

Εμφύτευση απινιδωτή- επανασυγχρονισμός

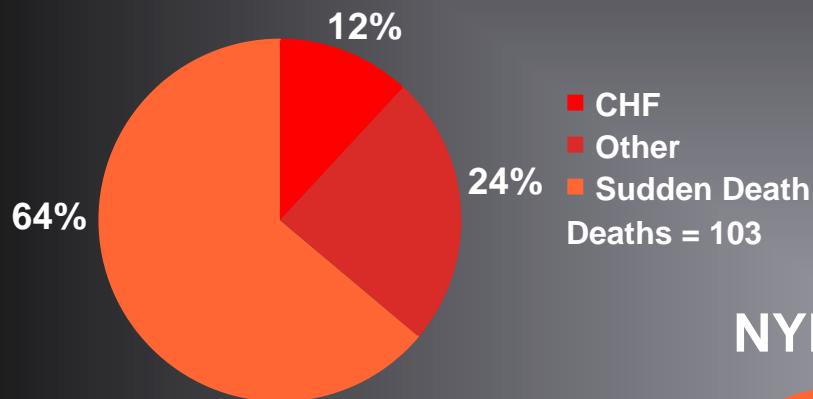
Βασίλειος Π. Βασιλικός MD, FACC, FESC
Καθηγητής Καρδιολογίας ΑΠΘ

-
- ▶ Αρρυθμικός θάνατος
 - ▶ Καρδιακή ανεπάρκεια

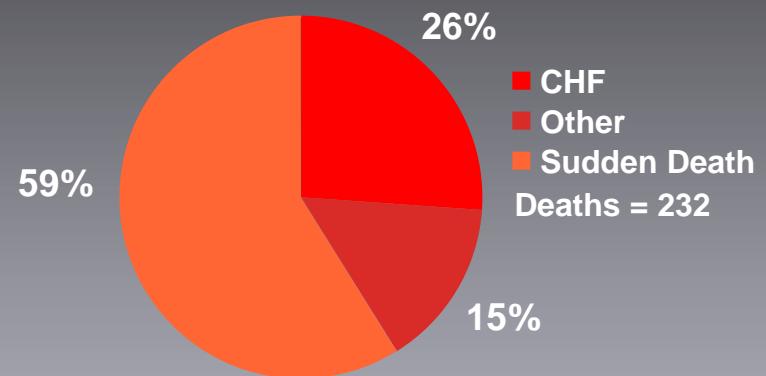
SCD in Heart Failure

SCD—a prominent mode of death

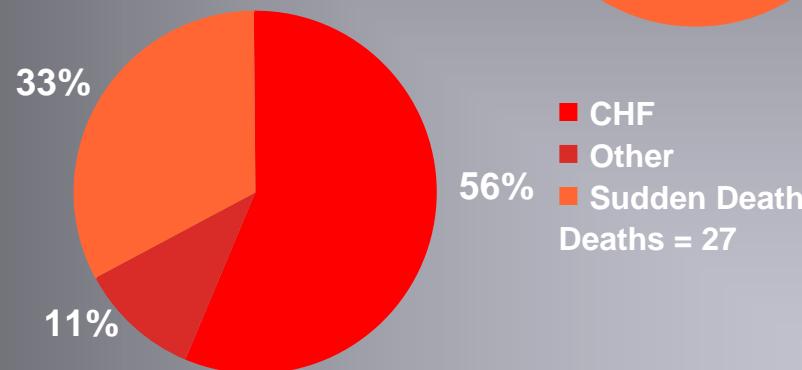
NYHA II



NYHA III



NYHA IV



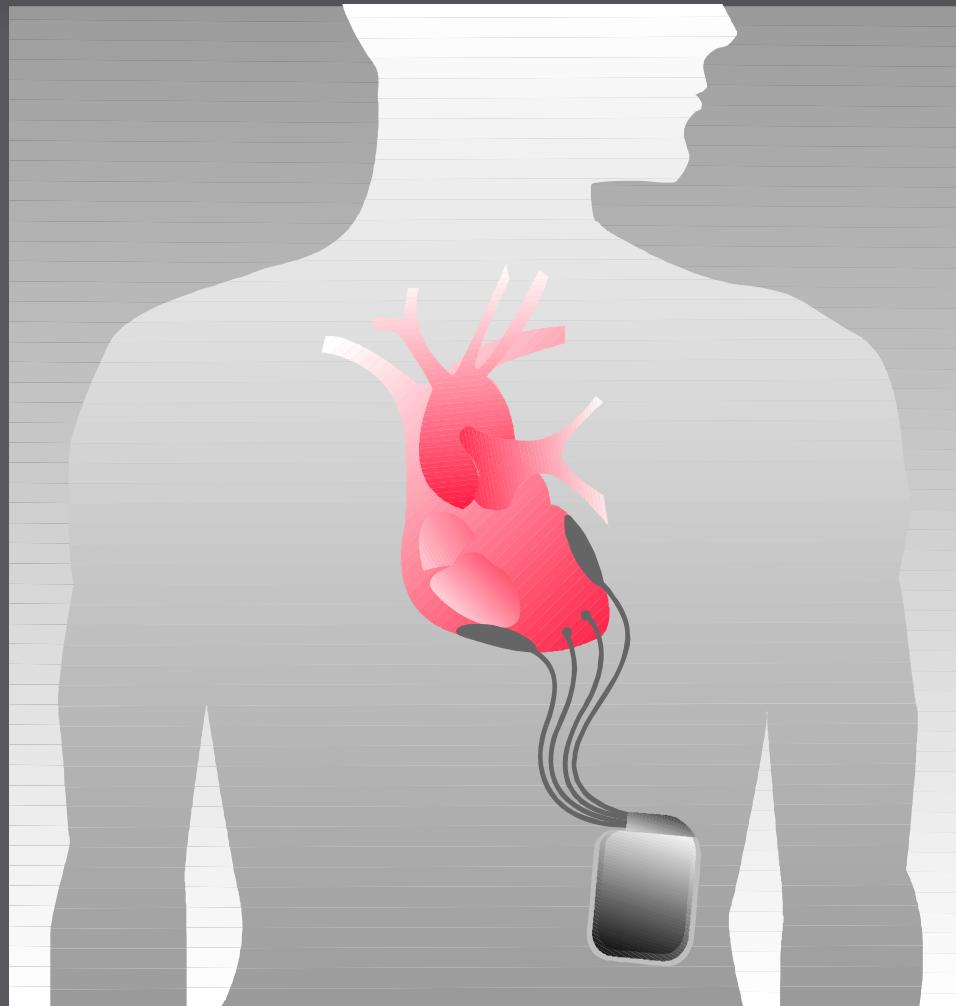
MERIT-HF study group. Effect of metoprolol CR/XL in chronic heart failure: metoprolol CR/XL randomized intervention trial in congestive heart failure (MERIT-HF). *LANCET*. 1999;353:2005.

ICD

- ▶ Συσκευή που σχεδιάστηκε για την πρόληψη του αιφνιδίου θανάτου σε ασθενείς με VT ή VF



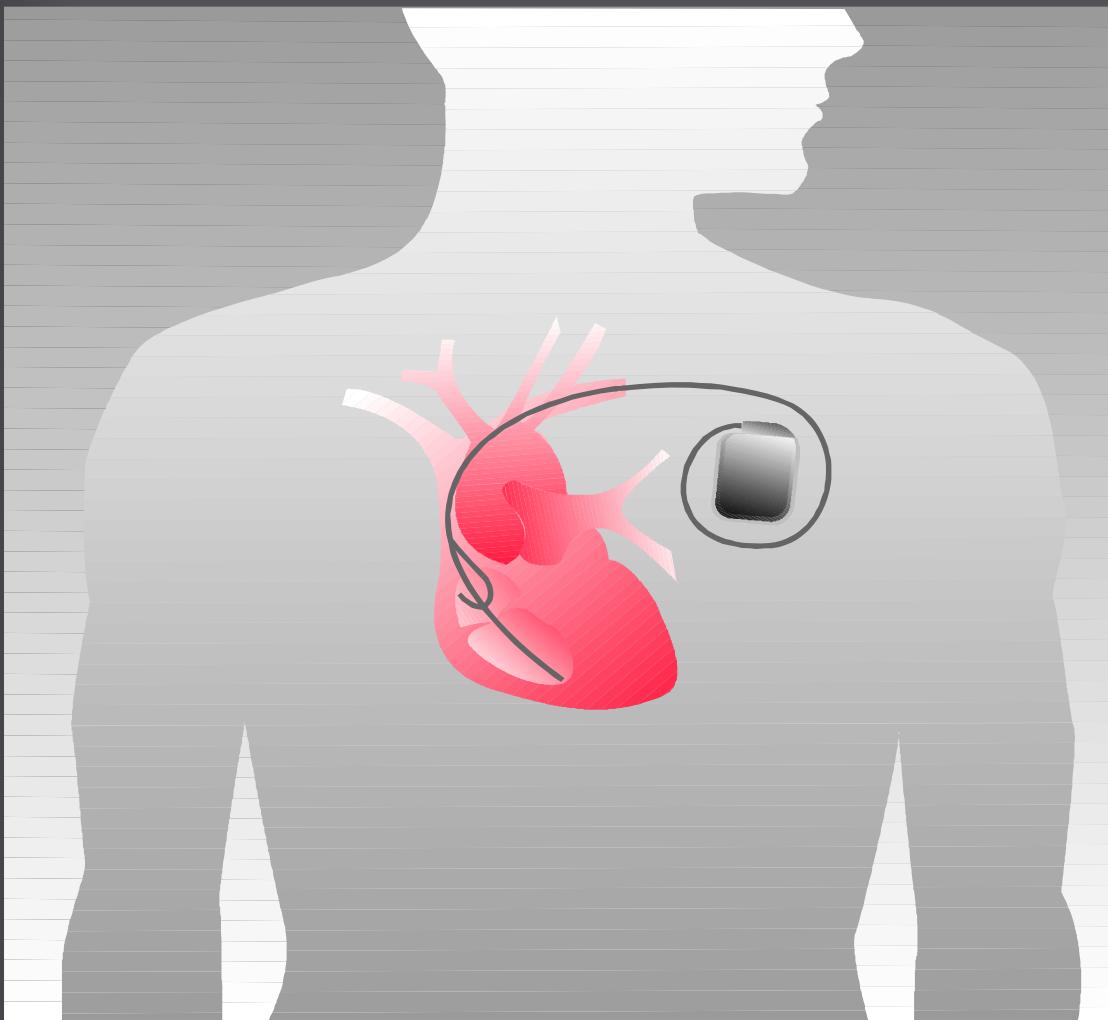
1980



Μέγεθος συσκευών

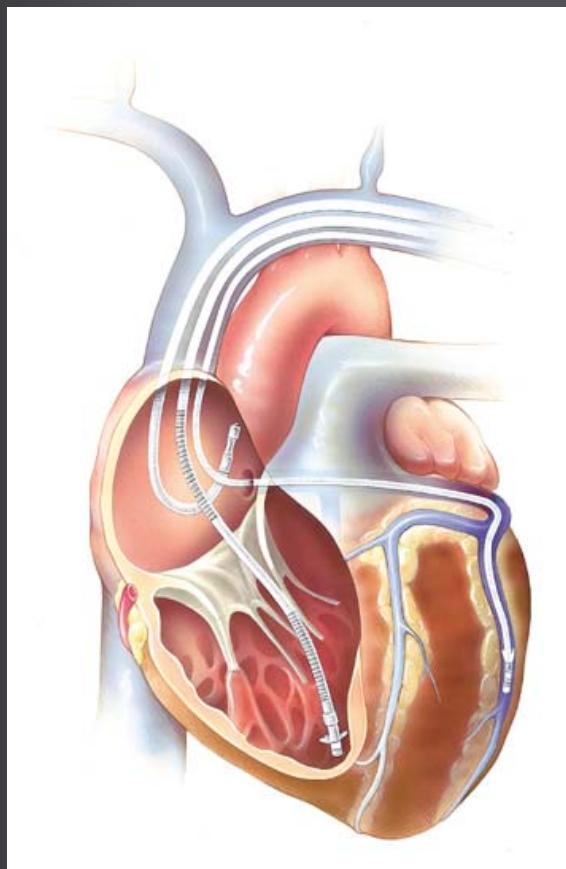


ICD - σήμερα





Τι μπορούμε να επιτίχουμε με τις «ηλεκτρικές» θεραπείες;



