

**Giovedì 2 Dicembre 2010**

**Simposio**

**NUOVE TECNOLOGIE IN CARDIOLOGIA  
GERIATRICA**

## **Terapia di resincronizzazione nello scompenso cardiaco**

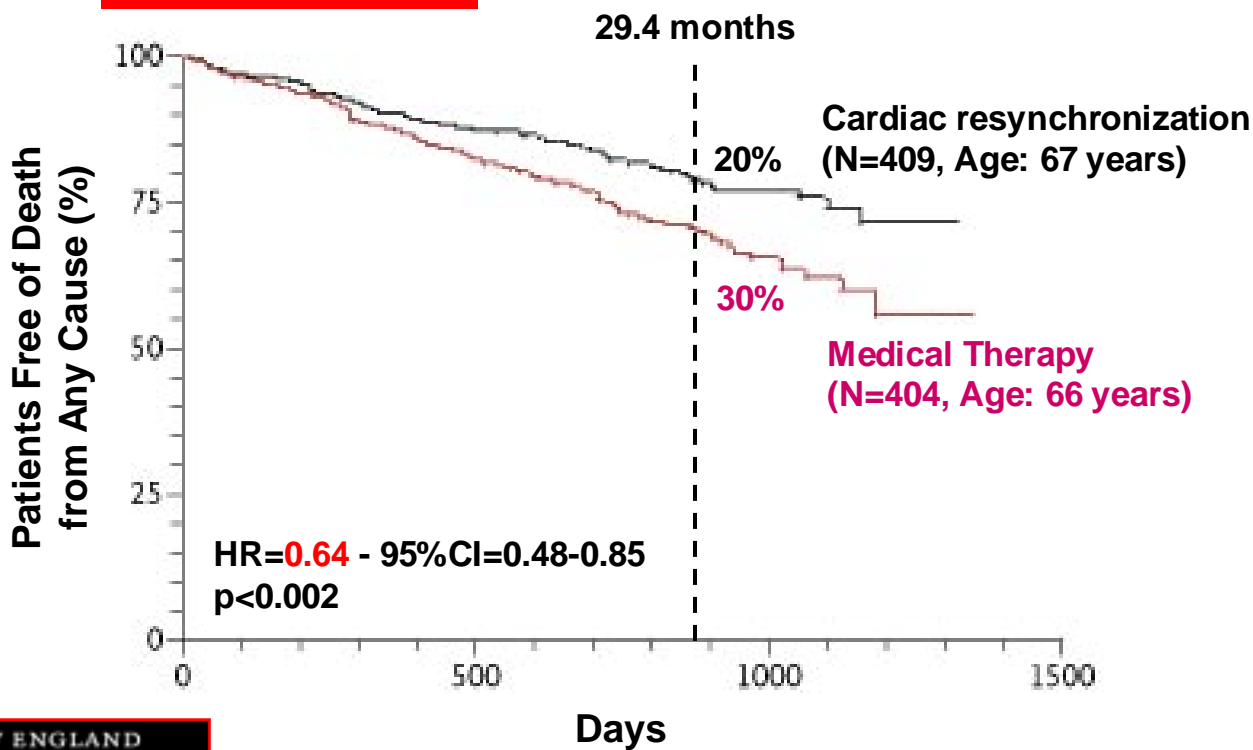
**Stefano Fumagalli**

**Unità di Cura Intensiva - SOD Cardiologia e Medicina Geriatrica  
AOU Careggi e Università di Firenze**



# The Effect of Cardiac Resynchronization on Morbidity and Mortality in Heart Failure

LVEF: 25%; NYHA III / IV





## 2010 Focused Update of ESC Guidelines on device therapy in heart failure

	Patient Population	Class
CRT-P / CRT-D is recommended to reduce MORBIDITY & MORTALITY	NYHA function Class III / IV LVEF $\leq$ 35%, QRS $\geq$ 120 ms, <b>SR</b> <u>Optimal Medical Therapy</u> (Class IV pts ambulatory)	<b>I A</b>
CRT, preferentially by CRT-D, is recommended to reduce MORBIDITY or to prevent disease PROGRESSION	NYHA function Class II LVEF $\leq$ 35%, QRS $\geq$ 150 ms, <b>SR</b> <u>Optimal Medical Therapy</u>	<b>I A</b>
CRT-P / CRT-D SHOULD be considered to reduce MORBIDITY	NYHA function Class III / IV LVEF $\leq$ 35%, QRS $\geq$ 130 ms, <b>AF</b> <i>Pacemaker dependency induced by AV nodal ablation</i>	<b>IIa B</b>
	<i>Slow ventricular rate and frequent pacing</i>	<b>IIa C</b>



