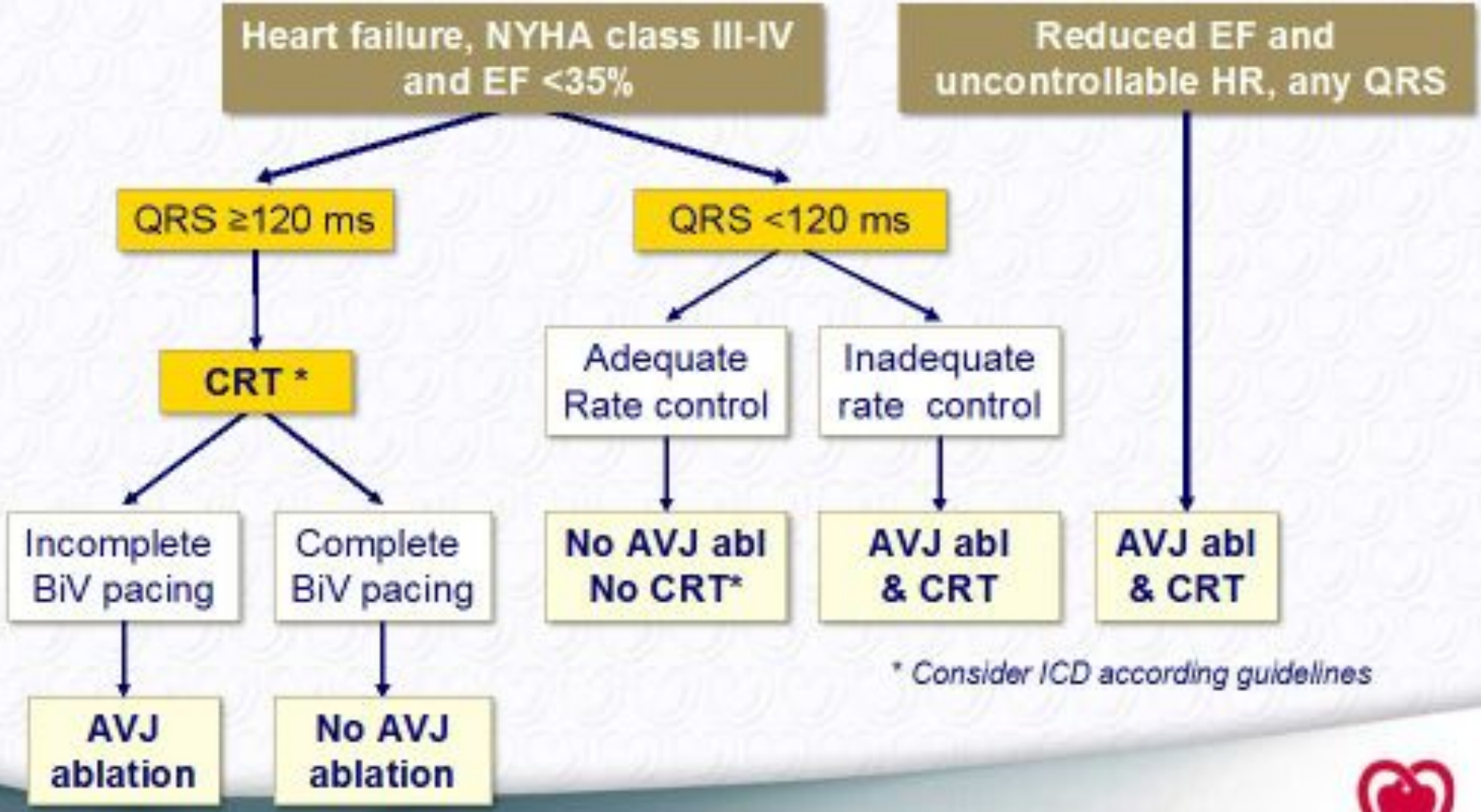


Figure 2. Kaplan–Meier plots of the results of the primary end point of freedom from heart failure hospitalization or death after cardiac resynchronization therapy (CRT), including all randomized patients with intention-to-treat analysis. Patients randomized to echocardiographic-guided left ventricular (LV) lead positioning strategy had a significantly more favorable clinical outcome in comparison to routinely treated patients.