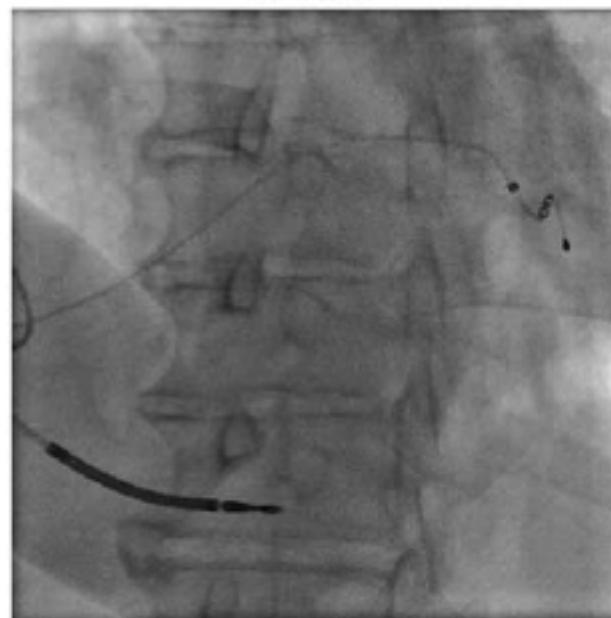
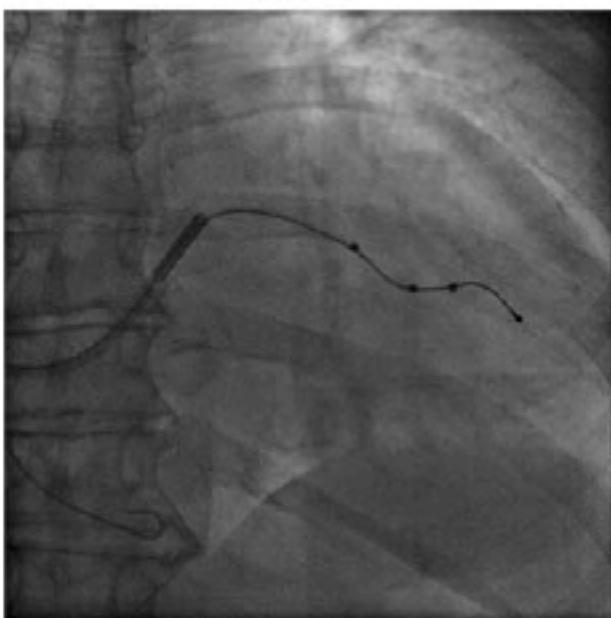
- ▶ Αμφικοιλιακή βηματοδότηση
- ▶ Τεχνολογία ICD



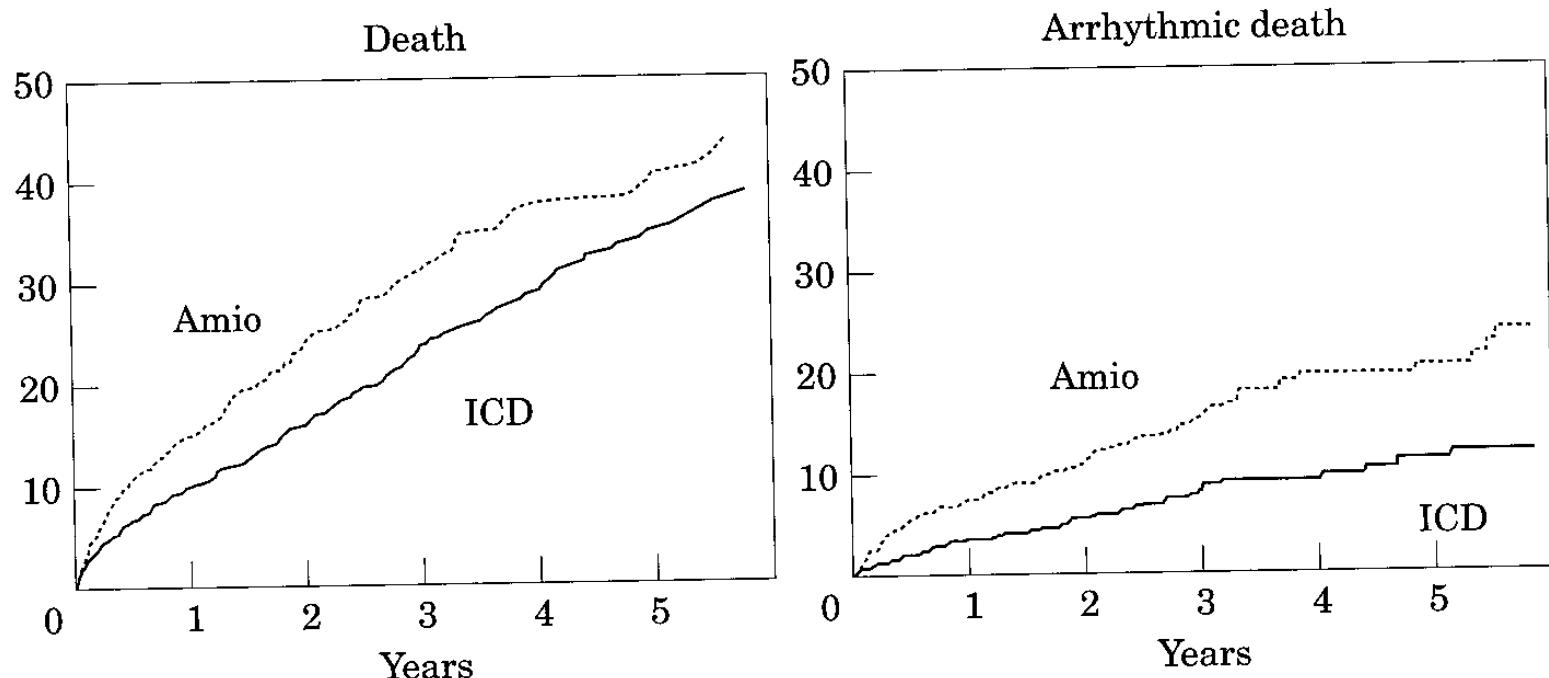
LAO 37



AP view



Secondary prevention trials



Number at risk											
ICD:	934	715	467	273	159	104	934	715	467	273	159
Amio:	932	664	427	248	128	82	932	664	427	248	128

Figure 1 Cumulative risk of fatal events or the amiodarone (....) and ICD (—) treatment arms.

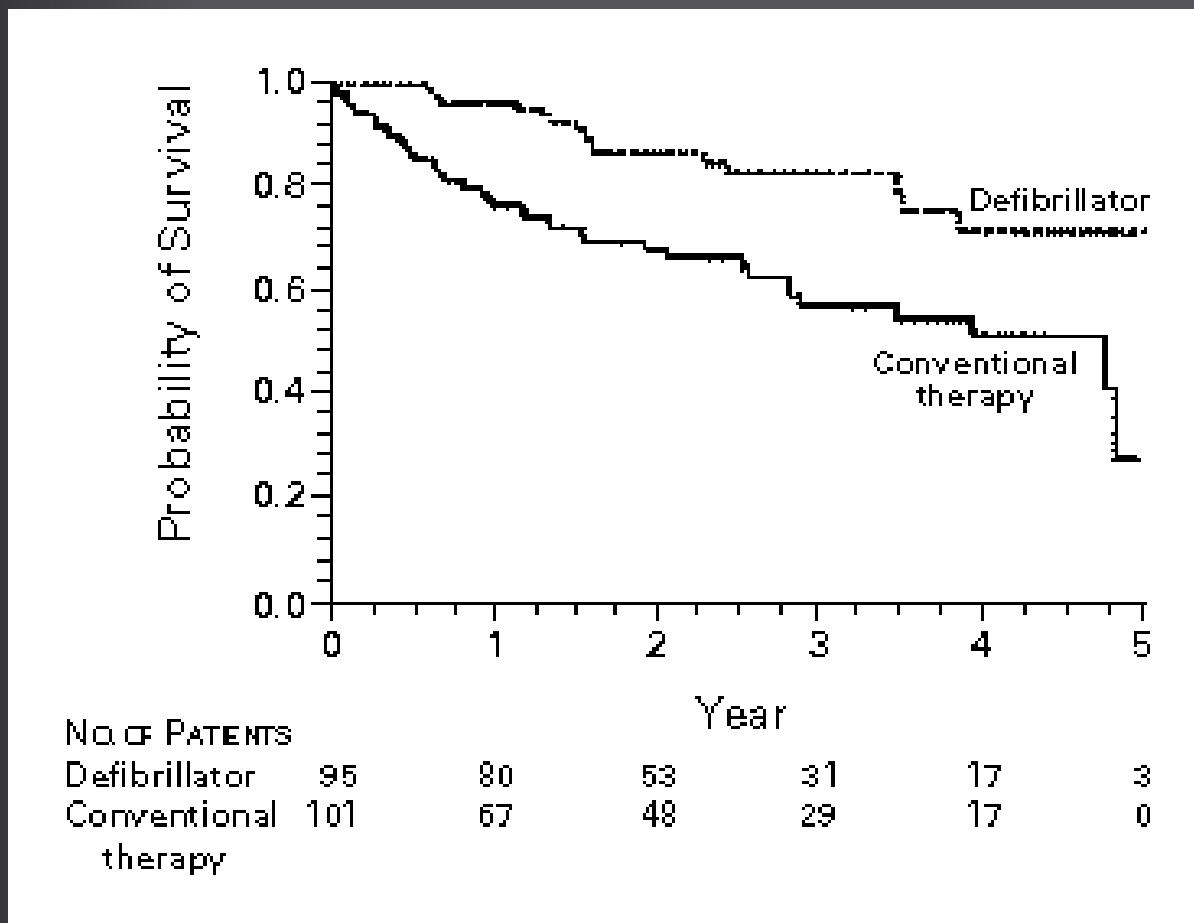
Eur Heart J, Vol. 21, issue 24, December 2000