# Cardiac-Resynchronization Therapy for Mild-to-Moderate Heart Failure

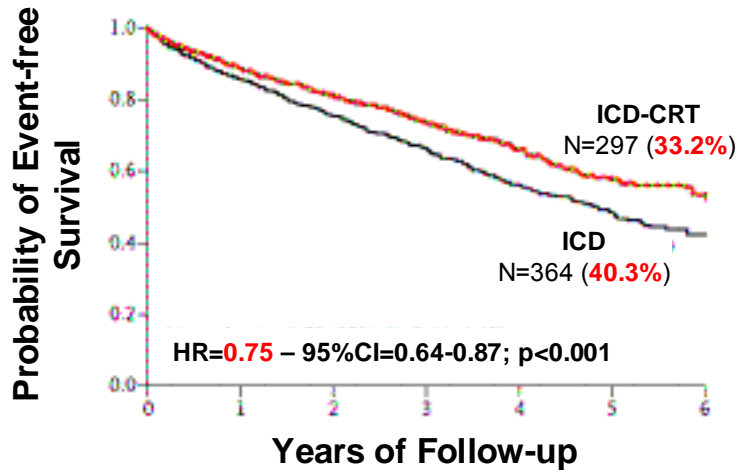
**ICD-CRT (N=894)**

Age: 66 yrs; Males: 84.8%;  
LVEF: 22.6%; NYHA II: 79.2%

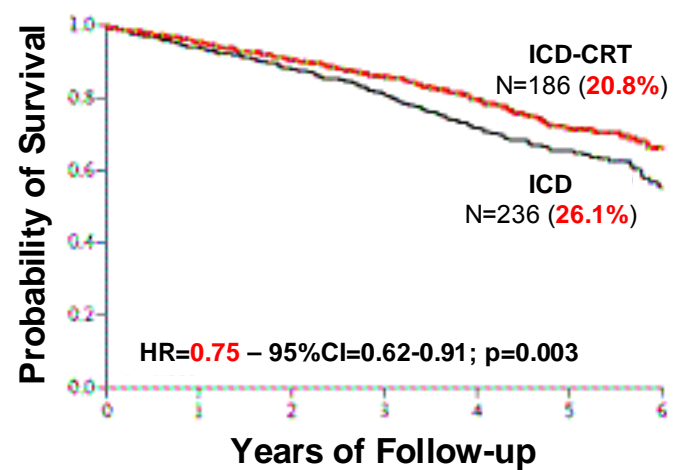
**ICD (N=904)**

Age: 66 yrs; Males: 81.0%;  
LVEF: 22.6%; NYHA II: 80.8%

**Death or Hospitalization for HF**



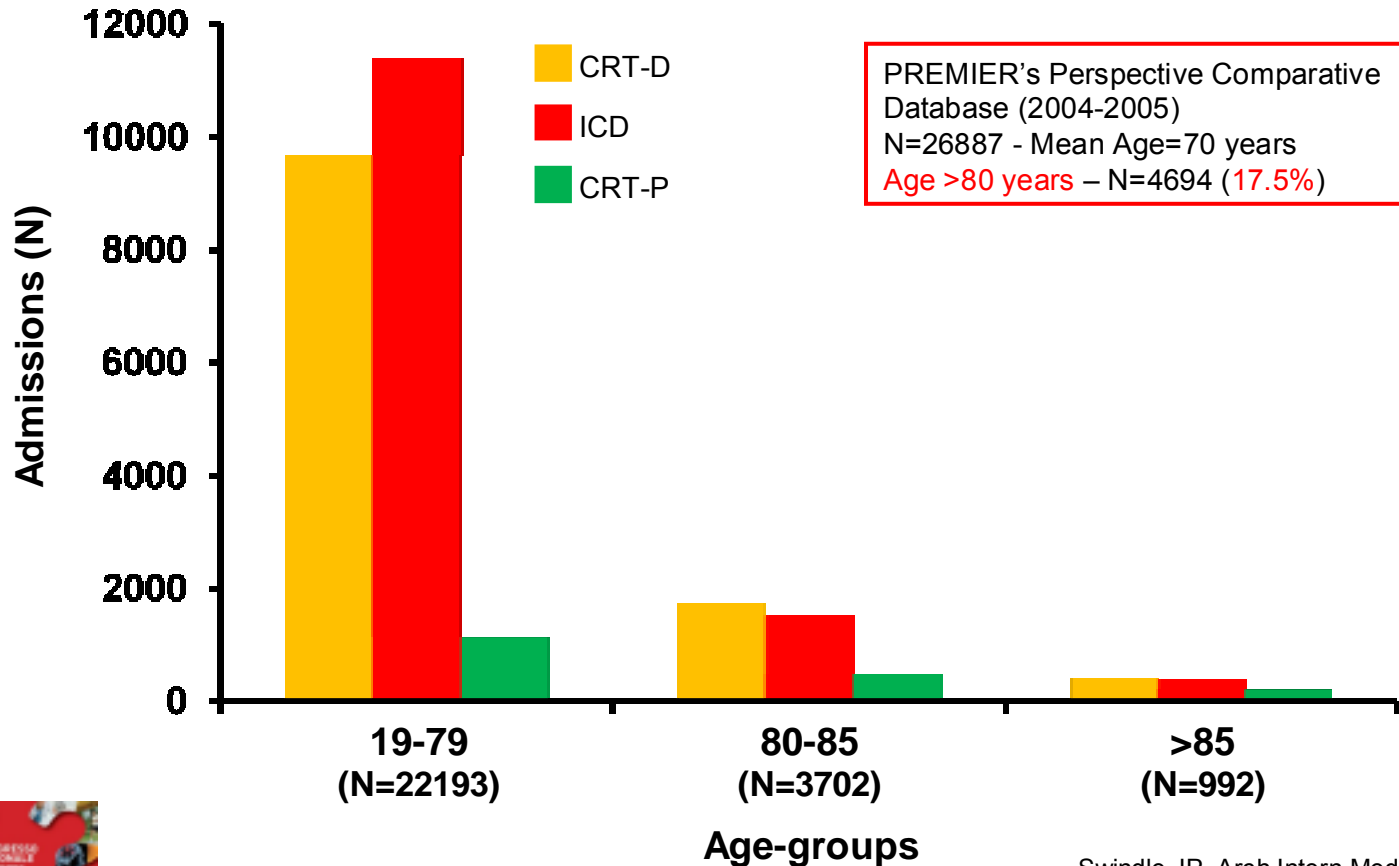
**Death**



Mean Follow-up: 40±20 months

# Implantable Cardiac Device Procedures in Older Patients

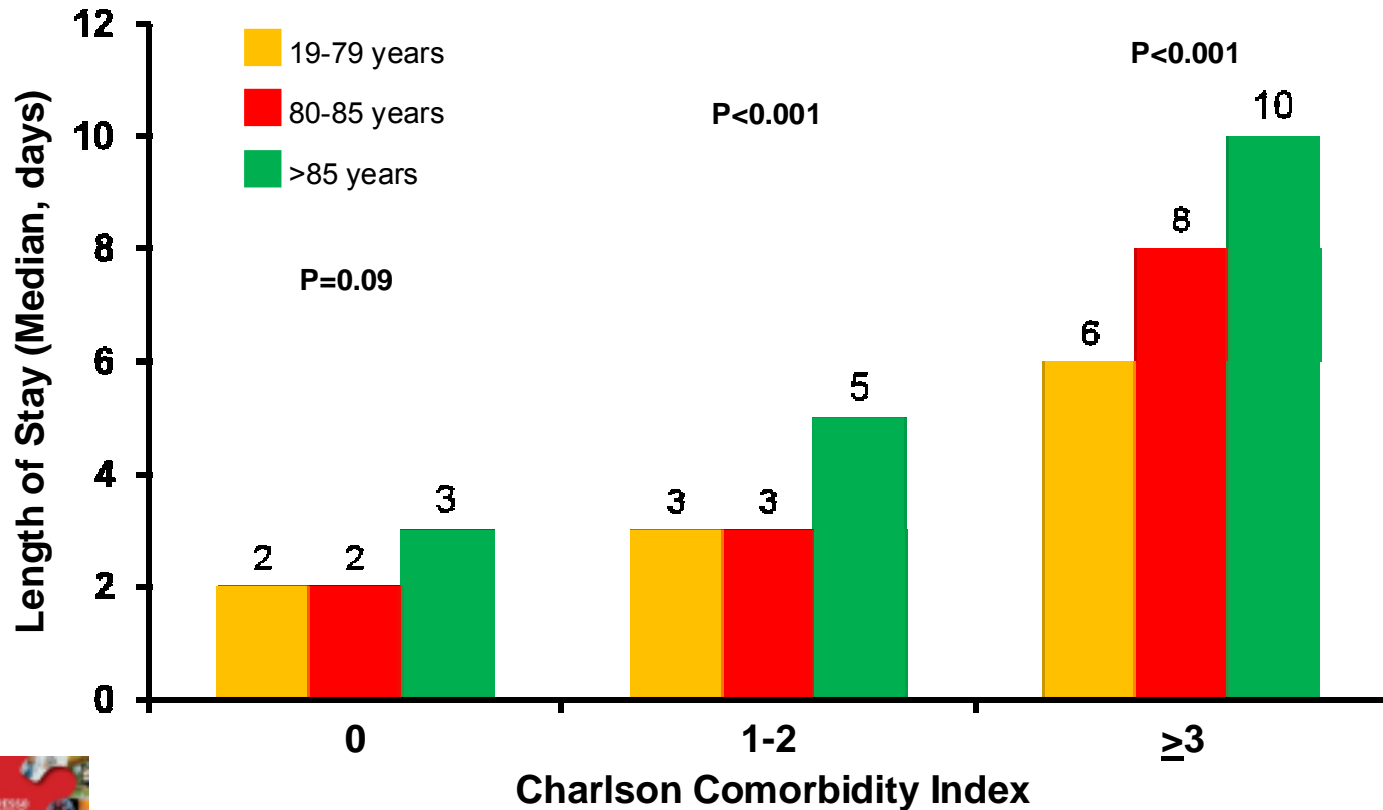
*Use and In-Hospital Outcomes*



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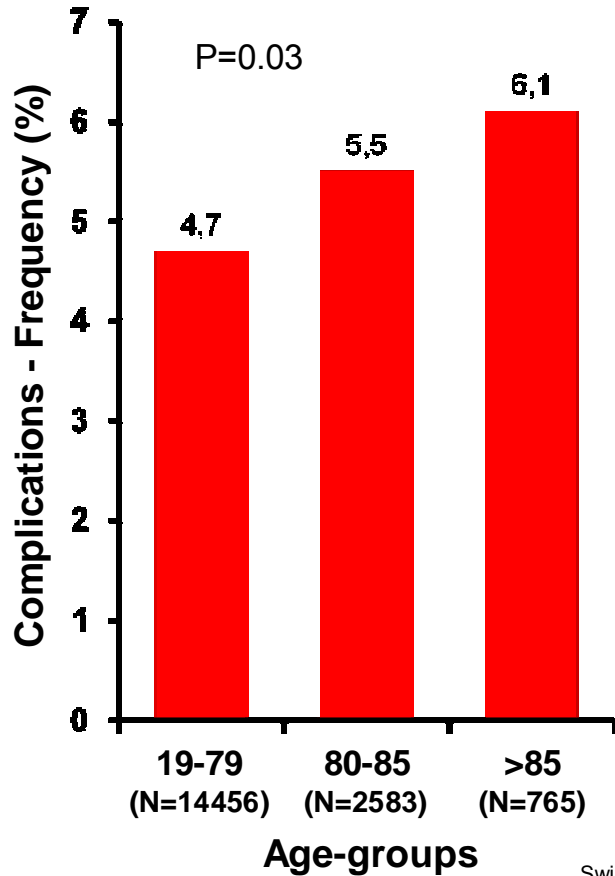
*Use and In-Hospital Outcomes*

Length of Stay in Hospital by Age and Comorbidity in CRT-D Patients

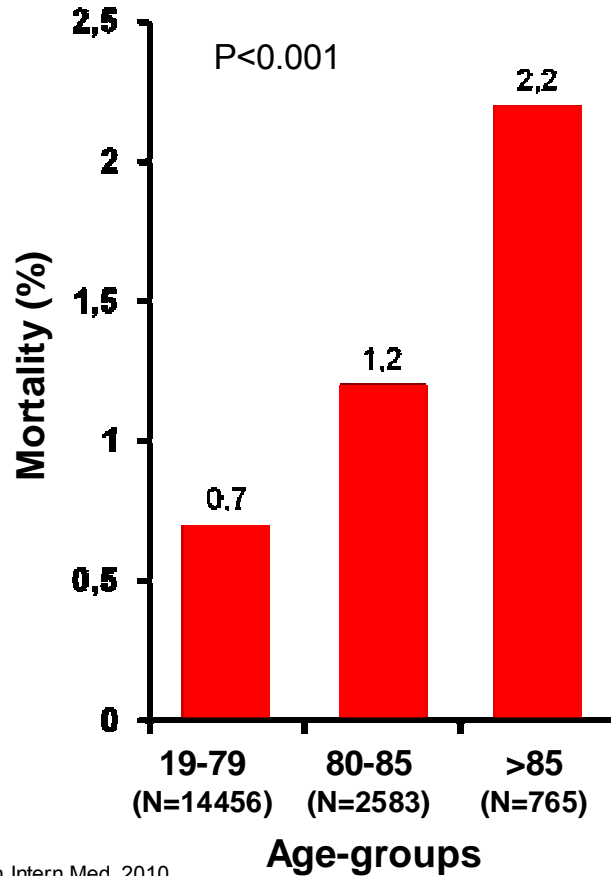


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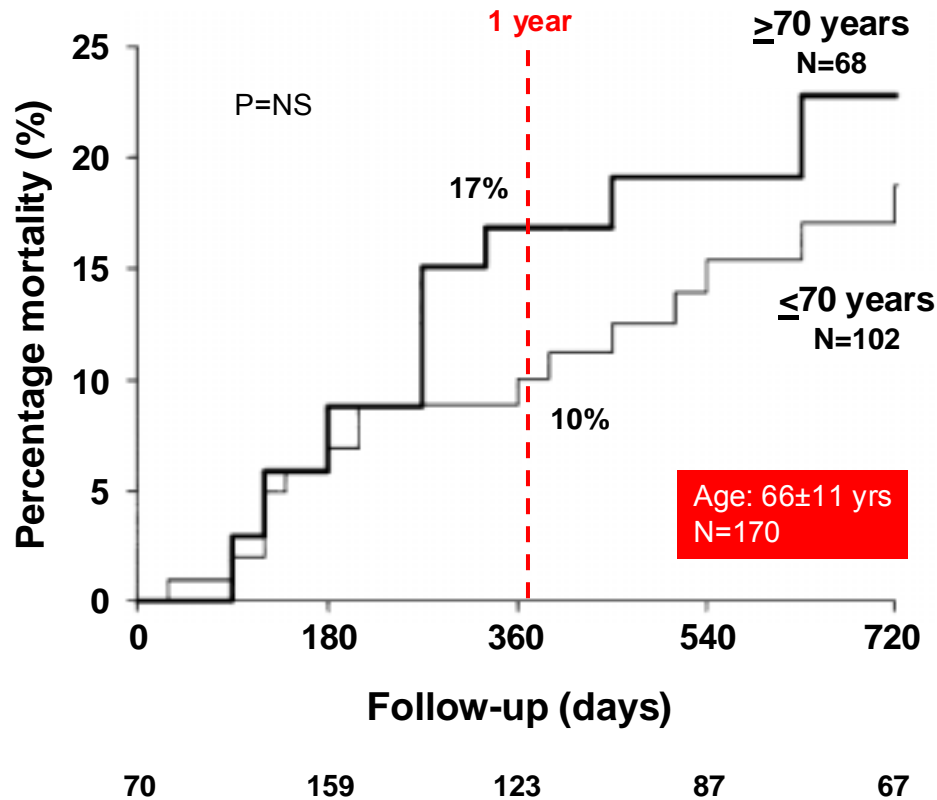
*Use and In-Hospital Outcomes*



Swindle JP, Arch Intern Med, 2010



# Comparison of Effectiveness of Cardiac Resynchronization Therapy in Patients <70 Versus ≥70 Years of Age



# Caratteristiche cliniche della popolazione del Registro Italiano InSync / InSync ICD, per gruppi di età



	Gruppi di età (anni)			P
	<65 (N=571)	65-74 (N=740)	≥75 (N=476)	
<b>Età (anni)</b>	57 ± 7	70 ± 3	78 ± 3	/
<b>Uomini (%)</b>	84	81	76	0.003
<b>BPCO (%)</b>	5	7	6	0.088
<b>Diabete (%)</b>	8	9	6	0.312
<b>IRC (%)</b>	3	8	4	0.001
<b>≥2 patologie (%)</b>	2	4	3	0.099
<b>CAD (%)</b>	39	50	50	<0.001
<b>LVEDD (mm)</b>	70 ± 10	69 ± 9	68 ± 9	0.015
<b>LVESD (mm)</b>	60 ± 12	58 ± 10	57 ± 11	0.016
<b>FE (%)</b>	26 ± 8	26 ± 7	27 ± 8	0.123
<b>Durata QRS (ms)</b>	167 ± 33	165 ± 31	162 ± 32	0.136
<b>Ricoveri (n)</b>	1.6 ± 1.4	1.6 ± 1.5	1.7 ± 1.4	0.256
<b>FA permanente (%)</b>	11	18	21	<0.001
<b>Diuretici (%)</b>	87	89	88	0.415
<b>Nitrati (%)</b>	17	23	46	0.001
<b>AA Classe III (%)</b>	34	38	34	0.312

**IRC:** insufficienza renale cronica; **CAD:** cardiopatia ischemica;  
**Ricoveri:** ricoveri per CHF nei 12 mesi precedenti; **AA:** antiaritmici



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# Caratteristiche cliniche della popolazione del Registro Italiano InSync / InSync ICD, per gruppi di età