Indications for AVJ ablation (±CRT) in permanent AF



* *Consider ICD according guidelines*

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Backup ICD in patients indicated for CRT

Comparative results of CRT-D versus CRT-P in primary prevention

	CRT-D	CRT-P
Mortality reduction	Similar level of evidence but CRT-D slightly better	Similar level of evidence but CRT-P slightly worse
Complications	Higher	Lower
Costs	Higher	Lower

Clinical guidance to the choice of CRT-P or CRT-D in primary prevention

Factors favouring CRT-D	Factors favouring CRT-P
Life expectancy >1 year	Advanced heart failure
Stable heart failure, NYHA II	Severe renal insufficiency or dialysis
Ischemic heart disease (low and intermediate MADIT risk score)	Other major co-morbidities
Lack of comorbidities	Frailty
	Cachexia

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KEY MESSAGES

- Typical LBBB
- QRS > 120 ms
- FE < 35% CLASS II, III, and IV
- AF patients
- LEAD POSITION AND OPTIMIZATION

Upgraded or *de novo* CRT in patients with conventional pacemaker indications and HF

Recommendations	Class	Level
1) **Upgrade from conventional PM or ICD** is indicated in HF patients with LVEF <35% and high percentage of ventricular pacing who remain in NYHA class and ambulatory IV despite adequate medical treatment.	I	B
2) **"De novo" implantation** should be considered in HF patients, reduced EF and expected high percentage of ventricular pacing in order to decrease the risk of worsening HF.	IIa	B

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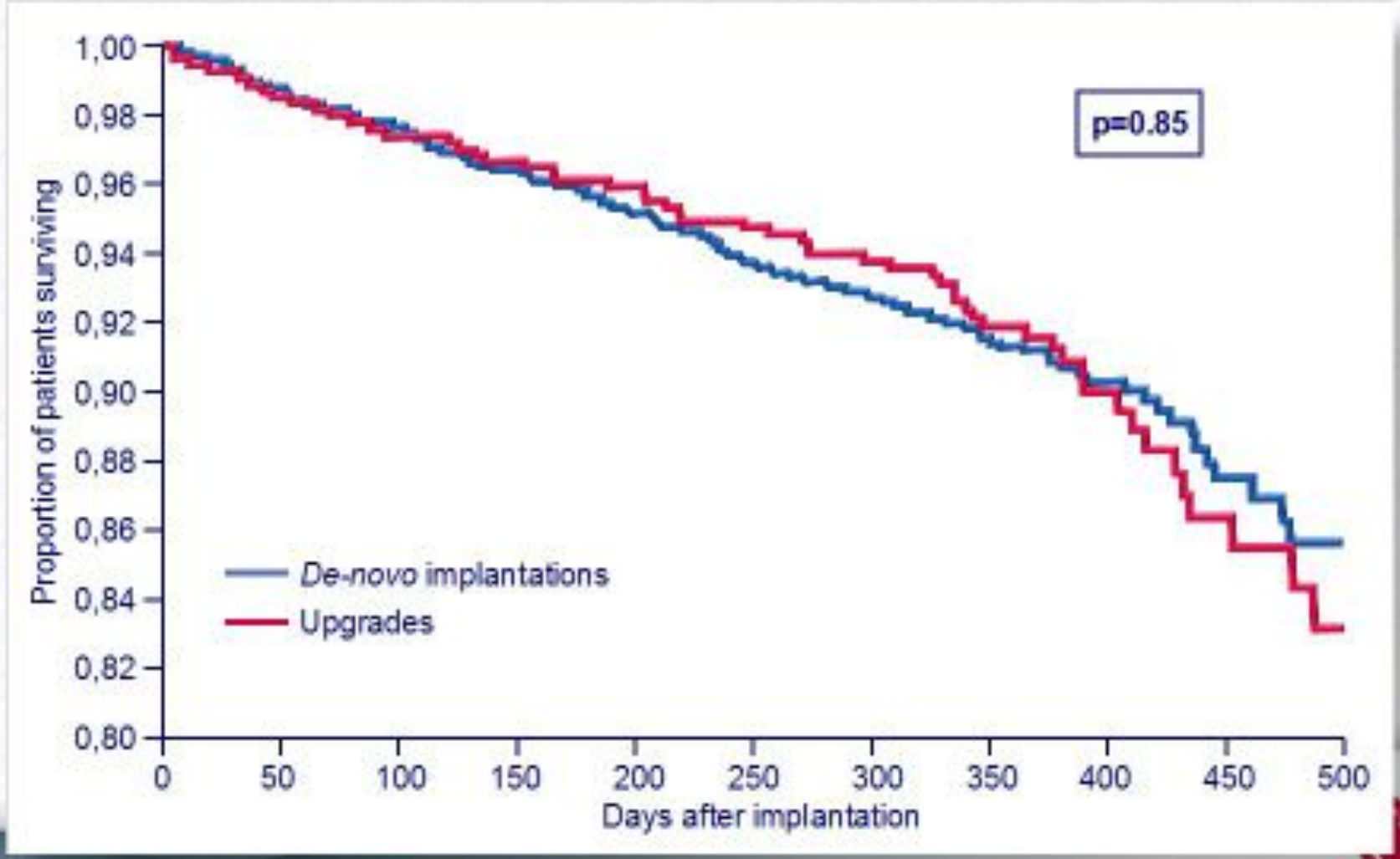
Time to death of any cause in the European CRT Survey



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