Connolly et al., Eur Heart J 2000

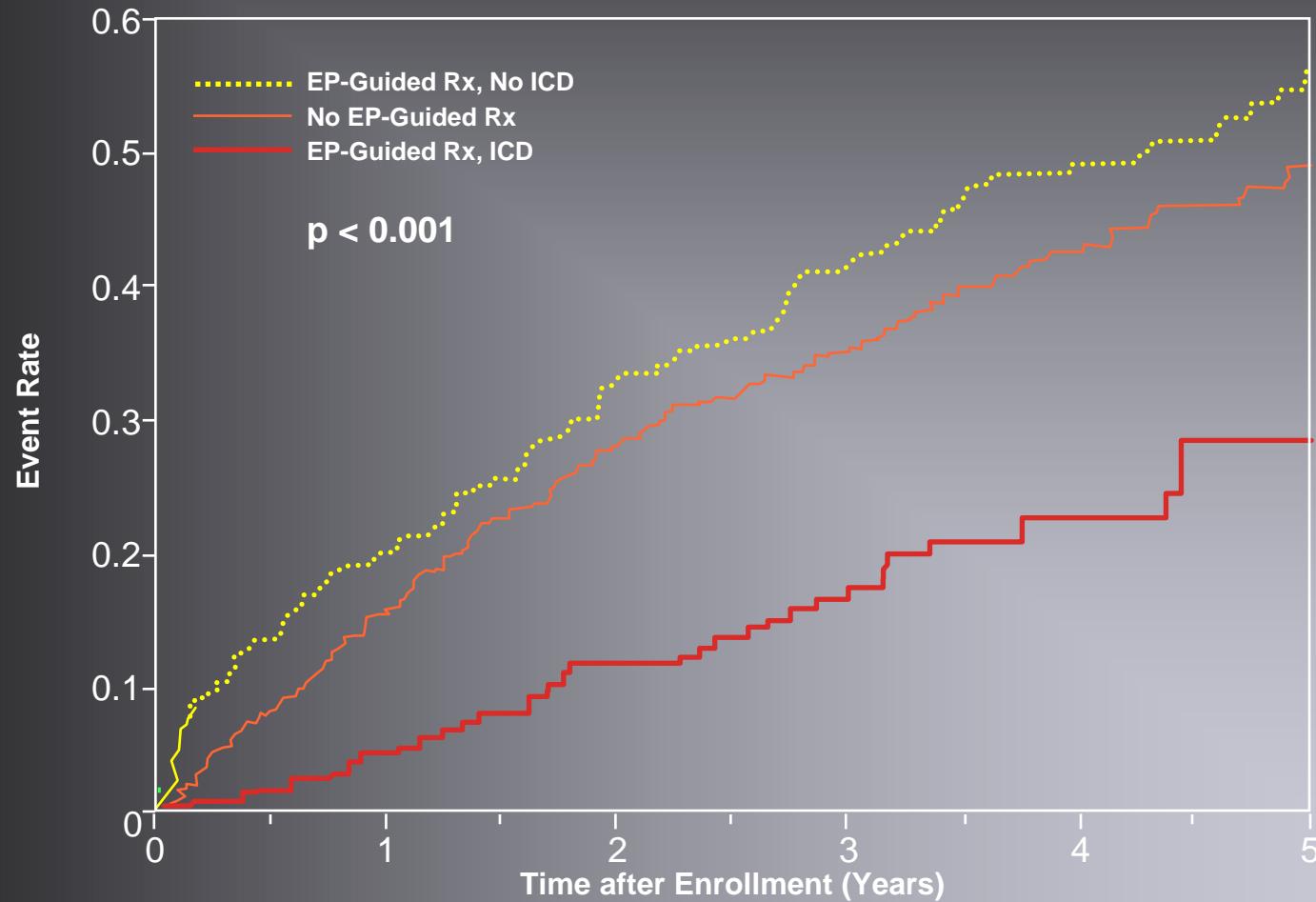
Primary prevention

trials

MADIT

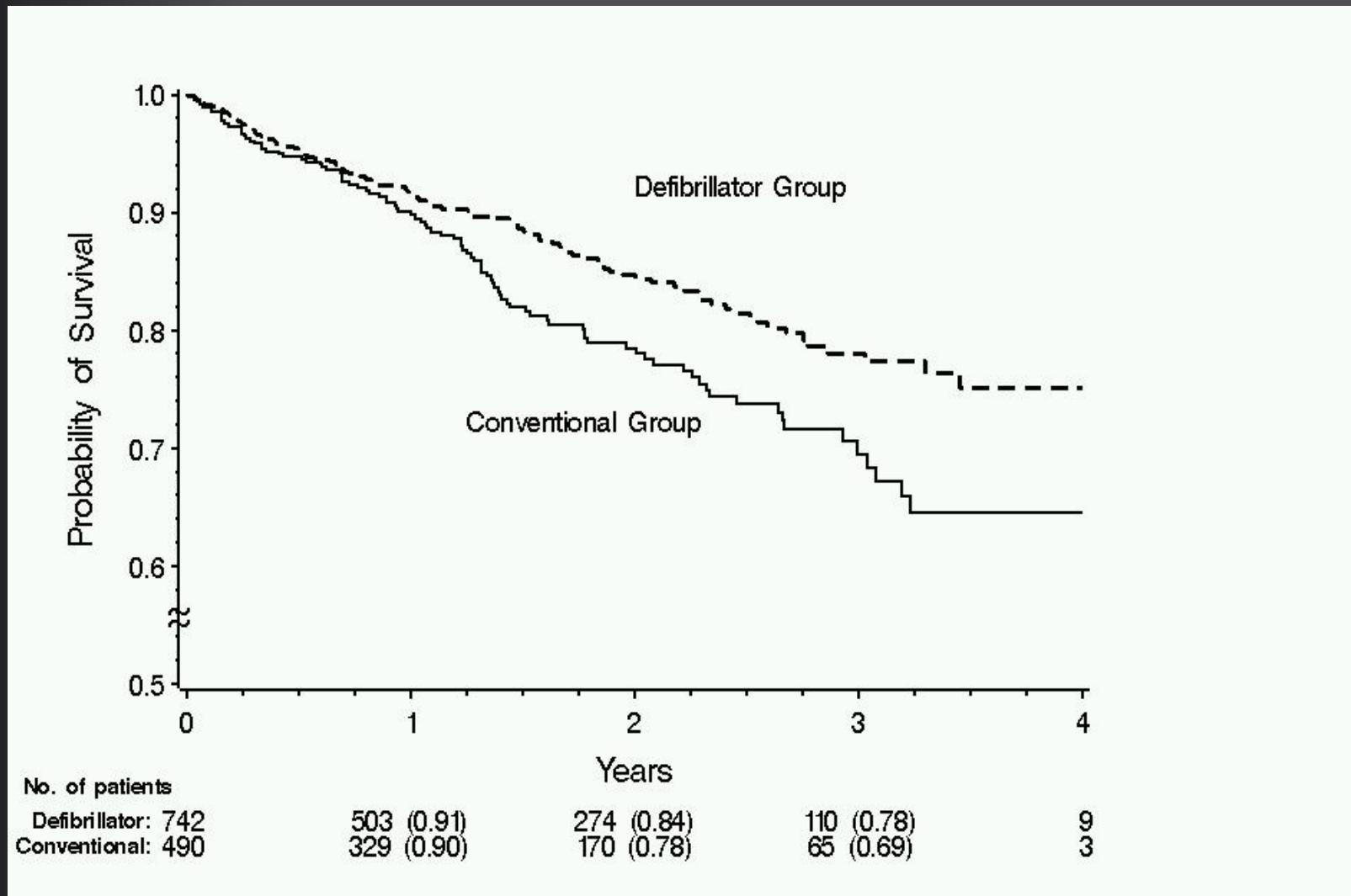


MUSTT - Ολική θνητότητα



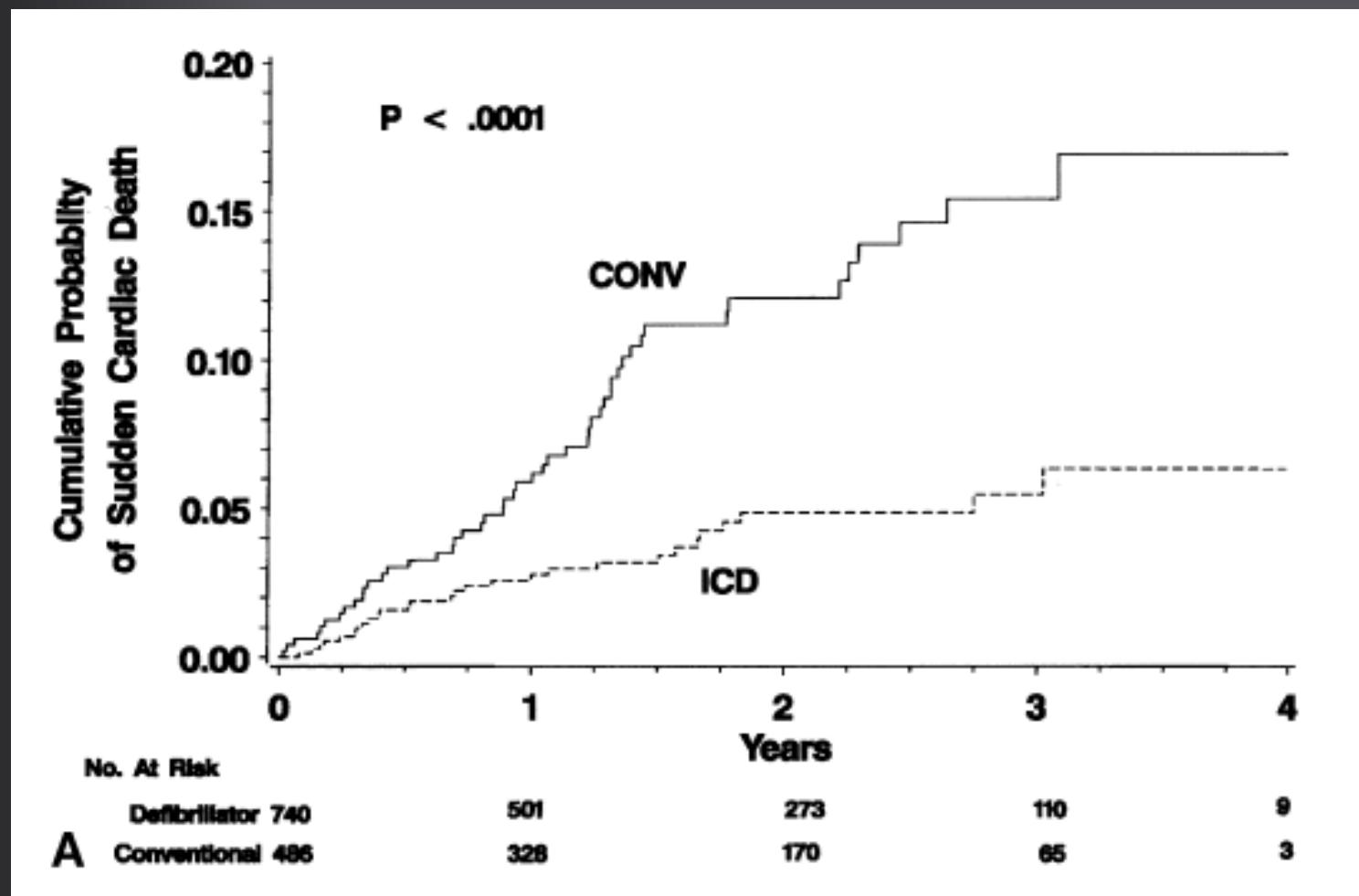
Buxton AE. *N Engl J Med.* 1999;341:1882-90.