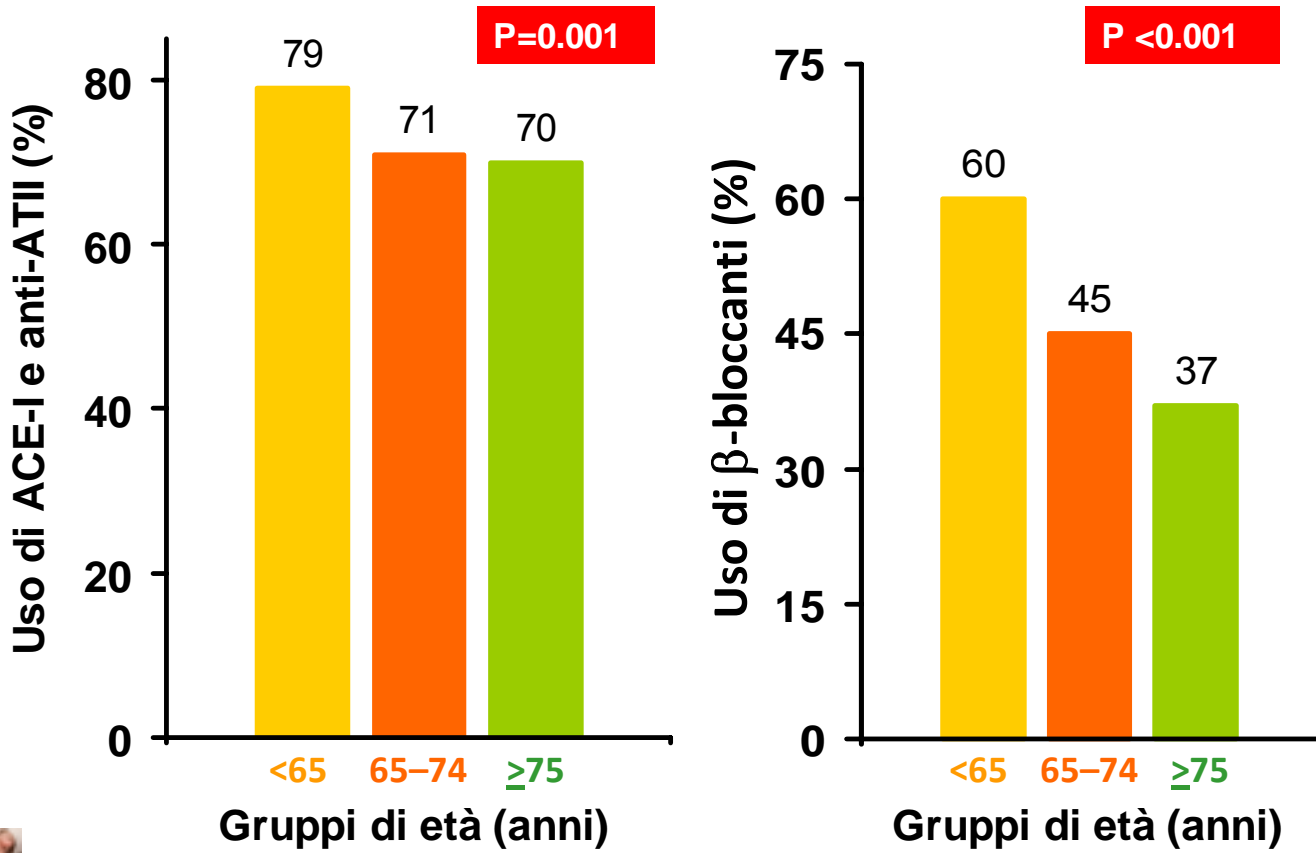


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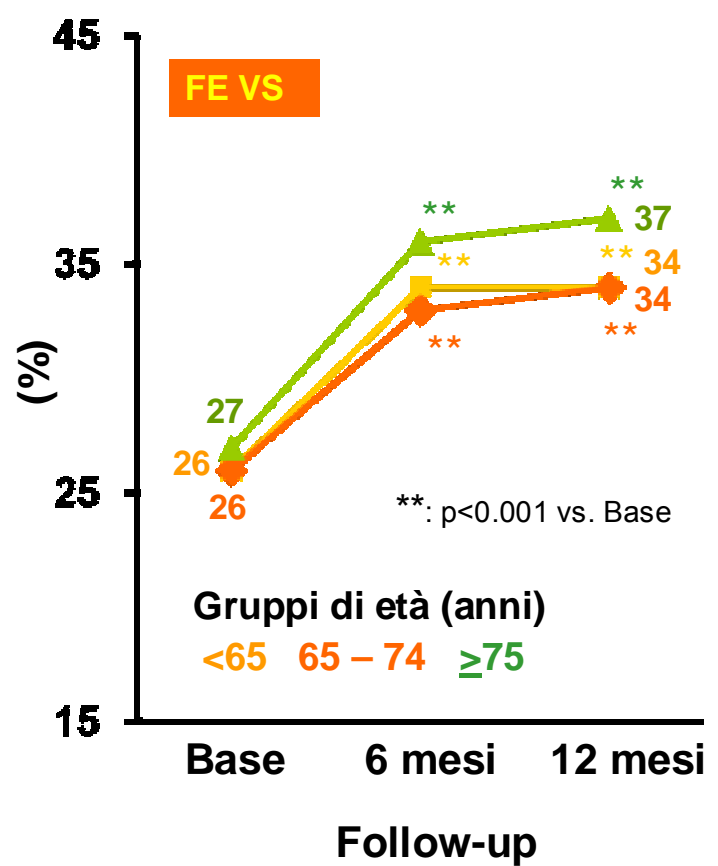
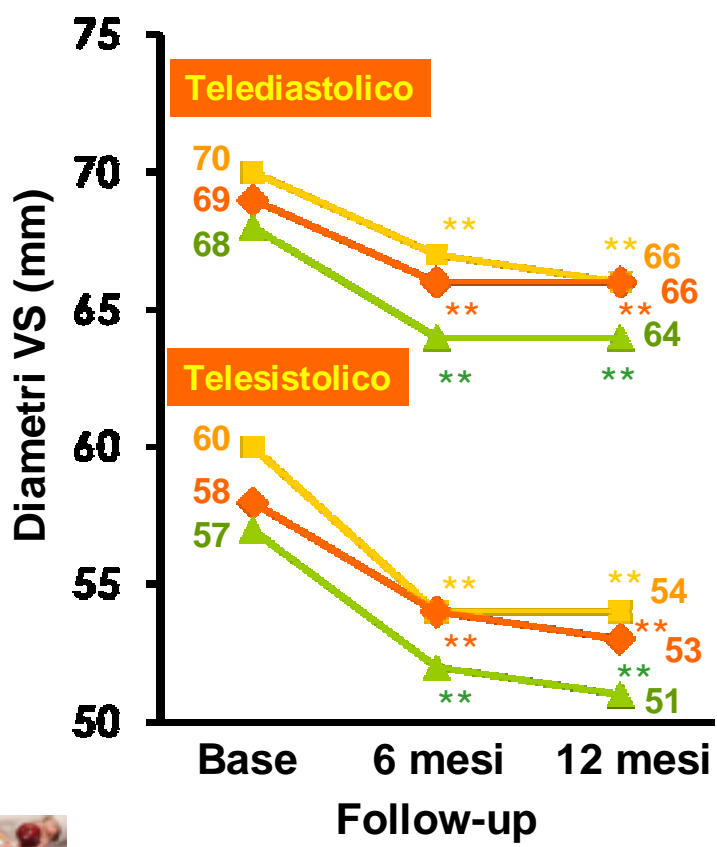


# Terapia con $\beta$ -bloccanti e ACE-inibitori o sartani, per gruppo di età. I risultati del Registro Italiano InSync / InSync ICD

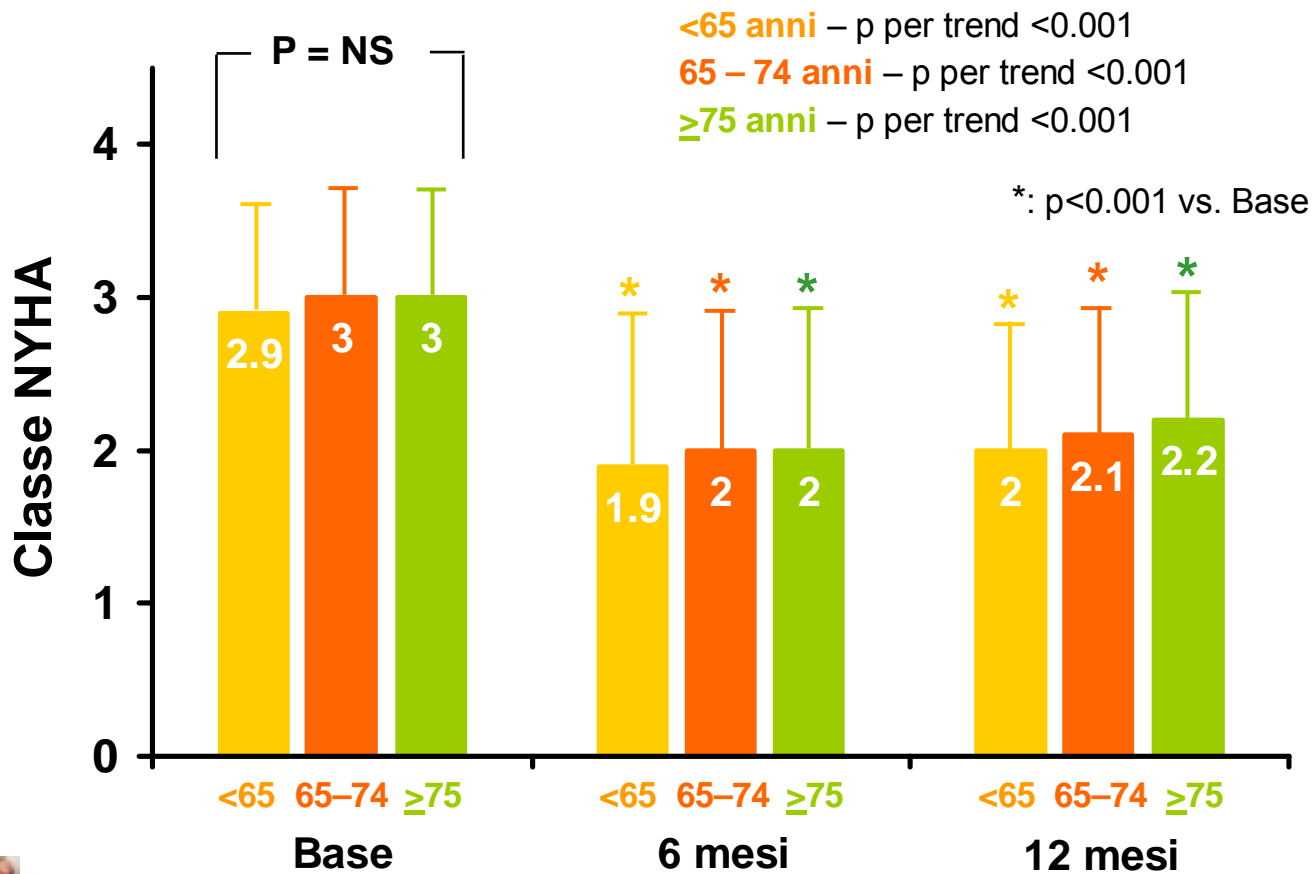




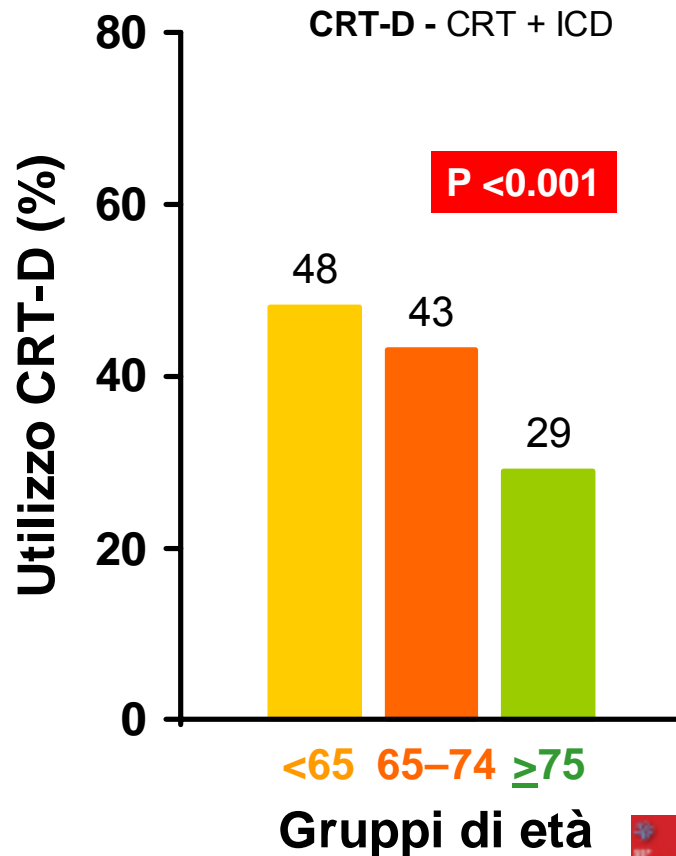
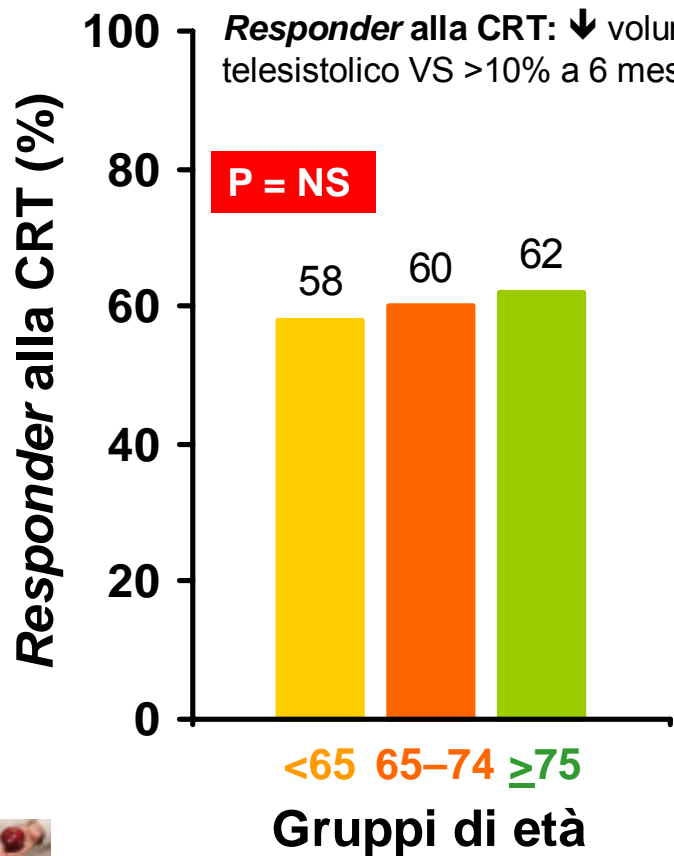
# Variazioni dei diametri e della frazione di eiezione del ventricolo sinistro (VS) con CRT durante il follow-up, per gruppo di età. I risultati del Registro Italiano InSync / InSync ICD