MADIT II



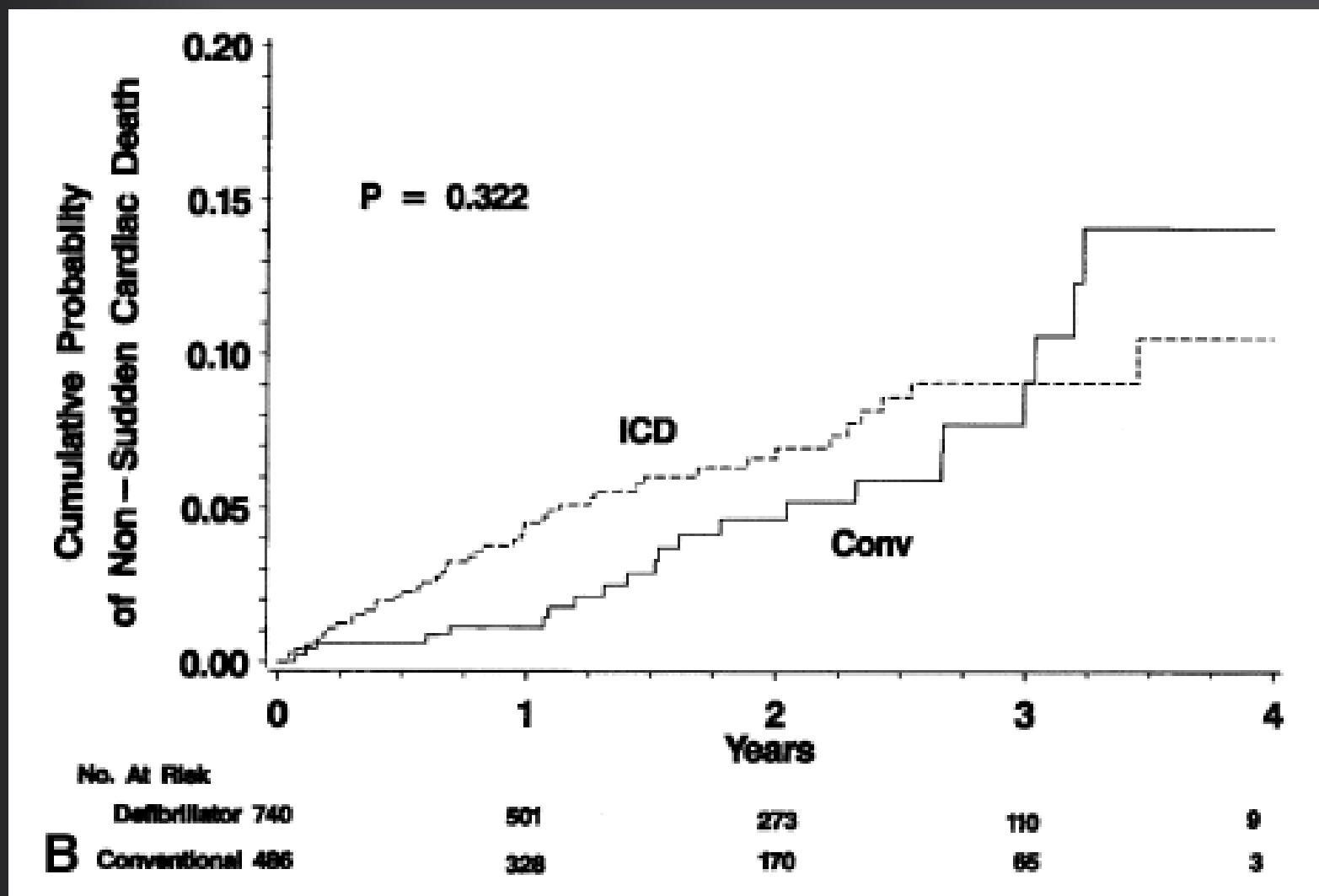
MADIT II Mortality events - SCD

Greenberg et al, JACC 2004



MADIT II Mortality events -NSCD

Greenberg et al, JACC 2004



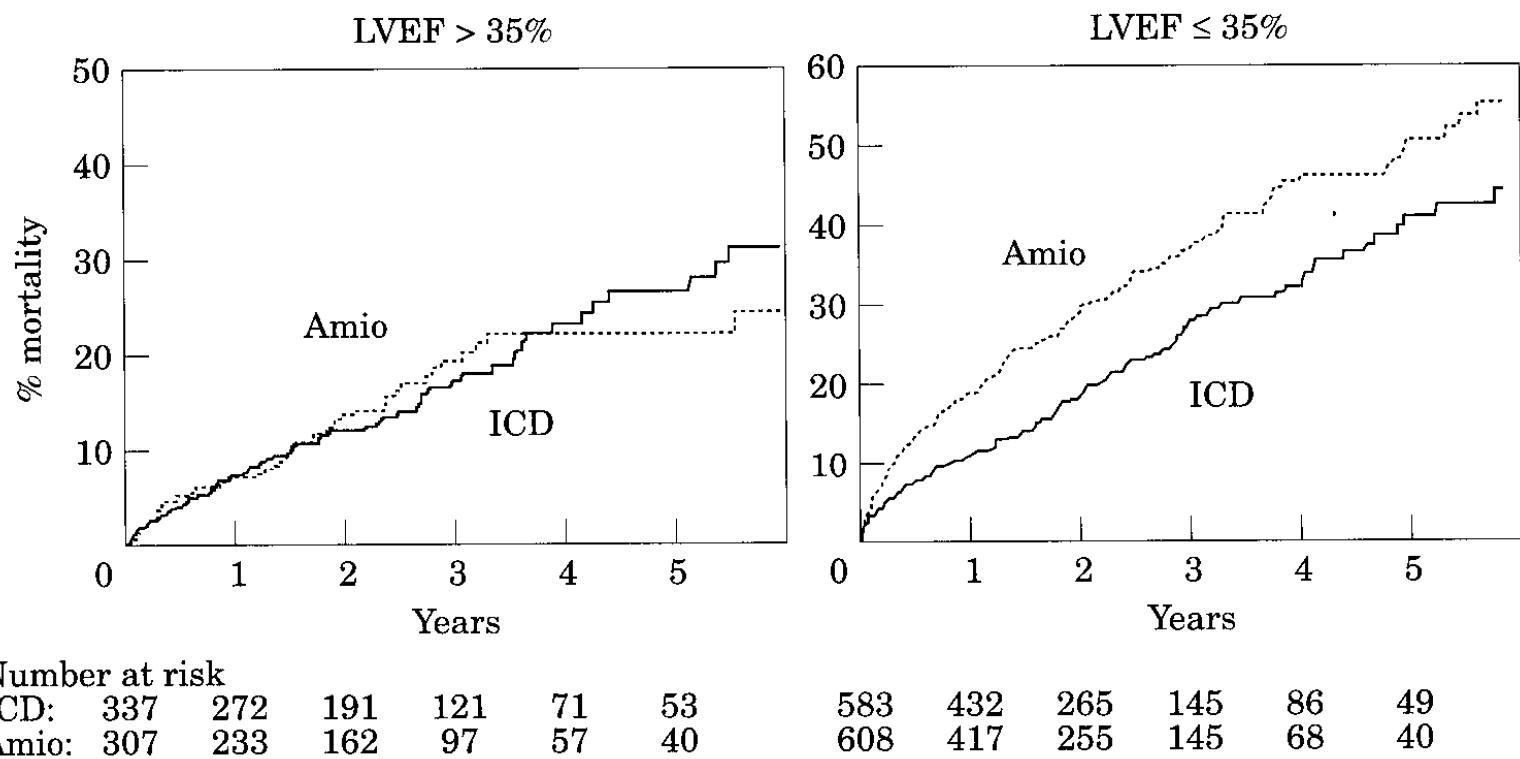
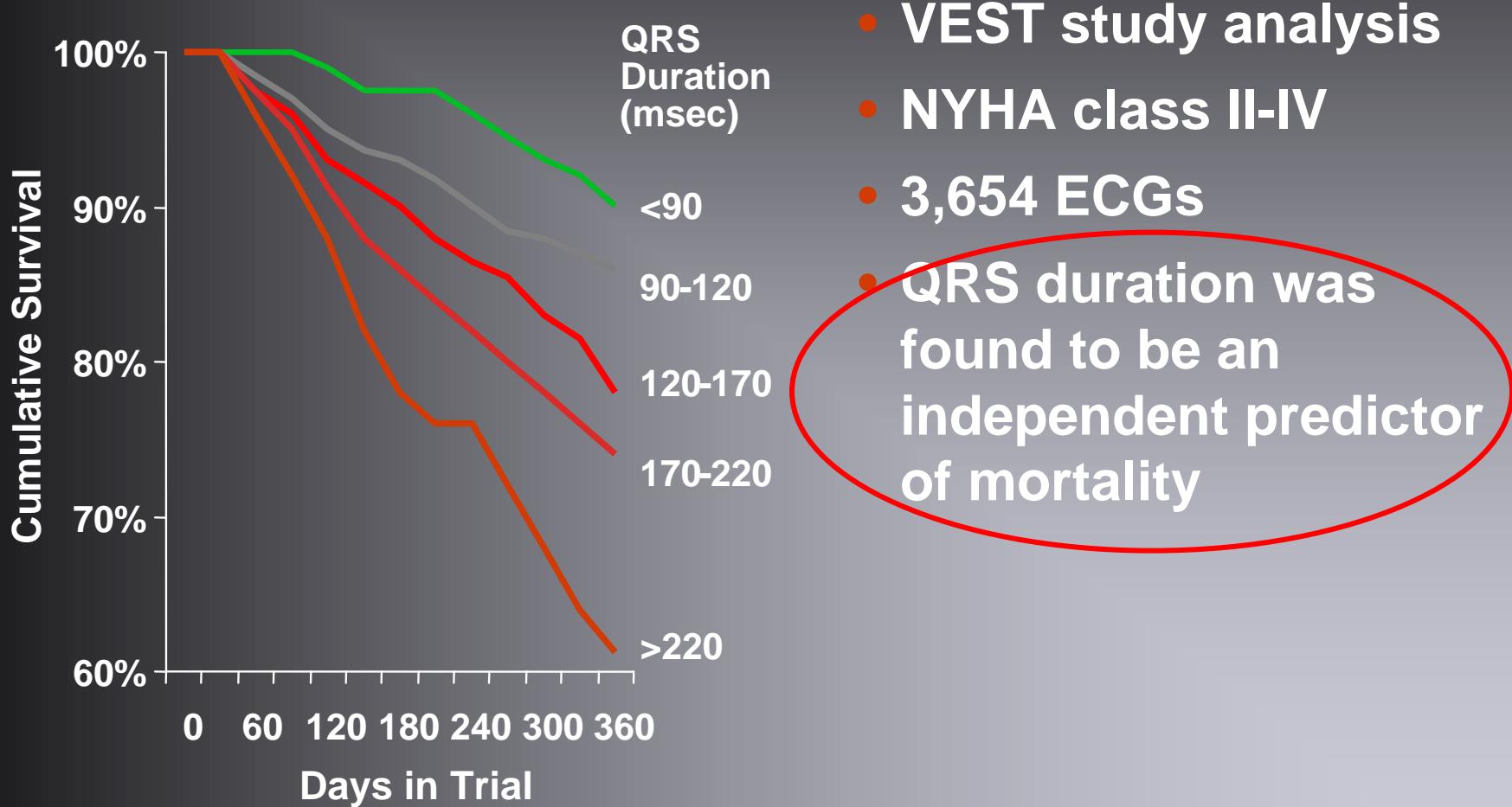


Figure 2 Cumulative risk of death for patients with left ventricular ejection fraction (LVEF) >35% and ≤35%.