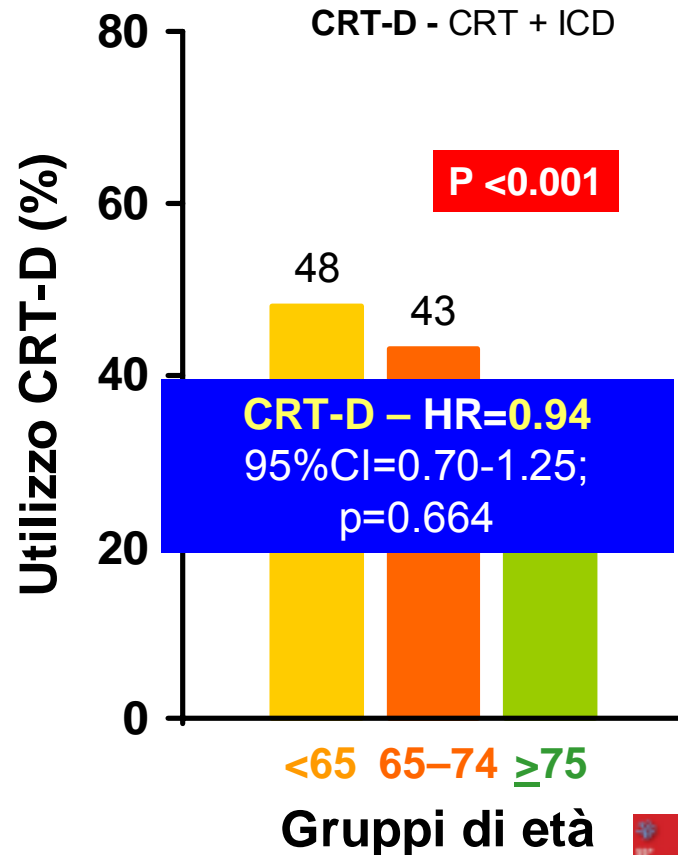
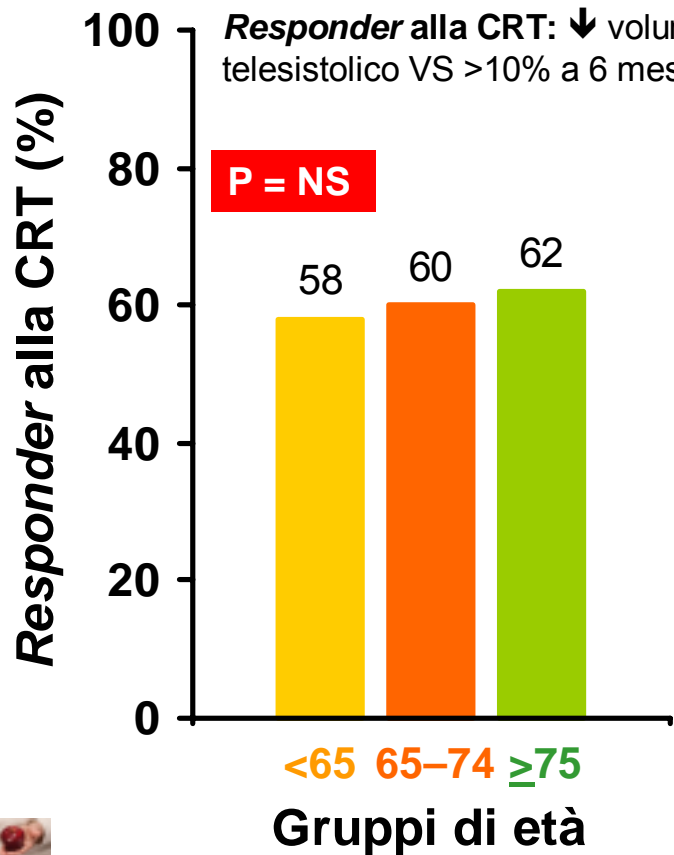
# Classe NYHA in condizioni di base e durante il follow-up, per gruppo di età. I risultati del Registro Italiano InSync / InSync ICD



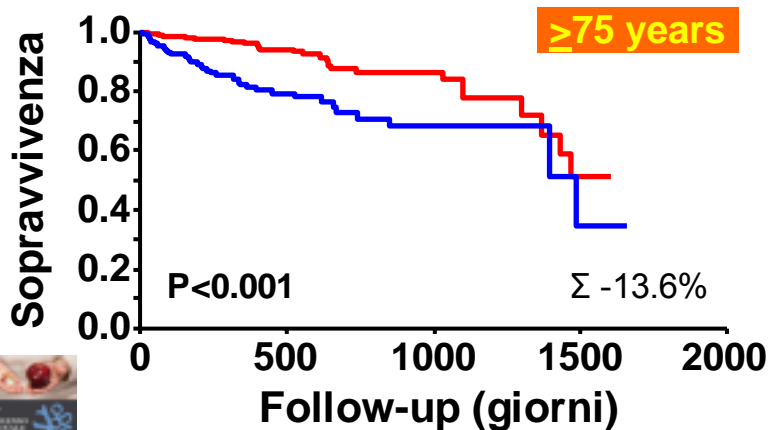
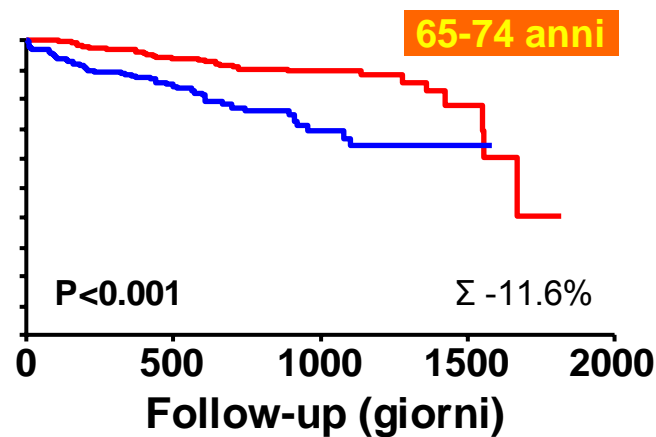
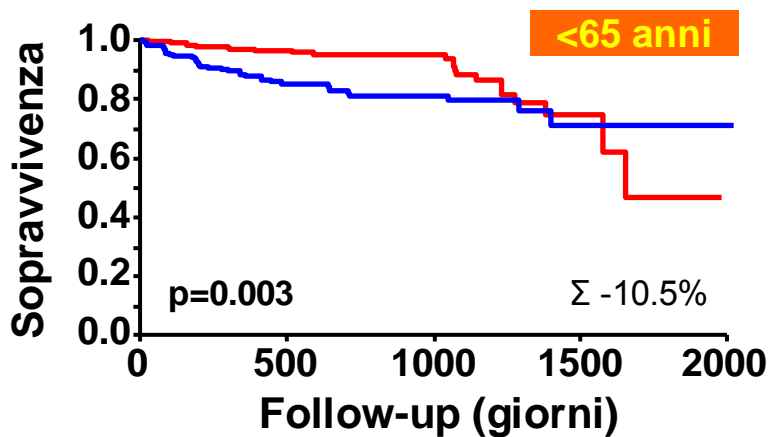
## Responder alla CRT ed utilizzo della CRT-D, per gruppo di età. I risultati del Registro Italiano InSync / InSync ICD



# Responder alla CRT ed utilizzo della CRT-D, per gruppo di età. I risultati del Registro Italiano InSync / InSync ICD



# Sopravvivenza durante il follow-up, per risposta alla CRT & gruppo di età. I risultati del Registro Italiano InSync / InSync ICD



- Responder alla CRT
- Non Responder alla CRT

**Responder alla CRT:** riduzione del volume telesistolico del VS >10% nella valutazione a 6 mesi



# Variabili cliniche correlate alla prognosi durante CRT nel Registro Italiano InSync / InSync ICD. Risultati del modello di Cox



	HR (95% CI)	p Value
Età <65 anni	1	/
65-74 anni	1.17 (0.80-1.69)	NS
≥75 anni	<b>1.57</b> (1.06-2.35)	0.026
Uomini	1.38 (0.90-2.12)	NS
Insufficienza renale	1.29 (0.75-2.22)	NS
Cardiopatìa ischemica	1.18 (0.87-1.60)	NS
FE VS, per Δ %	<b>0.96</b> (0.94-0.98)	<0.001
FA permanente	<b>1.63</b> (1.16-2.30)	0.005
<u>ACE-I / ARB</u>	<b>0.72</b> (0.52-0.98)	0.038
<u>β-bloccanti</u>	<b>0.49</b> (0.35-0.67)	<0.001
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# Meta-analysis: Age and Effectiveness of Prophylactic Implantable Cardioverter-Defibrillators

Annals of Internal Medicine

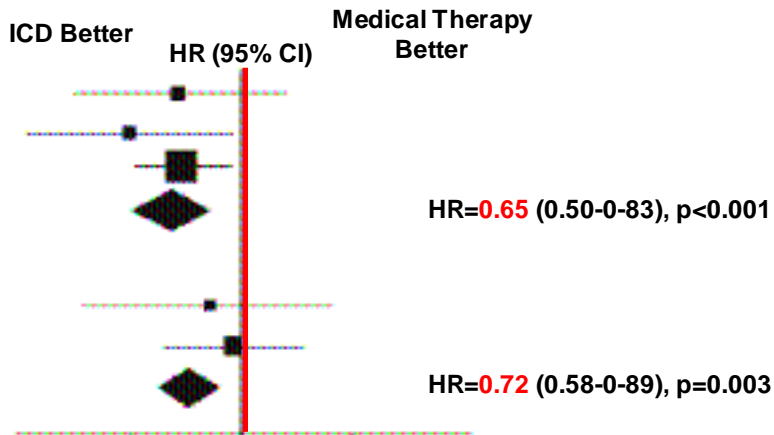
**Younger patients – N=3232**

## ICD Trials Relevant to the Current Practice

- DEFINITE, 2004
- MADIT-II, 2002
- SCD-HeFT, 2005
- OVERALL

## ICD Trials that Enrolled Early After Acute MI

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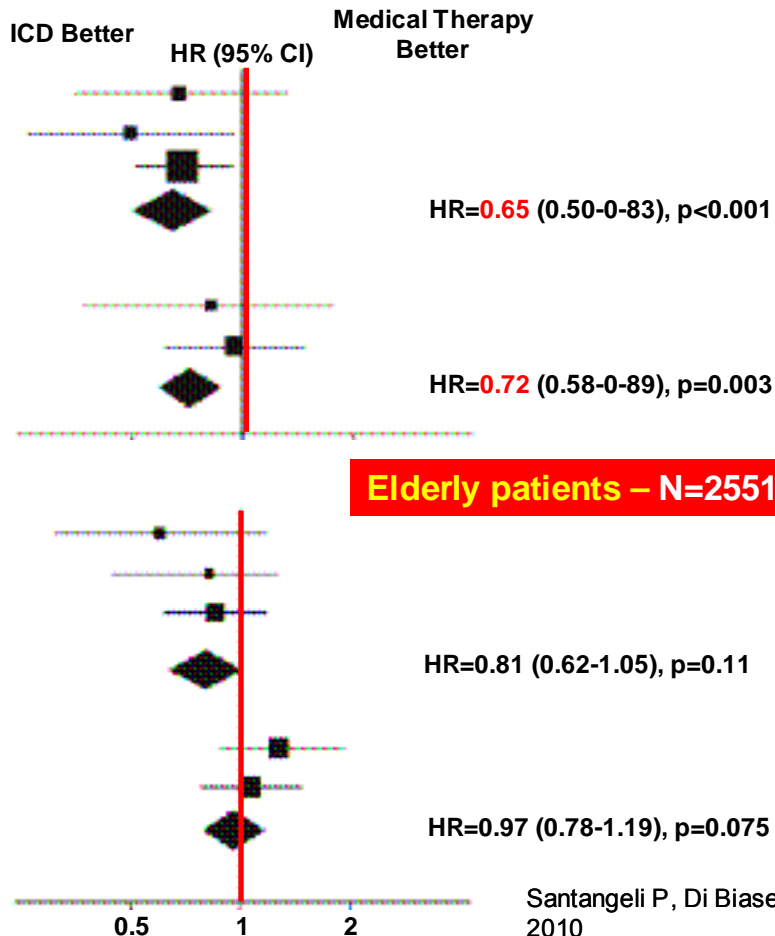
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\*/\*\* =  $\geq 65$  /  $\geq 60$  yrs old



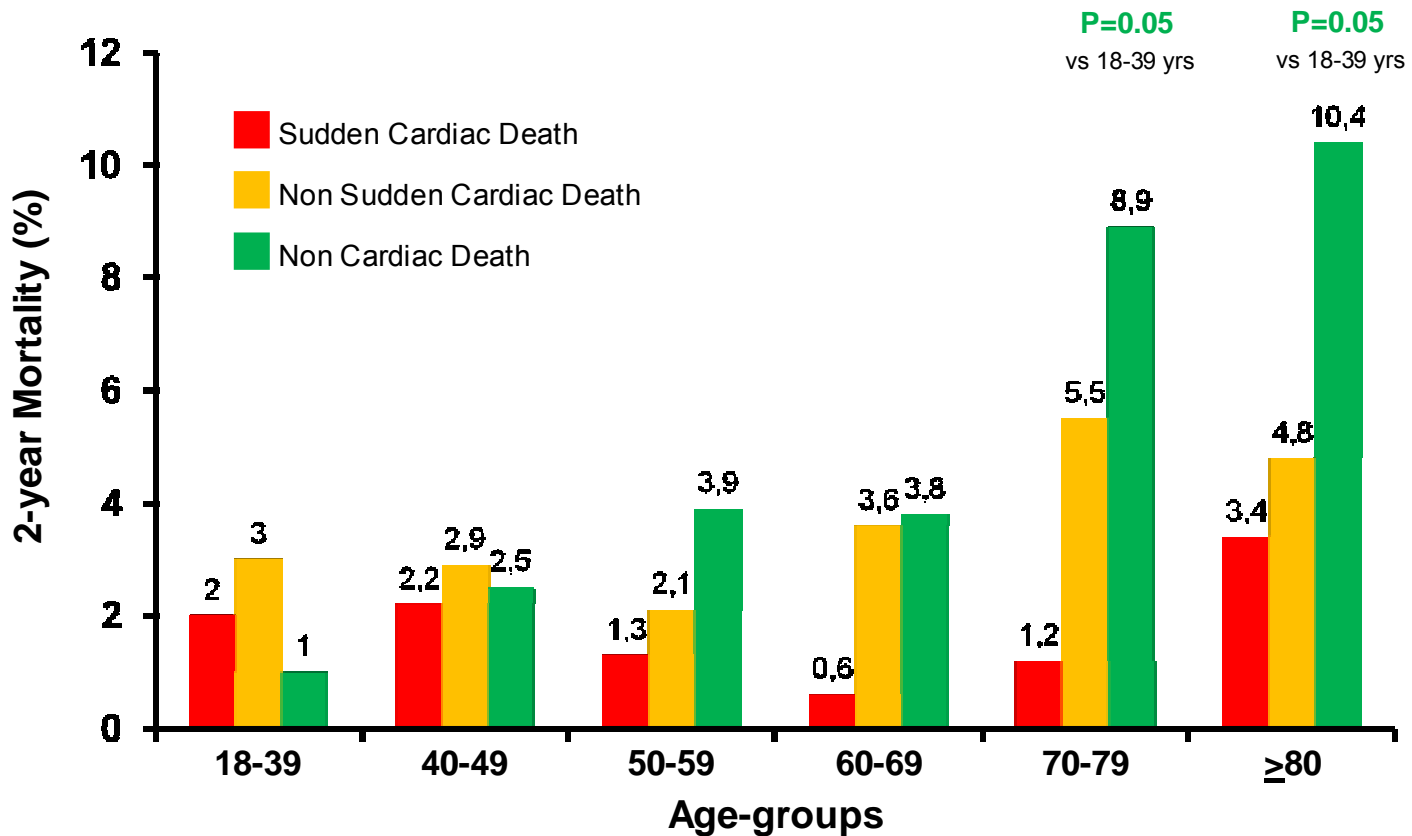
Santangelo P, Di Biase L, 2010





# Implantable cardioverter-defibrillator prescription in the elderly

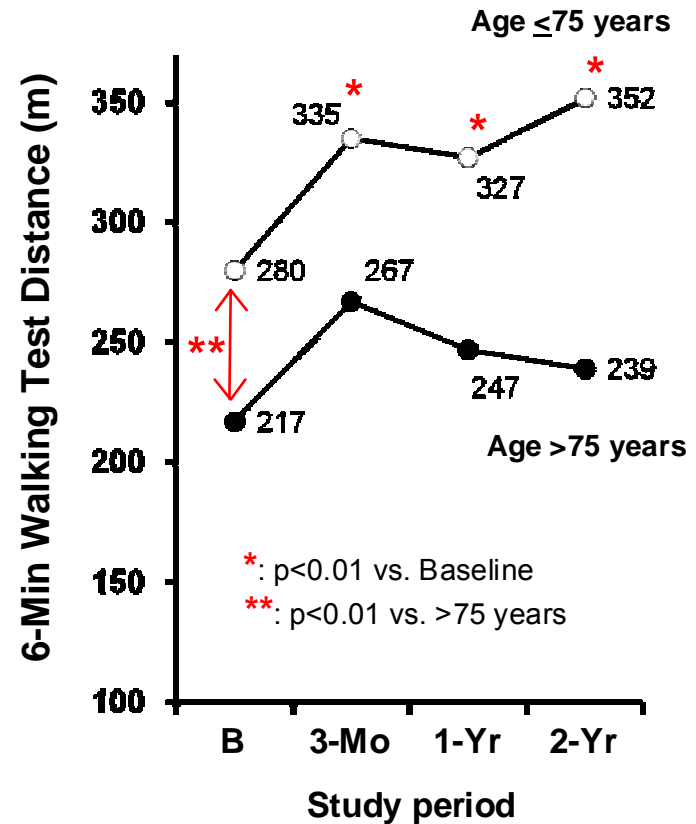
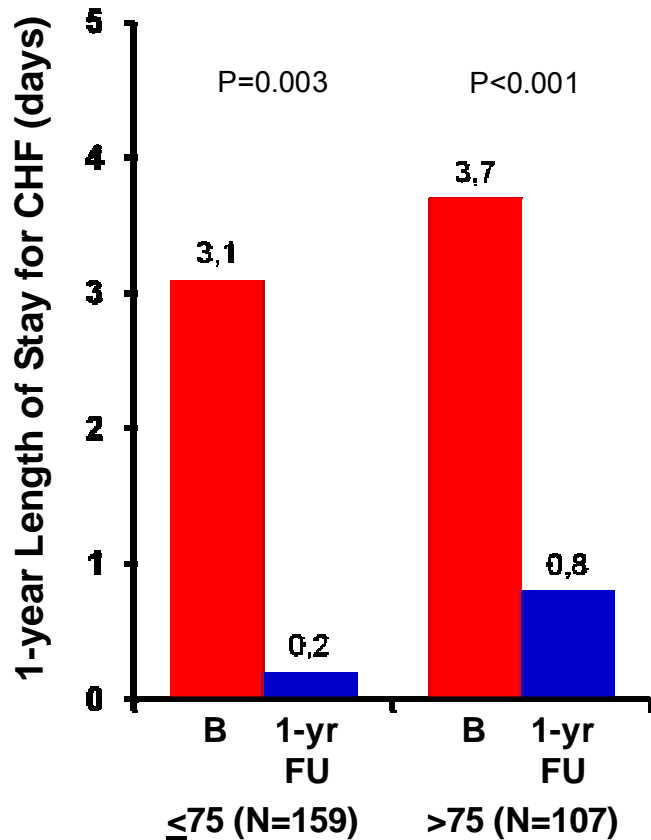
The Advancement in ICD Therapy (ACT) Registry – N=4566





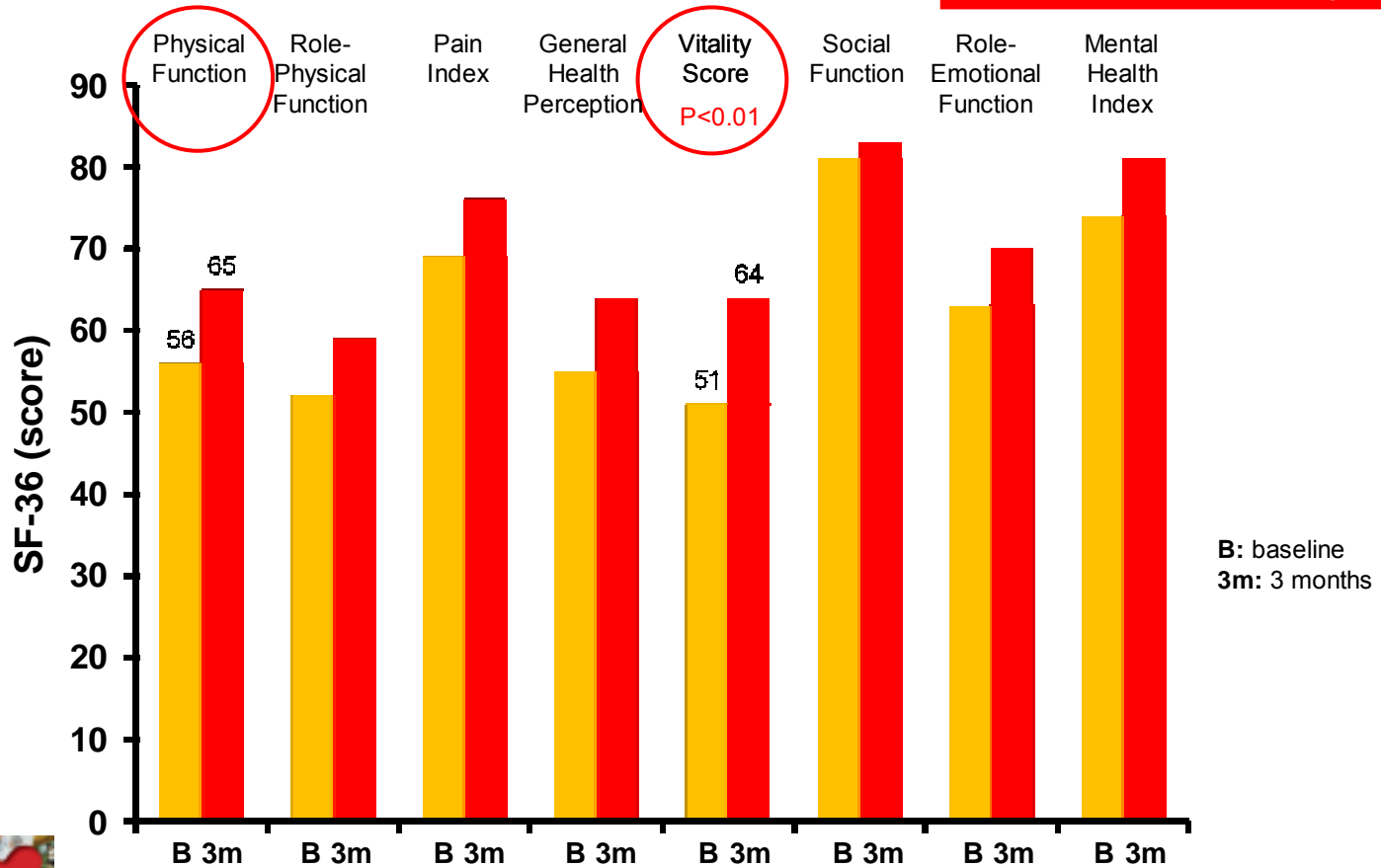
# Clinical response of cardiac resynchronization therapy in the elderly

Delnoy PPHM, Am Heart J, 2008



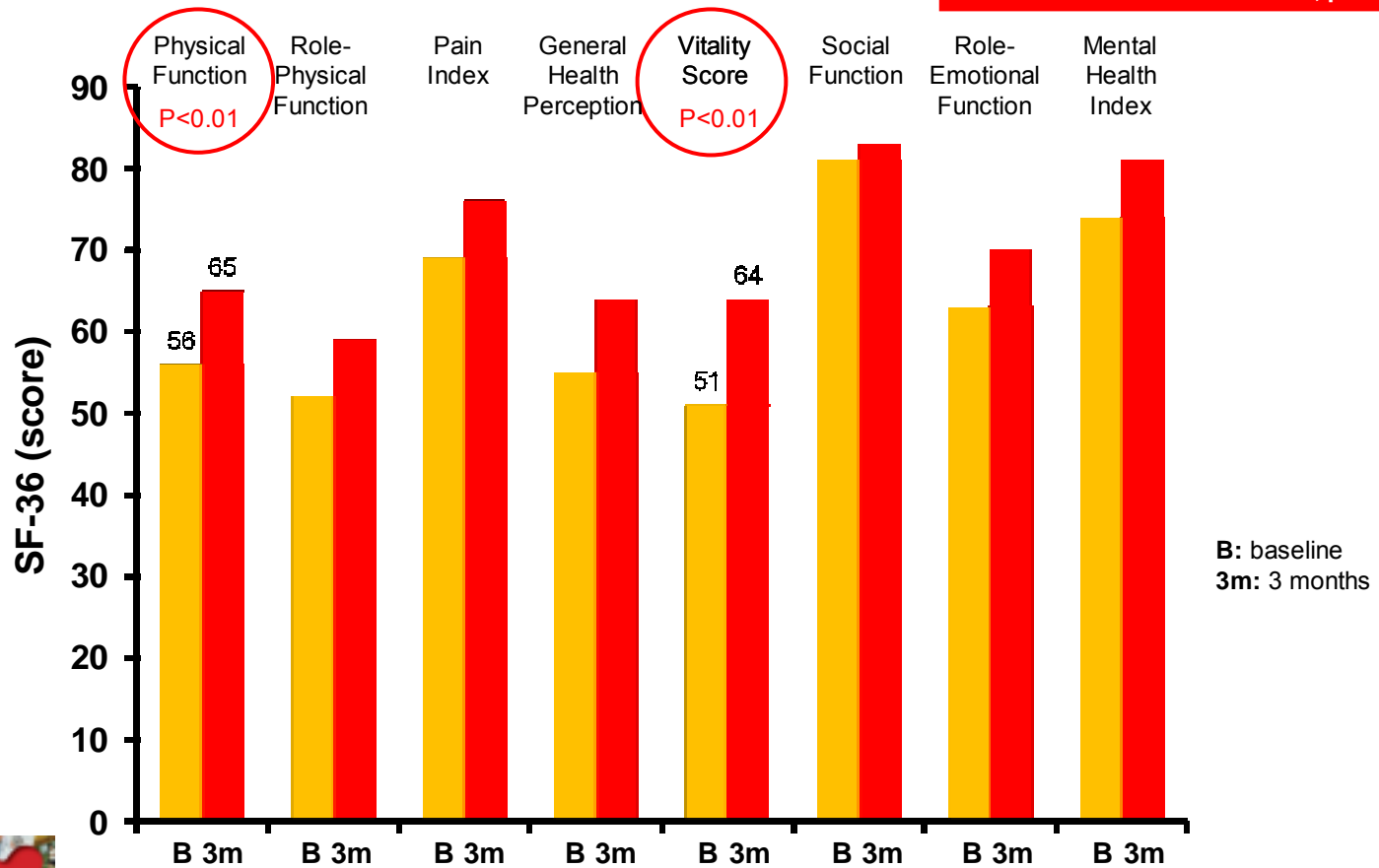
# Effects of cardiac resynchronization therapy on health-related quality of life in older adults with heart failure

Age: 68±8 yrs (range: 56-84)– N=21  
 EF: B=30% - 3m=39%, p<0.01  
 6-mWT : B=351 m - 3m=381 m, p<0.05