Connolly et al., Eur Heart J 2000

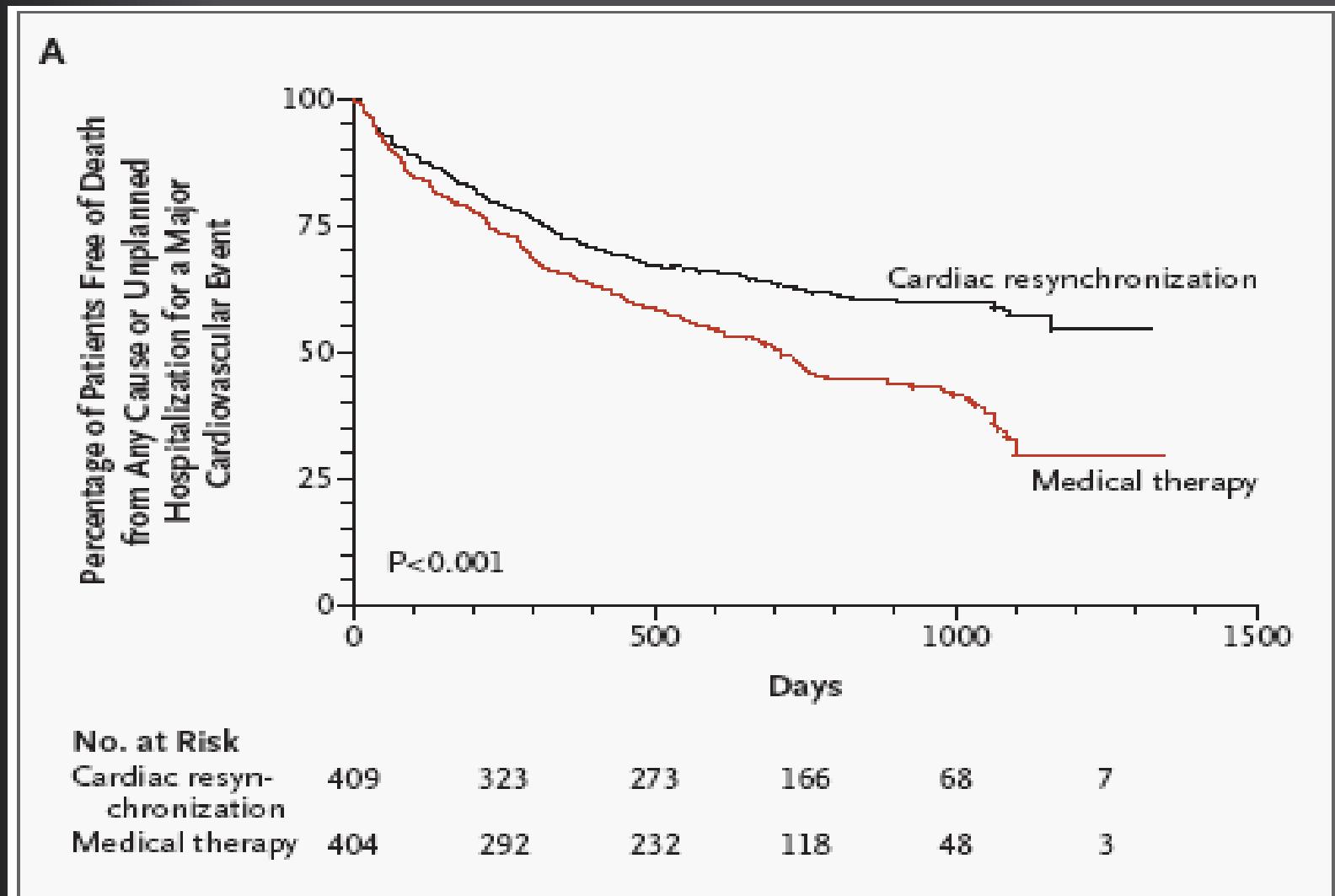
SCD in Heart Failure

QRS complex and mortality

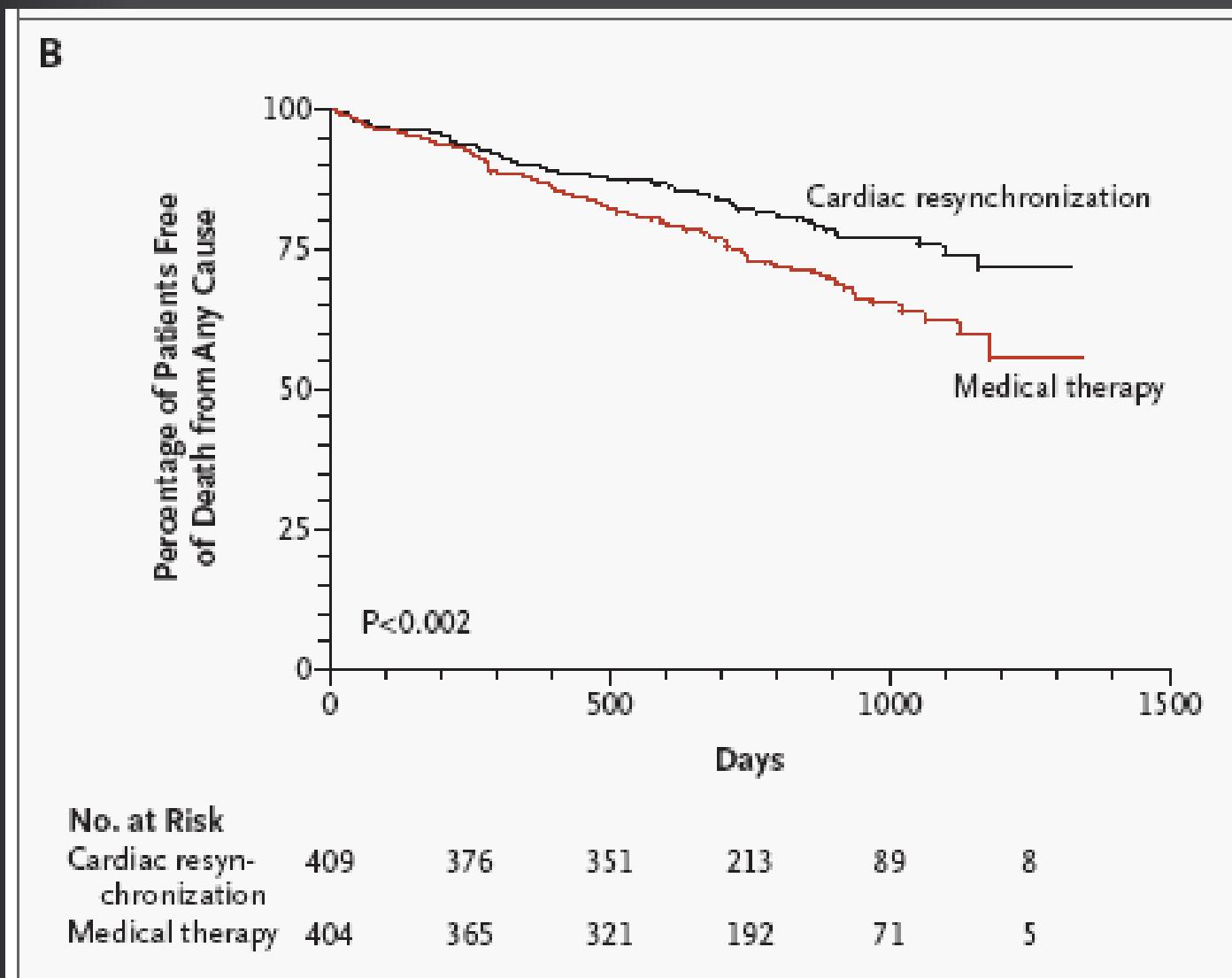


Adapted from V Gottipaty, MD.

CARE-HF: *death or hospitalization*



CARE-HF: *any death*



PROSPECT trial

(PRedictors Of reSPonse to CRT Therapy)

Circulation 2008

426 patients with stable heart failure
QRS \geq 130ms

- Echo indicators of ventricular dyssynchrony
 - Composite *clinical endpoint at 6 months*
 - Heart failure free survival
 - NYHA class improvement
 - QOL
 - LV ESV

Table 1. Summary of Echocardiographic Predictors of Response to CRT

Echocardiographic Predictor	Description of Method	Echocardiography Method	Cutoff
SPWMD ¹¹	Septal-posterior wall motion delay; M mode measured by parasternal short-axis view	M mode	≥130 ms
IVMD ¹²	Interventricular mechanical delay defined as the difference between left and right ventricular prejection intervals	Pulsed Doppler	≥40 ms
LVFT/RR ¹³	Left ventricular filling time (LVFT) in relation to cardiac cycle length (PR) as measured by transmural Doppler echo expressed as percentage	Pulsed Doppler	≤40%
LPEI ¹⁴	Left ventricular prejection interval defined as the time interval between the beginning of QRS and beginning of left ventricular ejection by Doppler	Pulsed Doppler	≥140 ms
LLWC ¹⁵	Intraventricular dyssynchrony left lateral wall contraction defined as the presence of overlap between the end of lateral wall contraction (via M mode) and onset of LV filling (by Doppler echocardiography)	M mode and pulsed Doppler	Any overlap
Ts-(lateral-septal) ¹⁵	Delay between time to peak systolic velocity in ejection phase at basal septal and basal lateral segments	TDI	≥60 ms
Ts-SD ^{11,16}	SD of time from QRS to peak systolic velocity in ejection phase for 12 left ventricular segments (6 basal and 6 middle)	TDI	≥32 ms
PVD ¹⁷	Peak velocity difference derived from subtracting the maximal from the minimal difference of time to peak velocity (excluding velocities occurring during isovolumic contraction time) for 6 segments at basal level	TDI	≥110 ms
DLC ^{17,18}	Delayed longitudinal contraction measured in the 6 basal left ventricular segments with a systolic contraction component in early diastole by TDI and confirmed with strain rate imaging	TDI+SR	≥2 basal segments
Ts-peak displacement	Maximum difference of time to peak systolic displacement for 4 segments	TDI	≥Median
Ts-peak (basal)	Maximum difference of time to peak systolic velocity for 6 segments at basal level	TDI	≥Median
Ts-onset (basal)	Maximum difference of time to onset of systolic velocity for 6 segments at basal level	TDI	≥Median

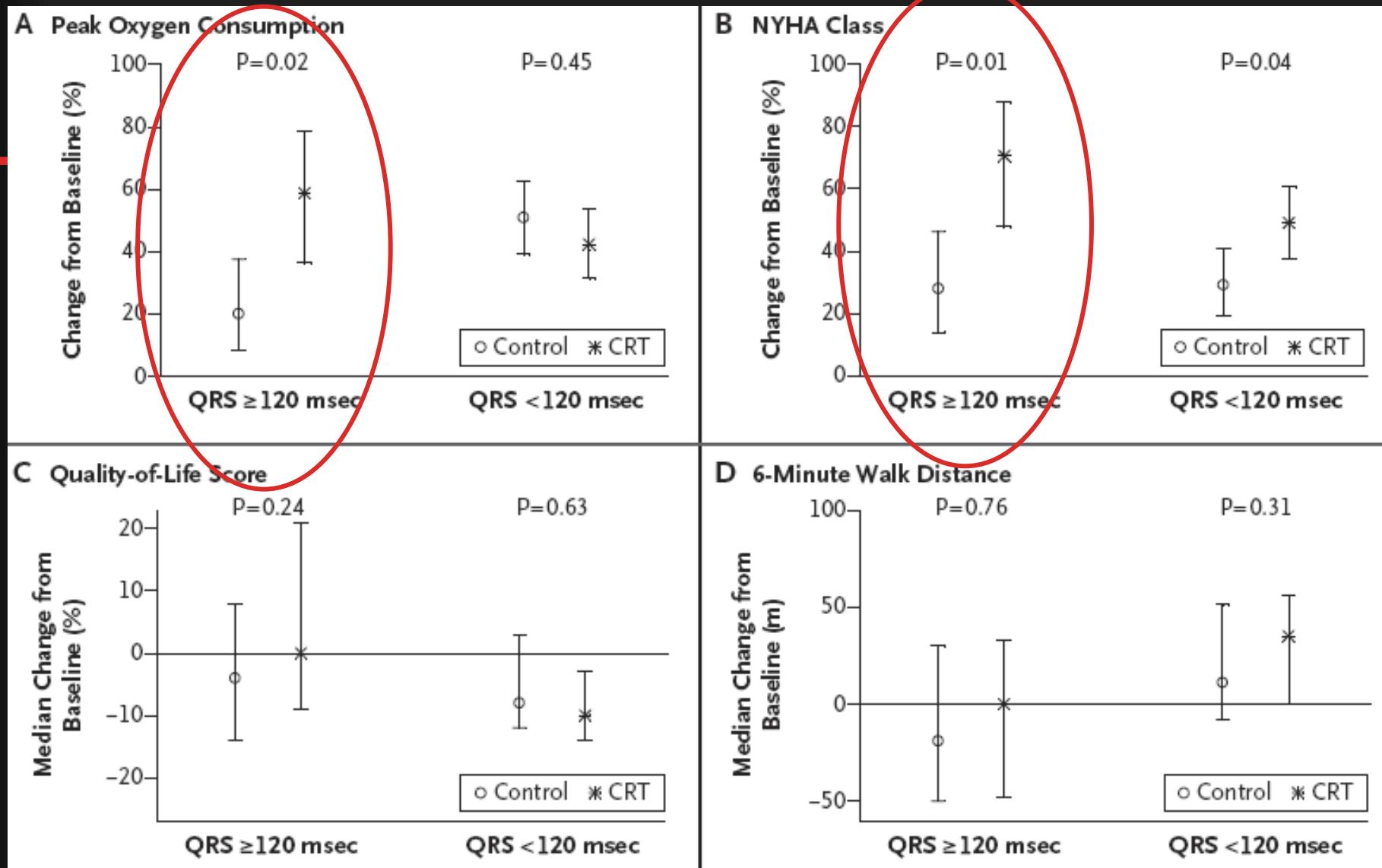
-
- ▶ “NARROW” QRS pts with CHF
 - ▶ Class II

ORIGINAL ARTICLE

Cardiac-Resynchronization Therapy in Heart Failure with Narrow QRS Complexes

John F. Beshai, M.D., Richard A. Grimm, D.O., Sherif F. Nagueh, M.D.,
James H. Baker II, M.D., Scott L. Beau, M.D., Steven M. Greenberg, M.D.,
Luis A. Pires, M.D., and Patrick J. Tchou, M.D., for the RethinQ Study Investigators*

- ▶ ICD indication
- ▶ EF<35%
- ▶ Class III
- ▶ QRS <130ms
- ▶ Mechanical asynchrony on echo



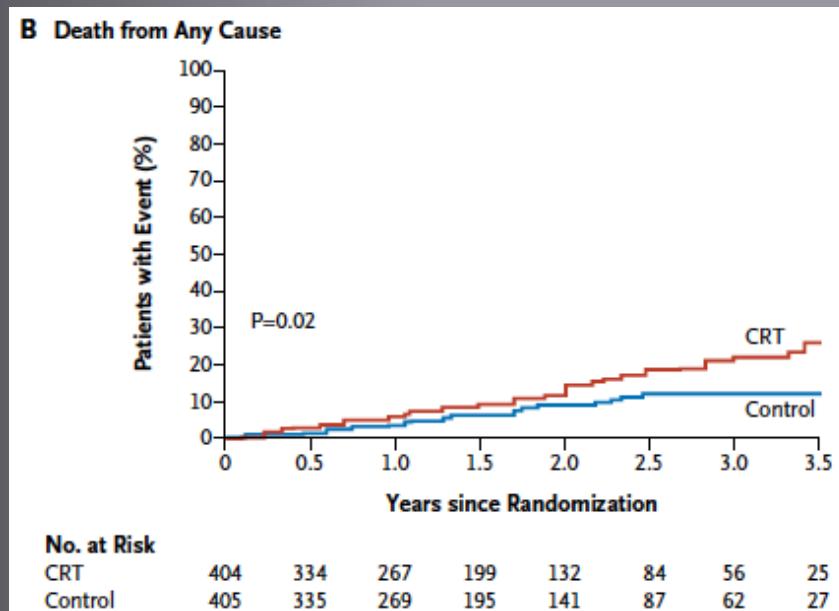
ORIGINAL ARTICLE

Cardiac-Resynchronization Therapy in Heart Failure with a Narrow QRS Complex

Frank Ruschitzka, M.D., William T. Abraham, M.D., Jagmeet P. Singh, M.D., Ph.D.,
 Jeroen J. Bax, M.D., Ph.D., Jeffrey S. Borer, M.D., Josep Brugada, M.D., Ph.D.,
 Kenneth Dickstein, M.D., Ph.D., Ian Ford, M.D., Ph.D., John Gorcsan III, M.D.,
 Daniel Gras, M.D., Henry Krum, M.B., B.S., Ph.D., Peter Sogaard, M.D., D.M.Sc.,
 and Johannes Holzmeister, M.D., for the EchoCRT Study Group*

N Engl J Med 2013.