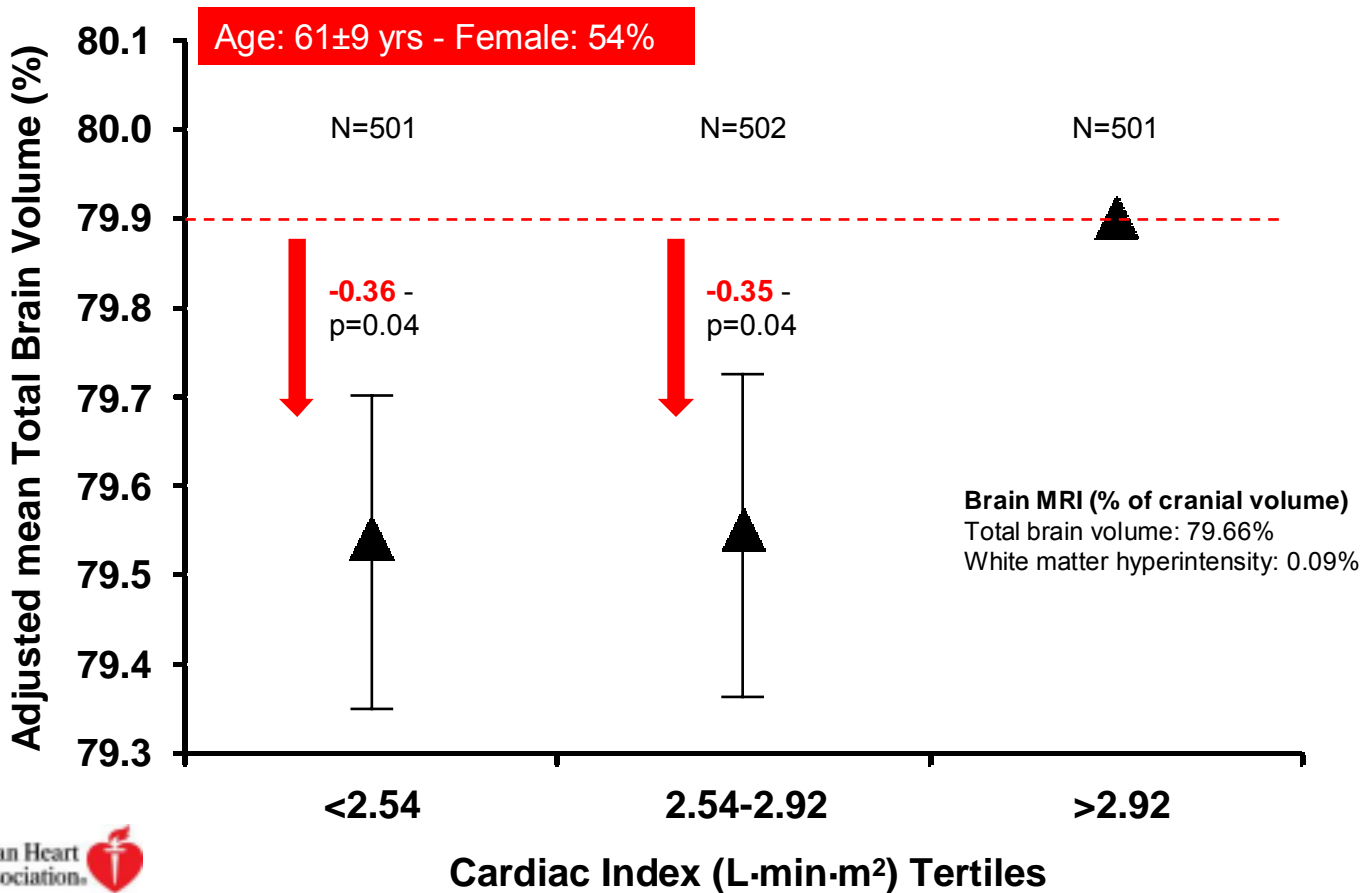
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# Cardiac Index Is Associated With Brain Aging

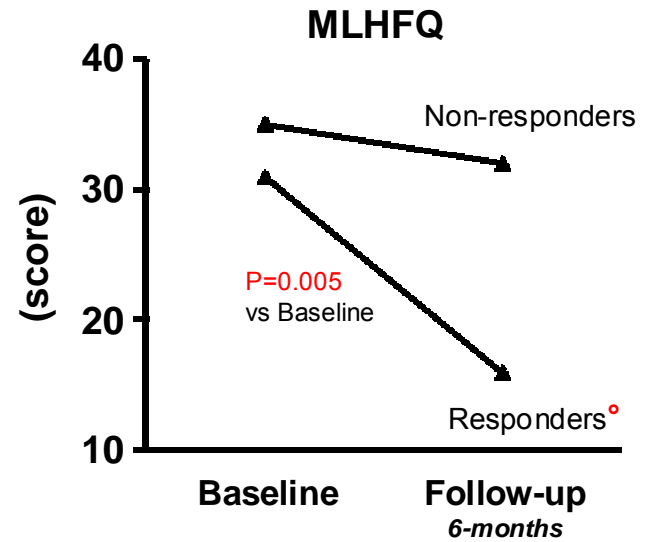
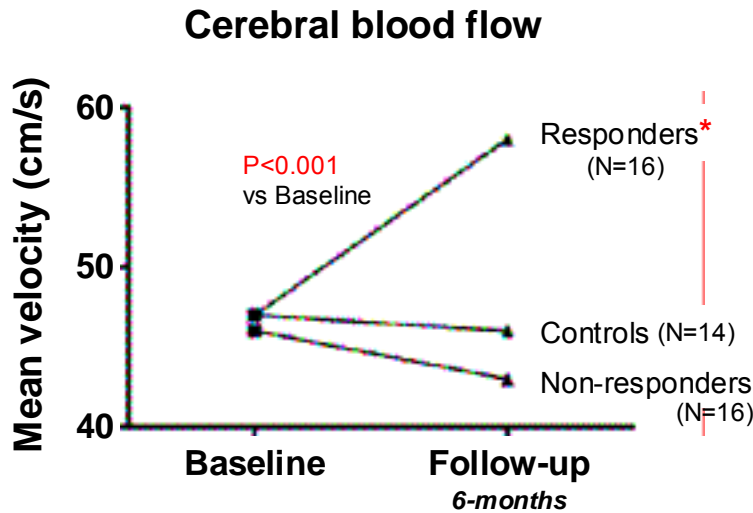
## The Framingham Heart Study