III or IV heart failure,
 LVEF<35%
 QRS duration < 130 msec
 echocardiographic evidence of left ventricular dyssynchrony



LV lead placement

MINI-FOCUS ISSUE: HEART FAILURE AND ELECTROPHYSIOLOGY

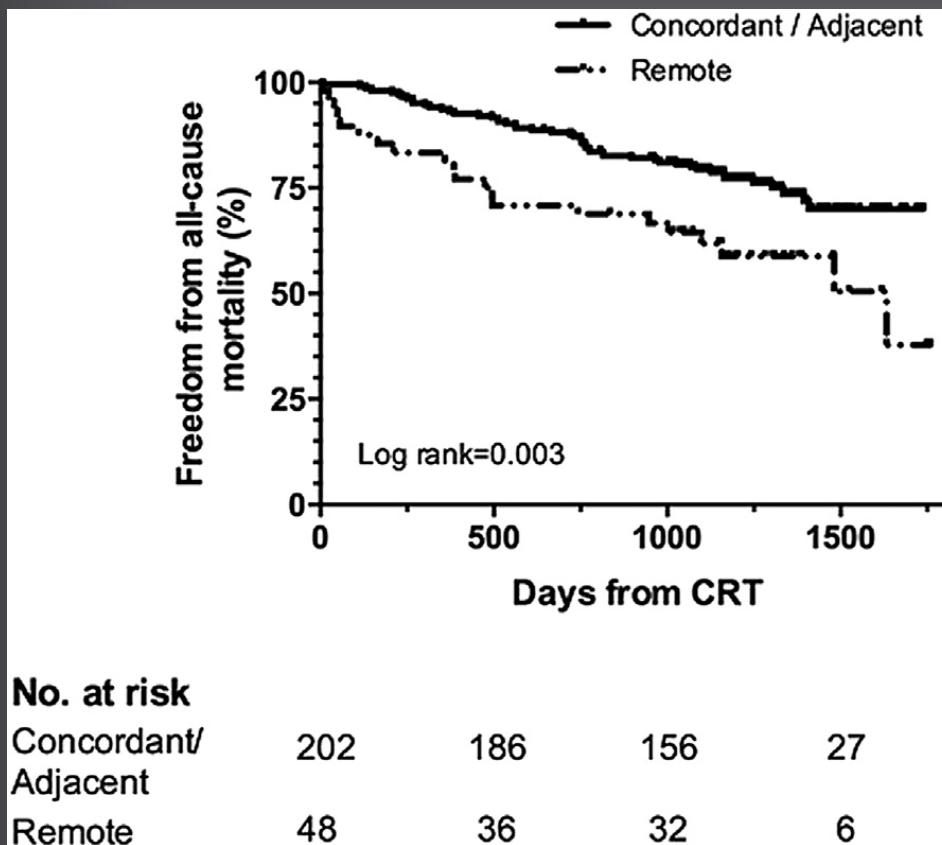
Prognostic Benefit of Optimum Left Ventricular Lead Position in Cardiac Resynchronization Therapy

Follow-Up of the TARGET Study Cohort
(Targeted Left Ventricular Lead Placement to guide
Cardiac Resynchronization Therapy)

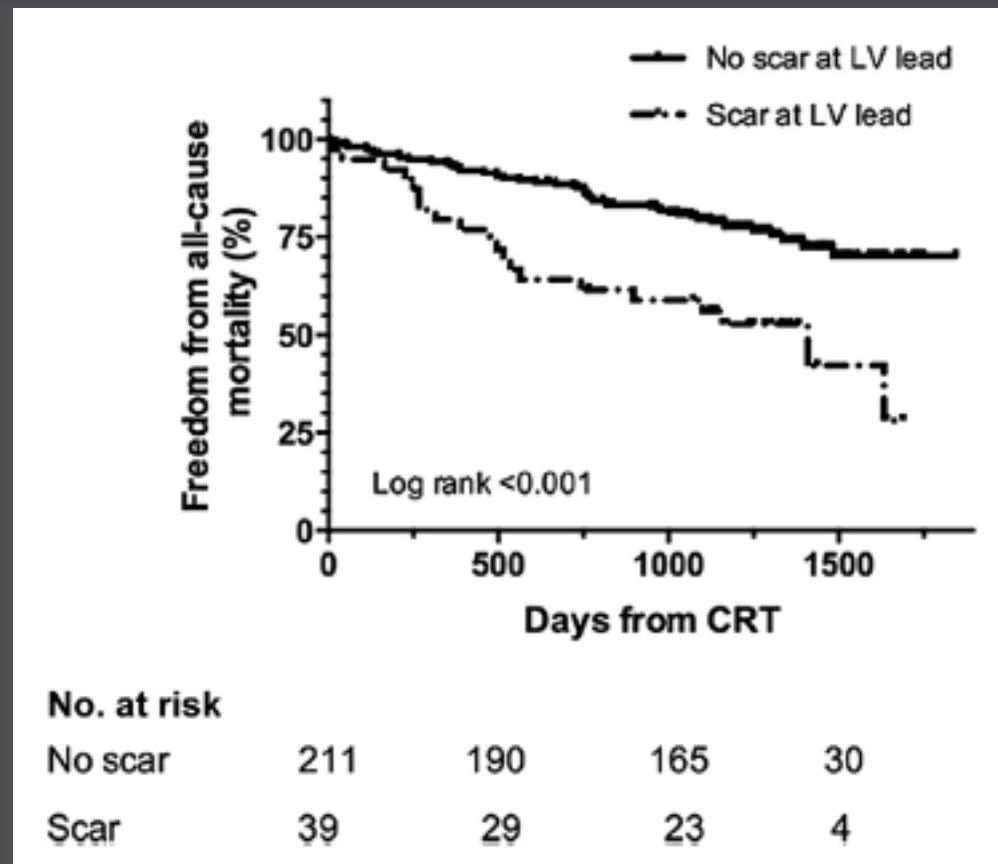
Anna C. Kydd, MD,* Fakhar Z. Khan, MD,* William D. Watson, MD,* Peter J. Pugh, MD,*
Munmohan S. Virdee, MD,† David P. Dutka, DM*

Cambridge, United Kingdom

Kaplan-Meier Curves According to LV Lead Position



Kaplan-Meier Curves Comparing All-Cause Mortality According to the Presence or Absence of Low-Amplitude Strain (Scar) at the LV Lead



The NEW ENGLAND
JOURNAL *of* MEDICINE

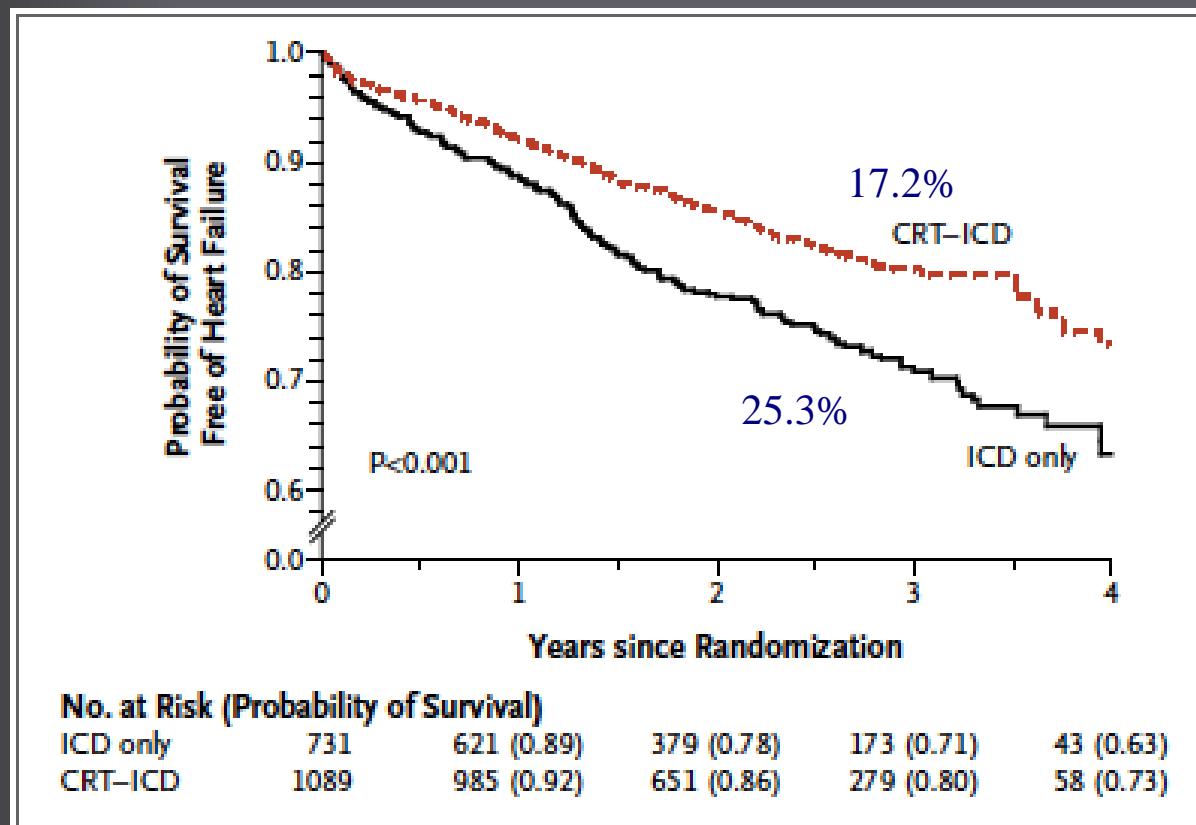
Cardiac-Resynchronization Therapy for the Prevention
of Heart-Failure Events

Arthur J. Moss, M.D., W. Jackson Hall, Ph.D., David S. Cannom, M.D., Helmut Klein, M.D., Mary W. Brown, M.S.,
James P. Daubert, M.D., N.A. Mark Estes III, M.D., Elyse Foster, M.D., Henry Greenberg, M.D.,
Steven L. Higgins, M.D., Marc A. Pfeffer, M.D., Ph.D., Scott D. Solomon, M.D., David Wilber, M.D.,
and Wojciech Zareba, M.D., Ph.D., for the MADIT-CRT Trial Investigators*

MADIT-CRT STUDY

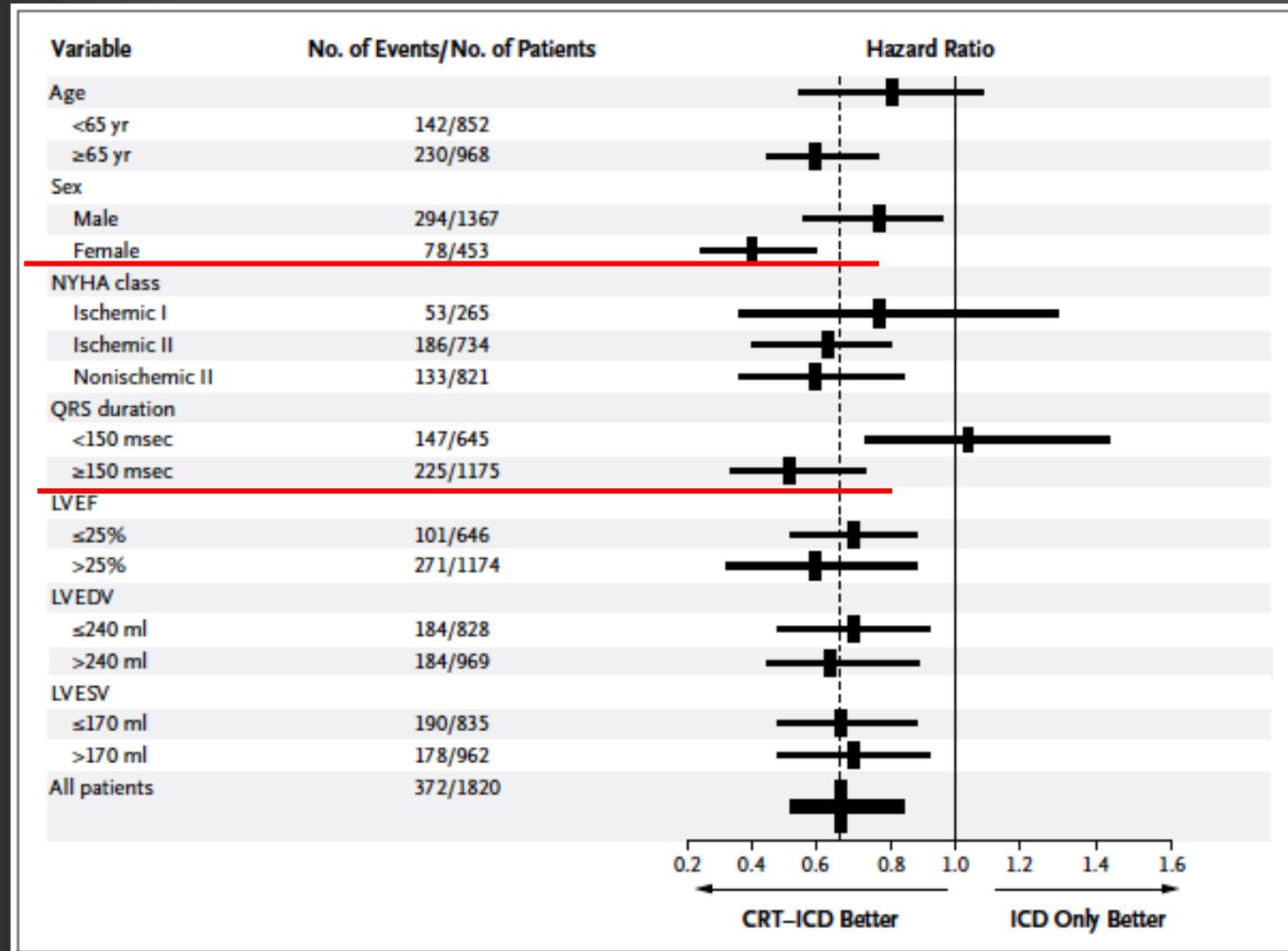
- ▶ N=1820
- ▶ Class I-II
- ▶ EF<30%
- ▶ QRS>130ms or >200ms paced
- ▶ Death from any cause or non-fatal heart failure event
- ▶ F/U 2.4 years

Kaplan–Meier Estimates of the Probability of Survival Free of Heart Failure

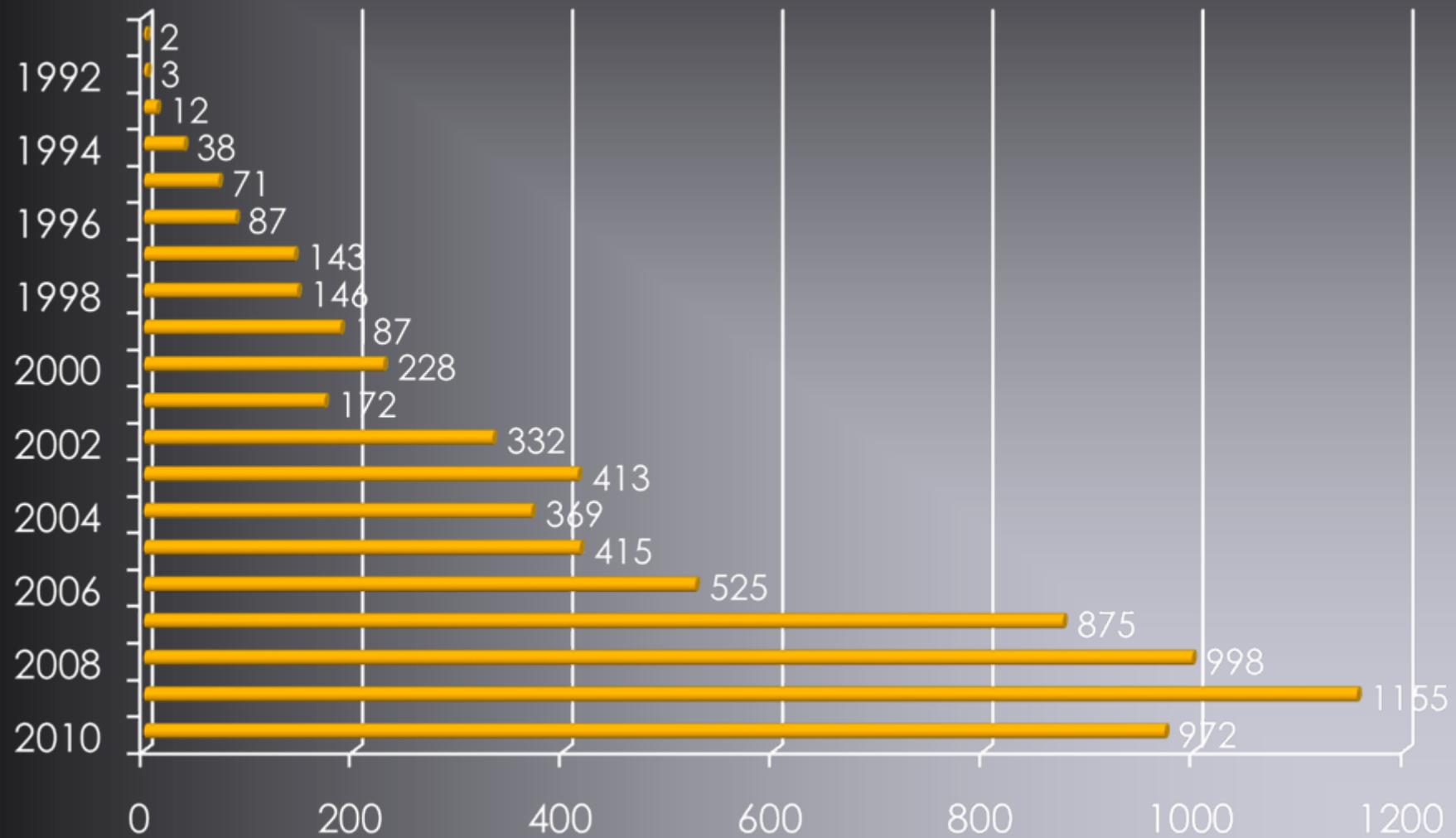


Variable	ICD-Only Group no. (%)	CRT-ICD Group no. (%)	Hazard Ratio (95% CI)†	P Value
All patients	731	1089		
Death or heart failure‡	185 (25.3)	187 (17.2)	0.66 (0.52–0.84)§	0.001§
Heart failure only	167 (22.8)	151 (13.9)	0.59 (0.47–0.74)	<0.001
Death at any time¶	53 (7.3)	74 (6.8)	1.00 (0.69–1.44)	0.99
Patients with ischemic cardiomyopathy (NYHA class I or II)¶	401	598		
Death or heart failure‡	117 (29.2)	122 (20.4)	0.67 (0.52–0.88)	0.003
Heart failure only	105 (26.2)	96 (16.1)	0.58 (0.44–0.78)	<0.001
Death at any time¶	35 (8.7)	53 (8.9)	1.06 (0.68–1.64)	0.80
Patients with nonischemic cardiomyopathy (NYHA class II)¶	330	491		
Death or heart failure‡	68 (20.6)	65 (13.2)	0.62 (0.44–0.89)	0.01
Heart failure only	62 (18.8)	55 (11.2)	0.59 (0.41–0.87)	0.01
Death at any time¶	18 (5.5)	21 (4.3)	0.87 (0.44–1.70)	0.68

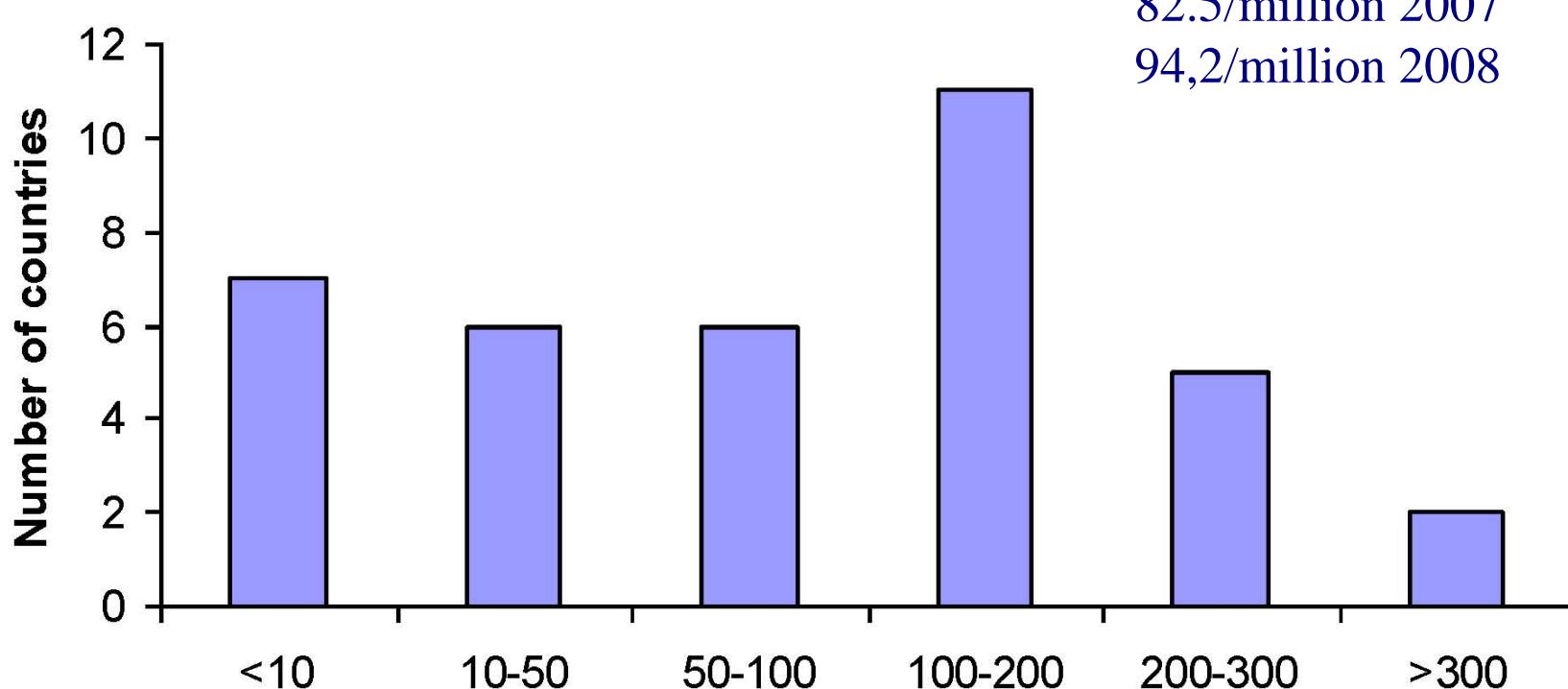
Risk of Death or Heart Failure, According to Selected Clinical Characteristics