# Effect of Cardiac Resynchronization Therapy on Cerebral Blood Flow

**Patients** - Age: 68 yrs; LVEF: 29%; QRS: 152 ms  
**Controls** - Age: 66 yrs; LVEF: 32%; QRS: 110 ms

**Responders** – 6-month reduction  $\geq 15\%$  of LV end-systolic volume



**Cerebral blood flow** -  
 Transcranial Doppler of  
 the right middle cerebral artery

**MLHF** – Minnesota Living with  
 Heart Failure Questionnaire

\* / °:  $p < 0.01$  /  $p < 0.05$  vs Controls  
 & Non-responders

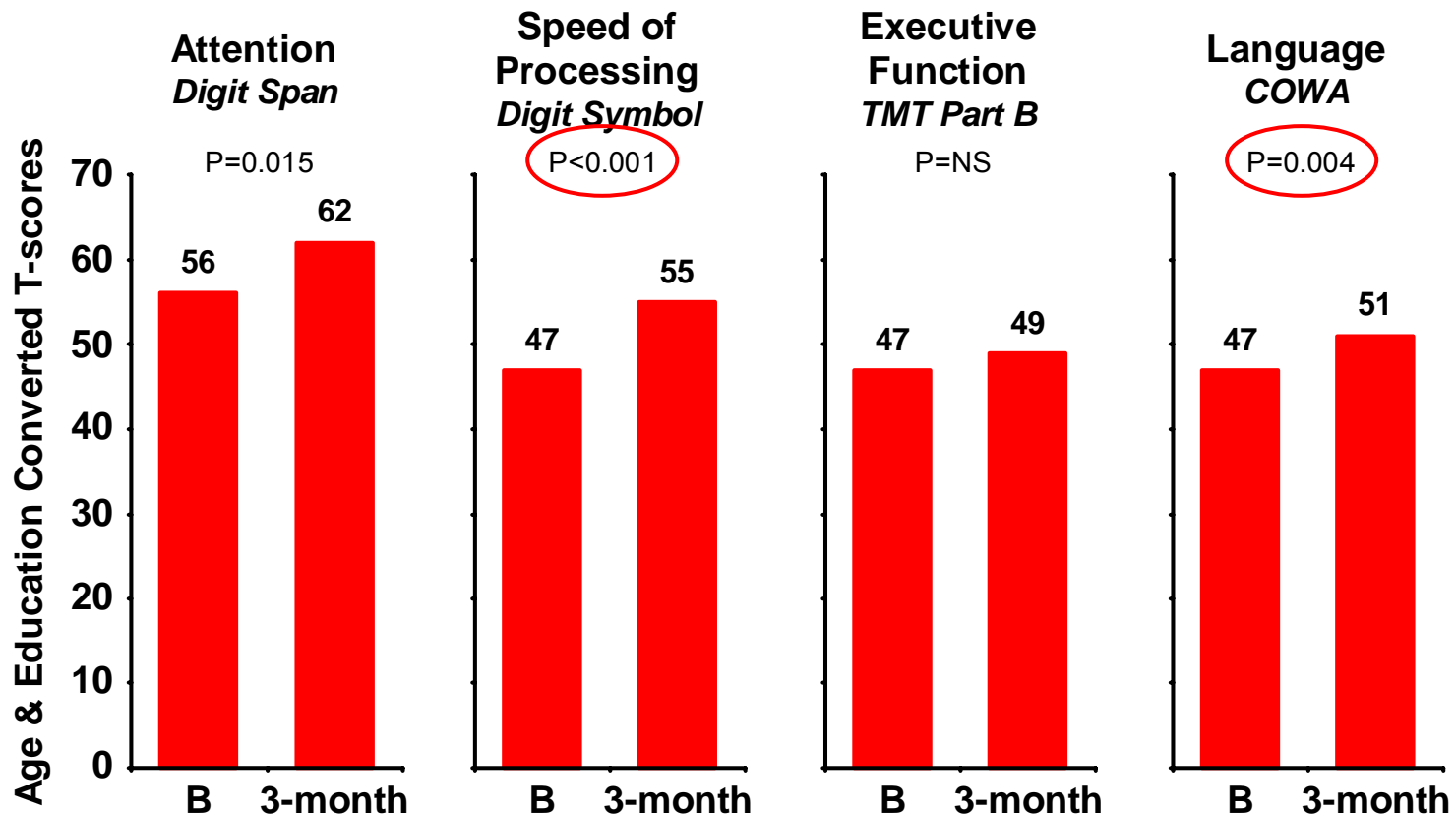




# Cardiac Resynchronization Therapy: A Pilot Study Examining Cognitive Change in Patients Before and After Treatment

Dixit NK, Clin Cardiol, 2010

Age:  $55 \pm 12$  – N=20  
Baseline (B) EF: 17%  
3-month EF: 30%

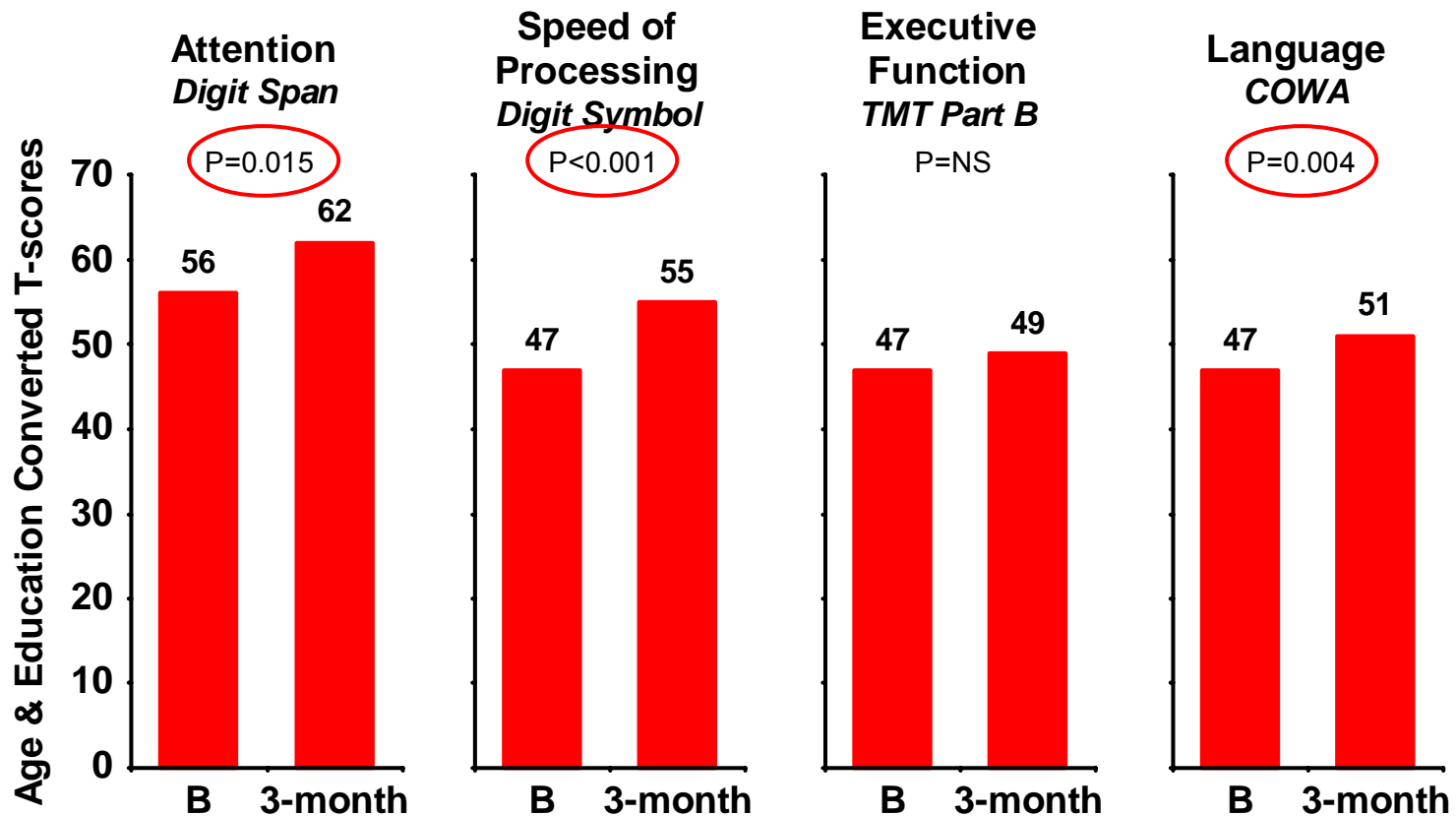




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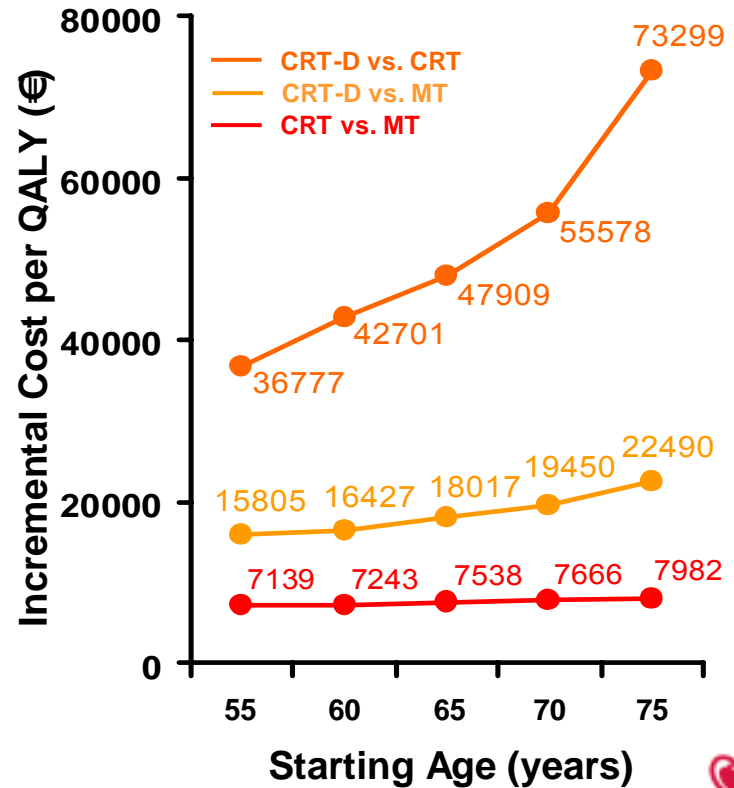
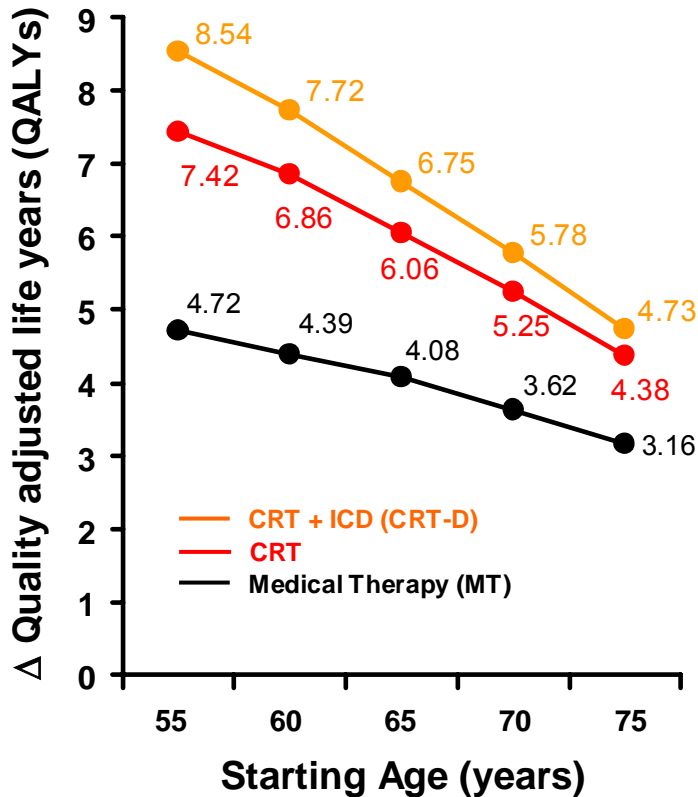
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# The long-term cost-effectiveness of cardiac resynchronization therapy with or without an implantable cardioverter-defibrillator



Estimates from individual patient data from the CARE-HF & the COMPANION trials



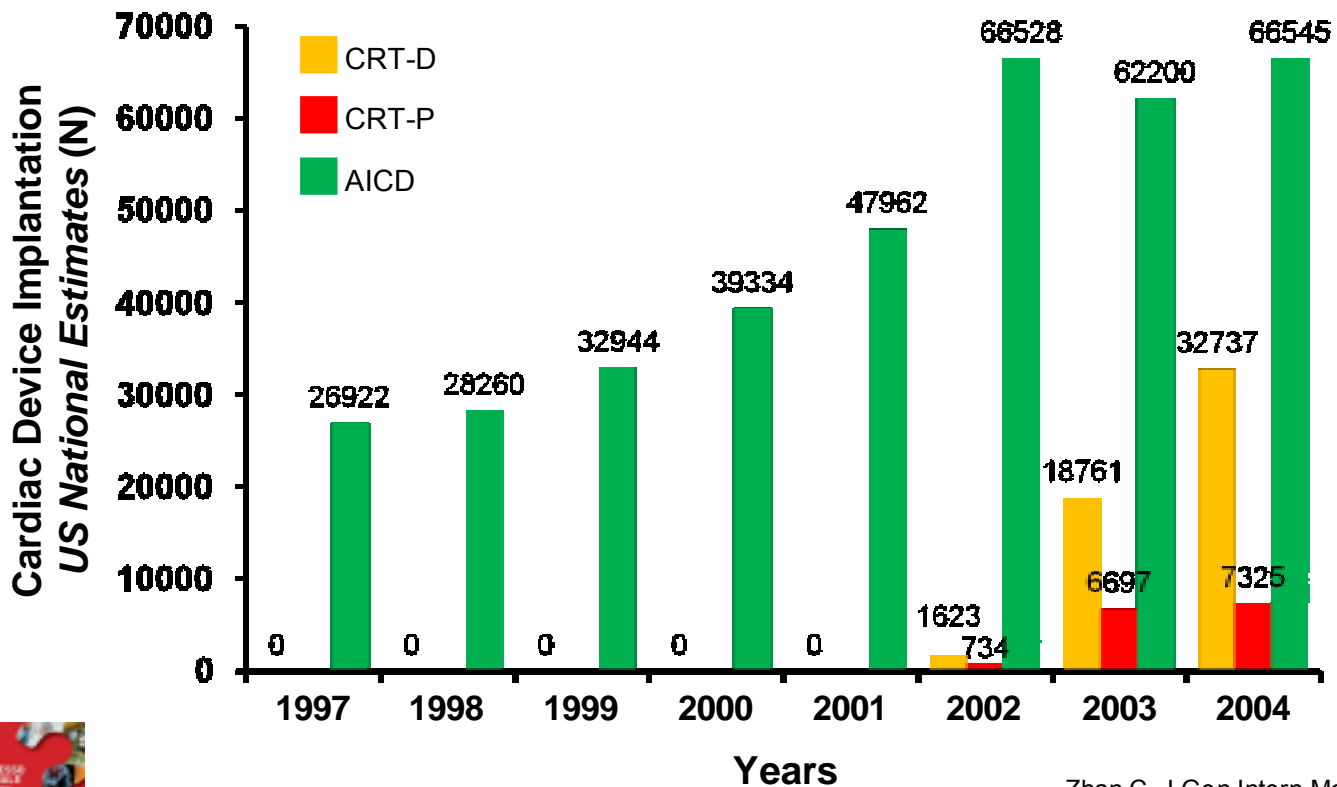
## Conclusioni



- La CRT determina il miglioramento della geometria e della funzione del VS in pazienti di tutte le età
- I benefici della CRT sono apprezzabili anche in termini di capacità funzionale e qualità della vita
- L'aumento della perfusione cerebrale, indotto dalla CRT, potrebbe rallentare il deterioramento cognitivo dei pazienti di età avanzata con scompenso cardiaco
- L' undertreatment farmacologico costituisce un problema reale, soprattutto nei più anziani
- L'uso della CRT in età avanzata è vantaggioso anche in termini economici
- Sono necessari studi clinici per confermare questi risultati ottenuti da registri di ampie proporzioni

# Cardiac Device Implantation in the United States from 1997 through 2004: A Population-based Analysis

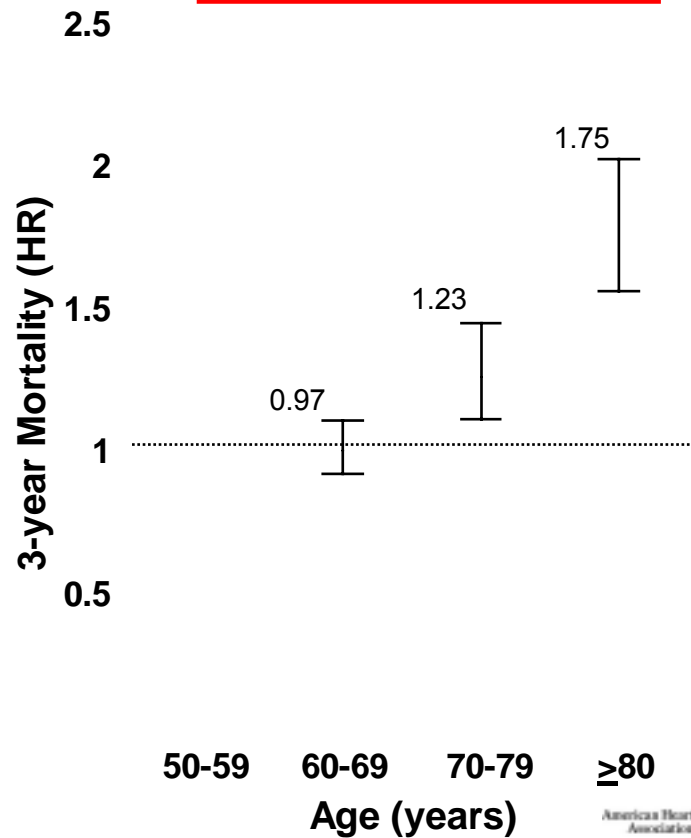
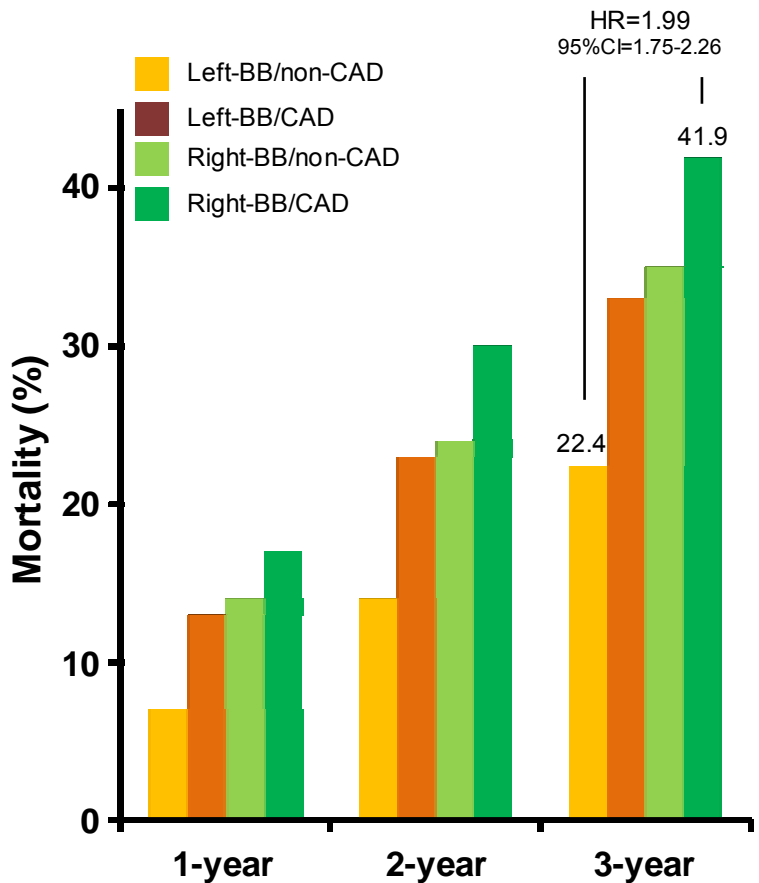
Primary source of data: The Healthcare Cost and Utilization Project Nationwide Inpatient Samples (by the Agency for Healthcare Research and Quality)