ICD implants 1991 -2010



ICD+CRT-D implantation rate per Million 2008



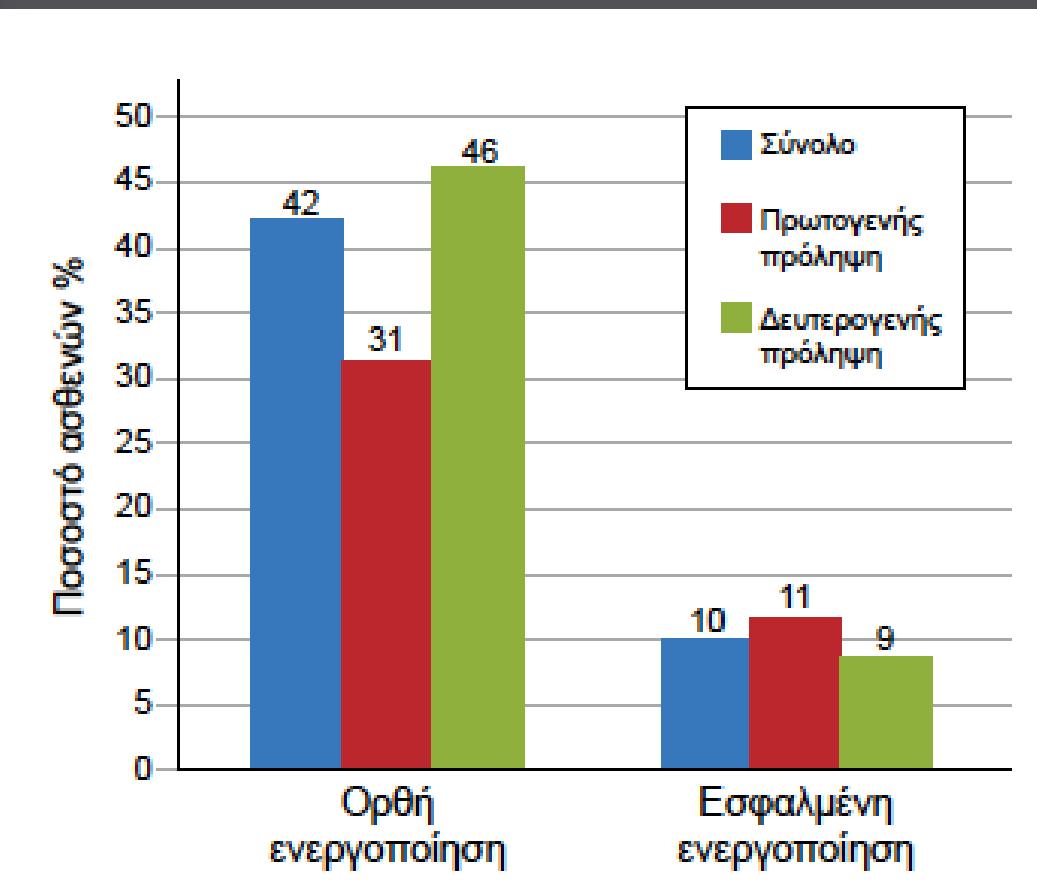
Source: EHRA Whitebook 2009

Κλινική Έρευνα

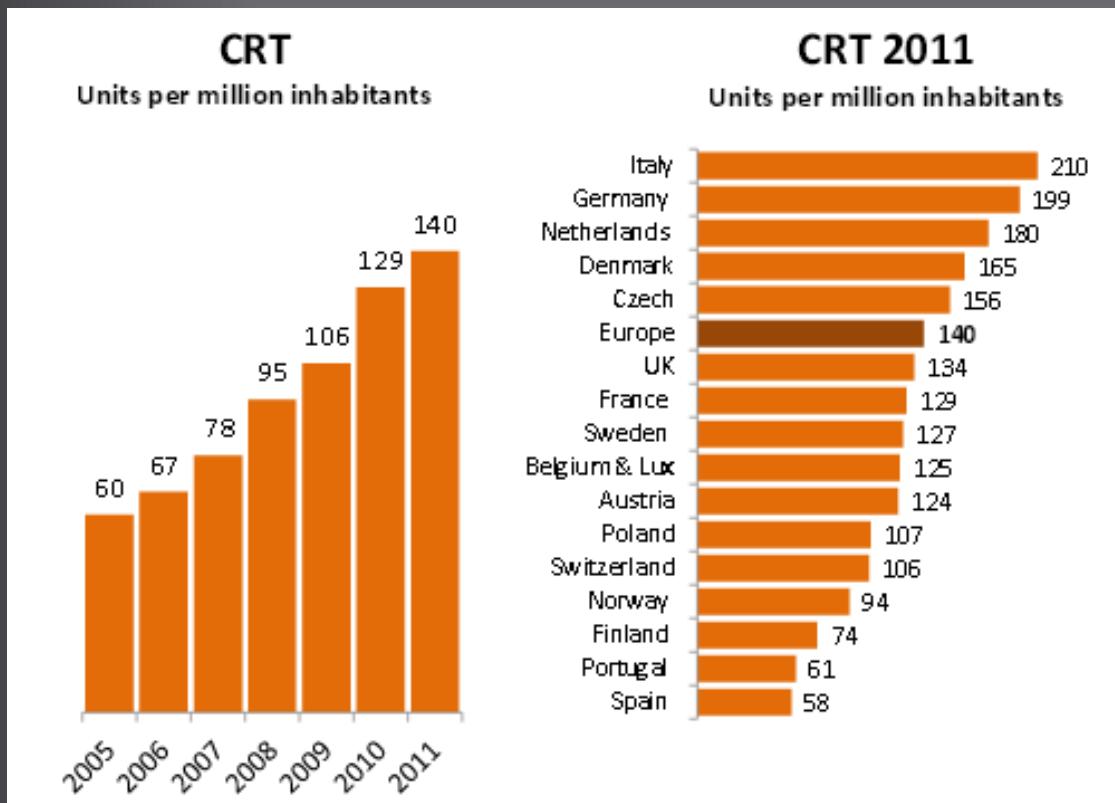
Συμπεράσματα από την Εμπειρία Τοποθέτησης Εμφυτεύσιμου Απινιδωτή σε Ασθενείς Υψηλού Κινδύνου για Αιφνίδιο Καρδιακό Θάνατο σε Τριτοβάθμιο Ελληνικό Κέντρο

ΒΑΣΙΛΕΙΟΣ Π. ΒΑΣΙΛΙΚΟΣ, ΑΘΑΝΑΣΙΟΣ ΒΟΣΝΑΚΙΔΗΣ, ΛΙΛΙΑΝ ΜΑΝΤΖΙΑΡΗ,
ΣΤΕΛΙΟΣ ΠΑΡΑΣΚΕΥΑΪΔΗΣ, ΓΕΩΡΓΙΟΣ ΔΑΚΟΣ, ΓΕΩΡΓΙΟΣ ΣΤΑΥΡΟΠΟΥΛΟΣ,
ΓΕΩΡΓΙΟΣ ΕΥΘΥΜΙΑΔΗΣ, ΣΩΤΗΡΙΟΣ ΜΟΧΛΑΣ, ΓΕΩΡΓΙΟΣ ΛΟΥΡΙΔΑΣ, ΓΕΩΡΓΙΟΣ ΠΑΡΧΑΡΙΔΗΣ,
ΙΩΑΝΝΗΣ Χ. ΣΤΥΛΙΑΔΗΣ

Α' Καρδιολογική Κλινική, Νοσοκομείο ΑΧΕΠΑ, Αριστοτελείο Πανεπιστήμιο Θεσσαλονίκης



Implantation rates of CRT per mill in Europe 2005-2011



CRT is only 15% of all PM implantations in Europe

Συμμετοχή

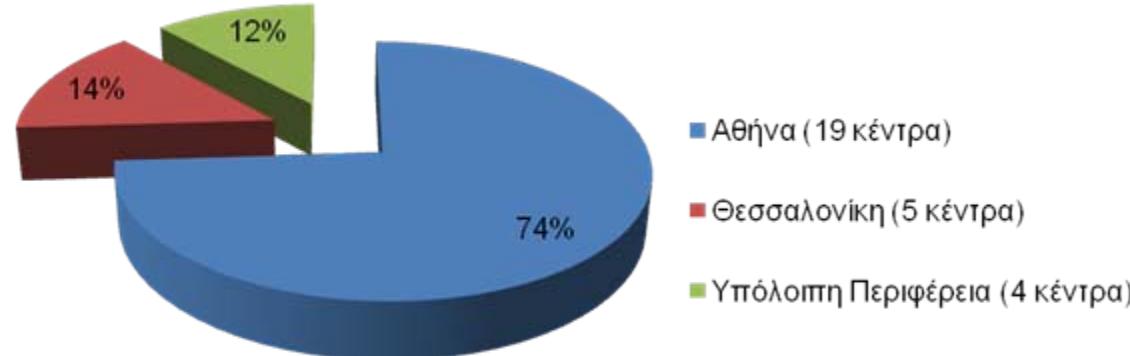
Στο Registry συμμετείχε το 89% των κέντρων που κάνουν εμφυτεύσεις συσκευών CRT στην Ελλάδα.

Συνολικός Αριθμός Εμφυτεύσεων

Κατά το έτος 2013 καταγράφηκαν συνολικά 308 εμφυτεύσεις αμφικοιλιακών βηματοδοτών και απινιδωτών.

Το οποίο αντιστοιχεί σε 28,48 εμφυτεύσεις ανά εκατομμύριο πληθυσμού.

Κατανομή του αριθμού των εμφυτεύσεων ανά περιοχή



Beneficial effect of CRT

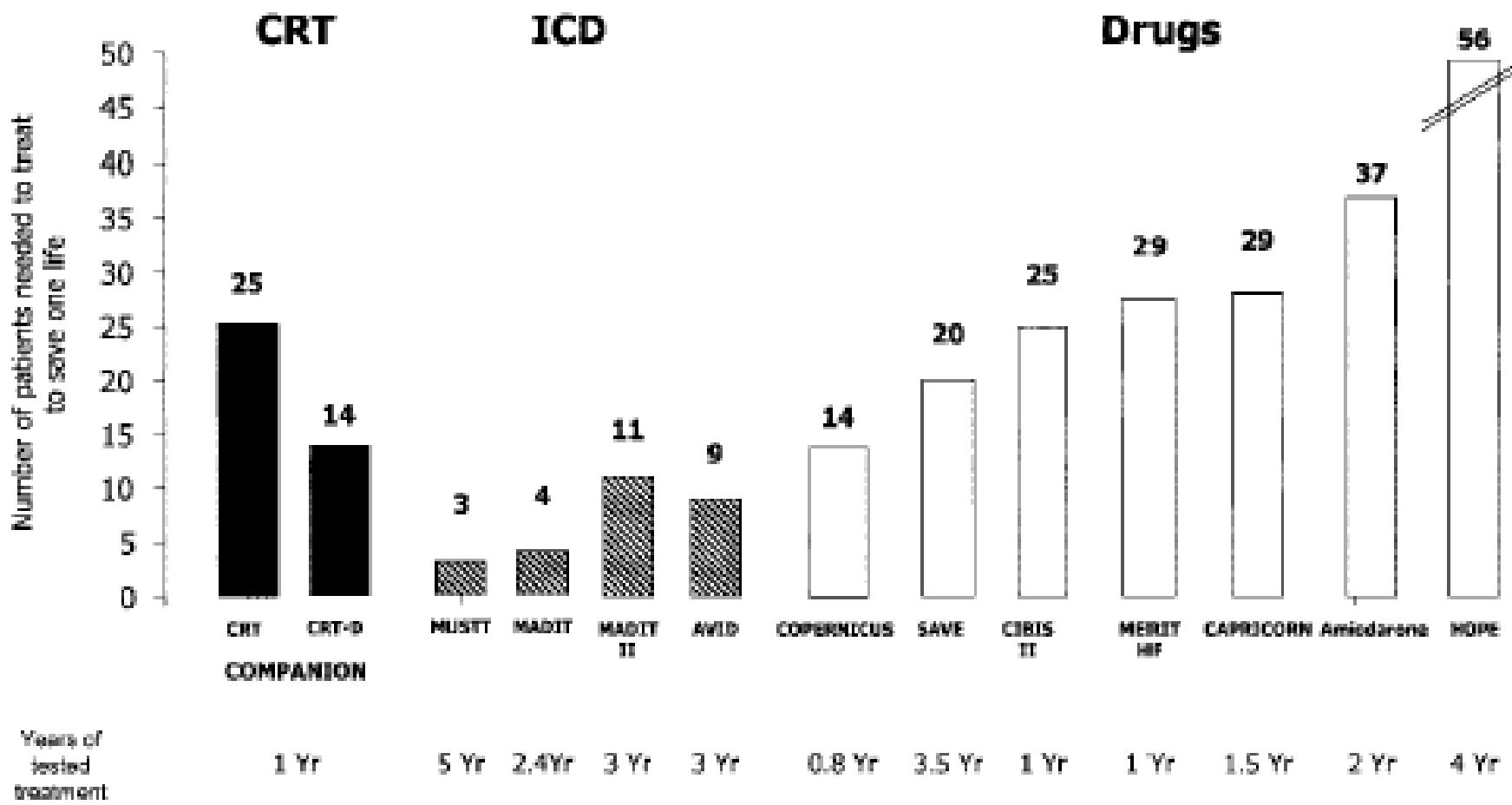
LBBB
QRS > 150 ms
Non-ischemic HF
Mechanical dyssynchrony
LV Lead match
Female gender

QRS < 120 ms
LV Lead mismatch
Ischemic HF
Extensive scar
LV Lead in scar
IVCD



Adverse effect of CRT

$$\text{NNTx years} = \frac{100}{(\% \text{Mortality in Control Group} - \% \text{Mortality in Treatment Group})}$$



Prophylactic Implantable Cardioverter-Defibrillator Therapy in Patients With Left Ventricular Systolic Dysfunction A Pooled Analysis of 10 Primary Prevention Trials

Kumaraswamy Nanthakumar, MD,* Andrew E. Epstein, MD,† G. Neal Kay, MD,‡ Vance J. Plumb, MD,‡
Douglas S. Lee, MD†

Toronto, Ontario, Canada; and Birmingham, Alabama

Strategies to decrease sudden cardiac death in patients with left ventricular systolic dysfunction are evolving. Recent clinical trials have evaluated the role of prophylactic implantable cardioverter-defibrillators (ICDs) in patients with and without additional risk stratifiers. We pooled studies comparing treatment with and without ICDs from published data and presented abstracts, irrespective of QRS duration and etiology of systolic dysfunction. On the basis of the available clinical trials, implantation of an ICD for primary prevention of death provides a 7.9% absolute mortality reduction ($p = 0.003$) in patients with left ventricular (LV) systolic dysfunction who were receiving optimized medical therapy. This finding was not sensitive to the exclusion of any individual trial. The ICD is an effective primary preventative measure in patients who are at risk for death; however, the application of this therapy needs to be individualized for the patient, similar to drug therapies in LV systolic dysfunction. In health care settings without unlimited resources, optimal use of this therapy will require better risk stratification methods or lowering of the initial device cost. (J Am Coll Cardiol 2004;44:2166–72) © 2004 by the American College of Cardiology Foundation