# Bundle-Branch Block Morphology and Other Predictors of Outcome After Cardiac Resynchronization Therapy in Medicare Patients



Medicare **ICD** Registry (2005-6)  
 Mean Follow-up: 40 months  
 Age: 73 years - N=14946

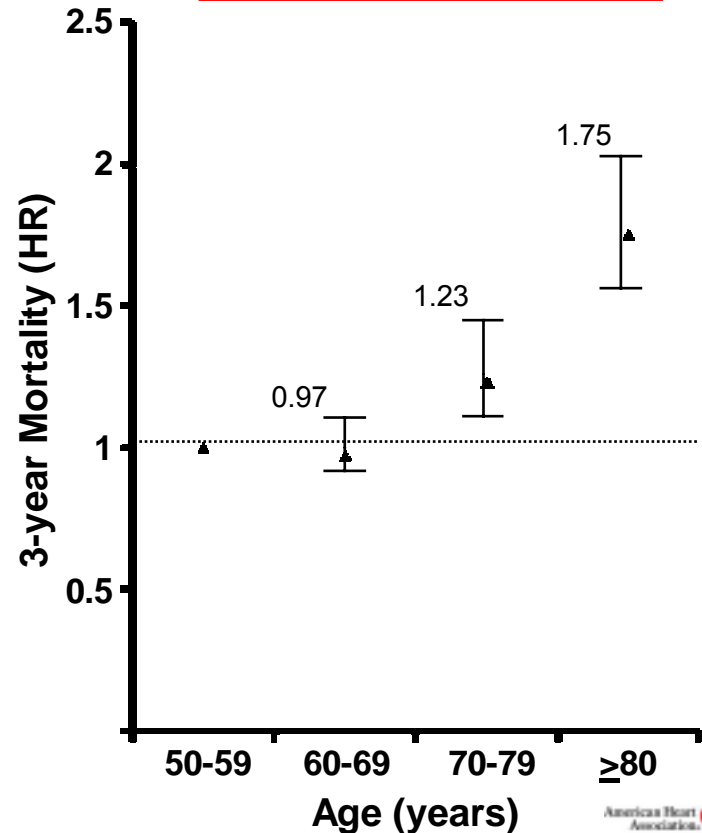
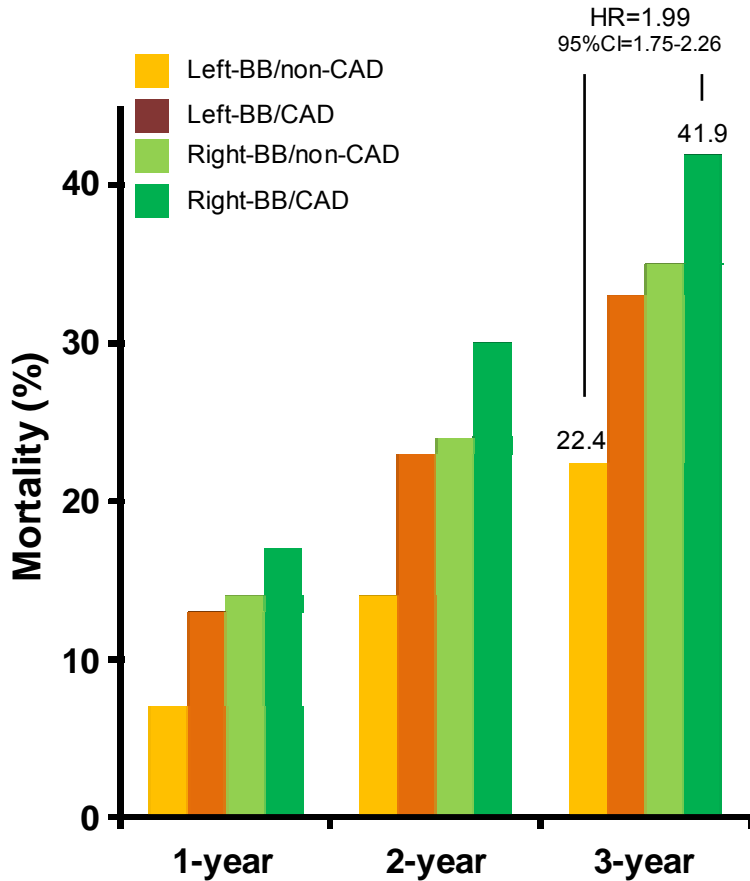


Bilchick KC, Circulation, 2010

# Bundle-Branch Block Morphology and Other Predictors of Outcome After Cardiac Resynchronization Therapy in Medicare Patients



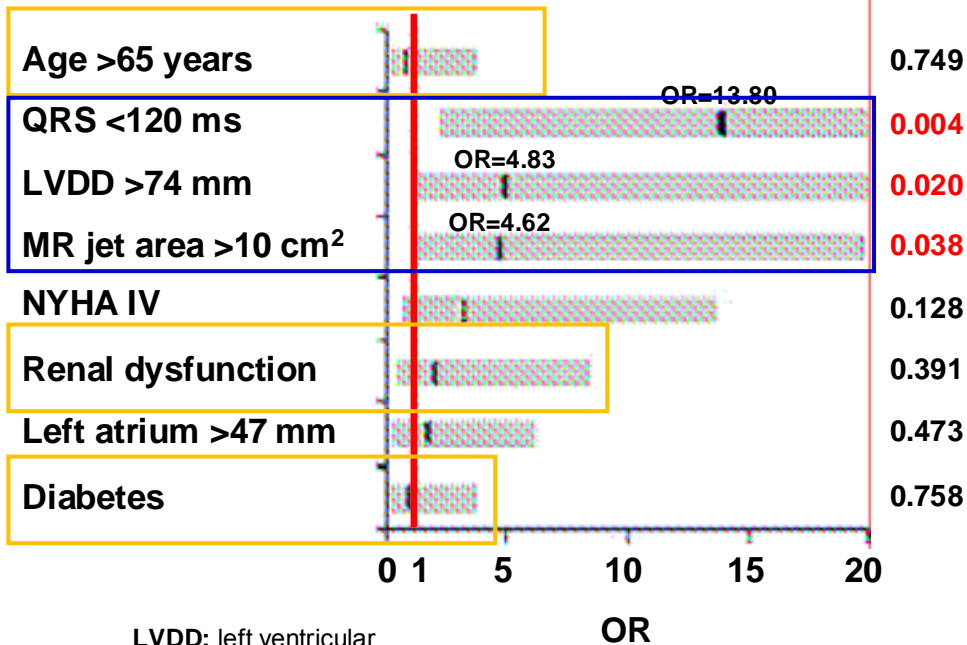
Medicare **ICD** Registry (2005-6)  
 Mean Follow-up: 40 months  
 Age: 73 years - N=14946



# Cardiac resynchronization therapy is effective even in elderly patients with comorbidities

## Predictors of non-response to cardiac resynchronization therapy

Age: 62±11; Age ≥65 yrs: 36 (41%)  
 Men: 55 (63%)  
 LVEF: 24% - (N=87)



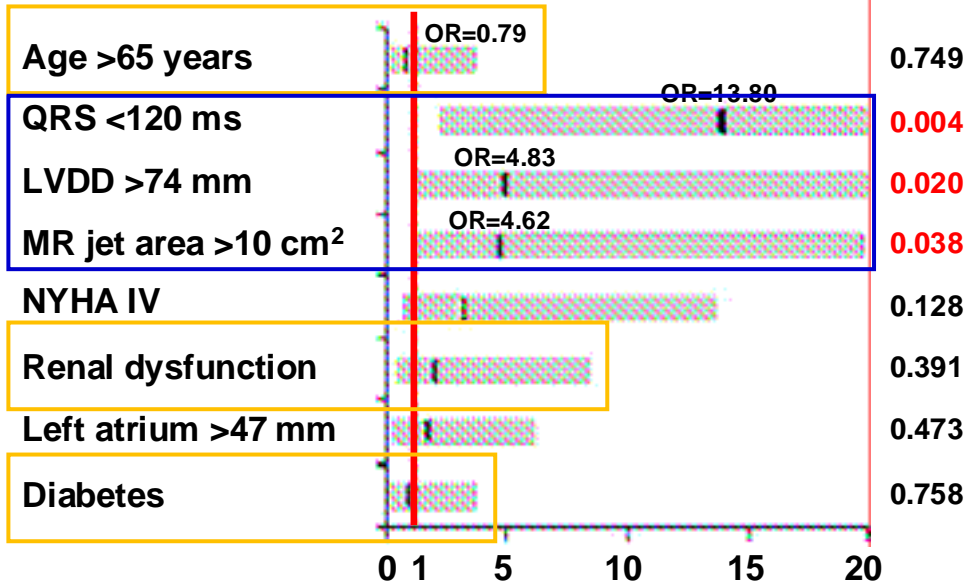
LVDD: left ventricular end-diastolic diameter  
 MR: mitral regurgitation



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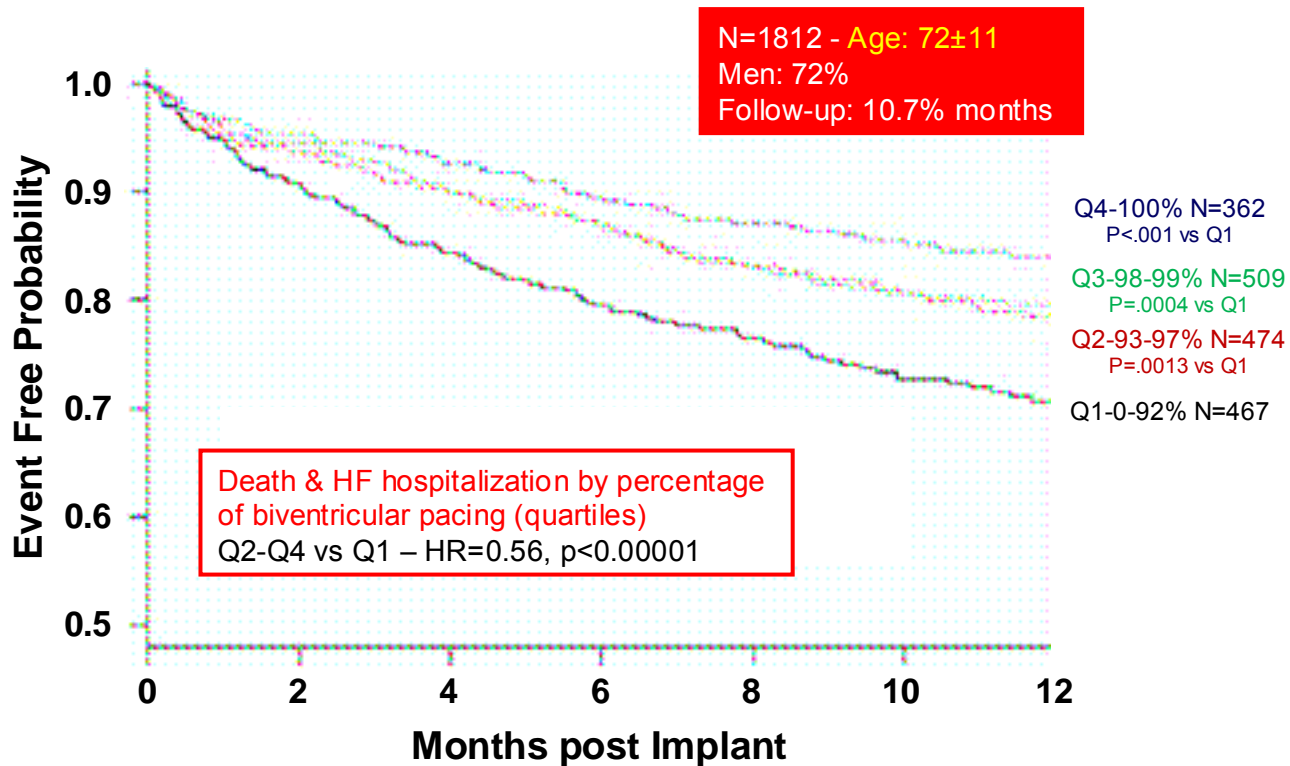
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# Heart Failure Decompensation and All-Cause Mortality in Relation to Percent Biventricular Pacing in Patients With Heart Failure

Is a Goal of 100% Biventricular Pacing Necessary?



# Implantable cardioverter-defibrillator prescription in the elderly



Epstein AE, Heart Rhythm, 2009

The Advancement in ICD Therapy (ACT) Registry – N=4566

