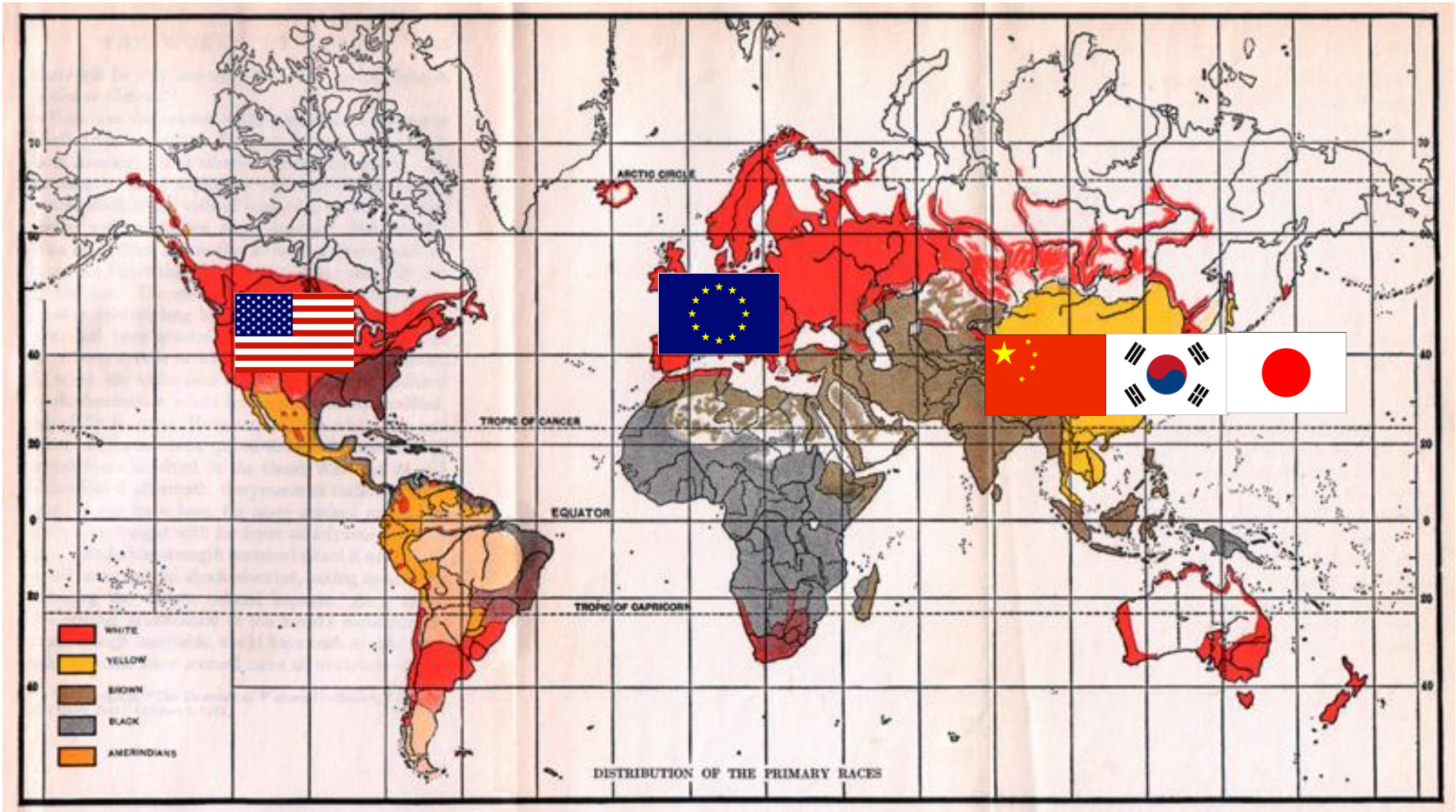# Are ICD & CRT More Effective in Asian HF Patients?
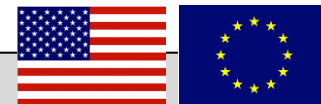
연세의대 세브란스병원 심장내과
엄 재 선

Distribution of the Races

DISTRIBUTION OF THE PRIMARY RACES

WHITE
YELLOW
BROWN
BLACK
AMERINDIANS

ICD for Primary Prevention

in Asian HF Patients?

2016 ESC guidelines for HF.
Eur Heart J 2016;37:2129-200
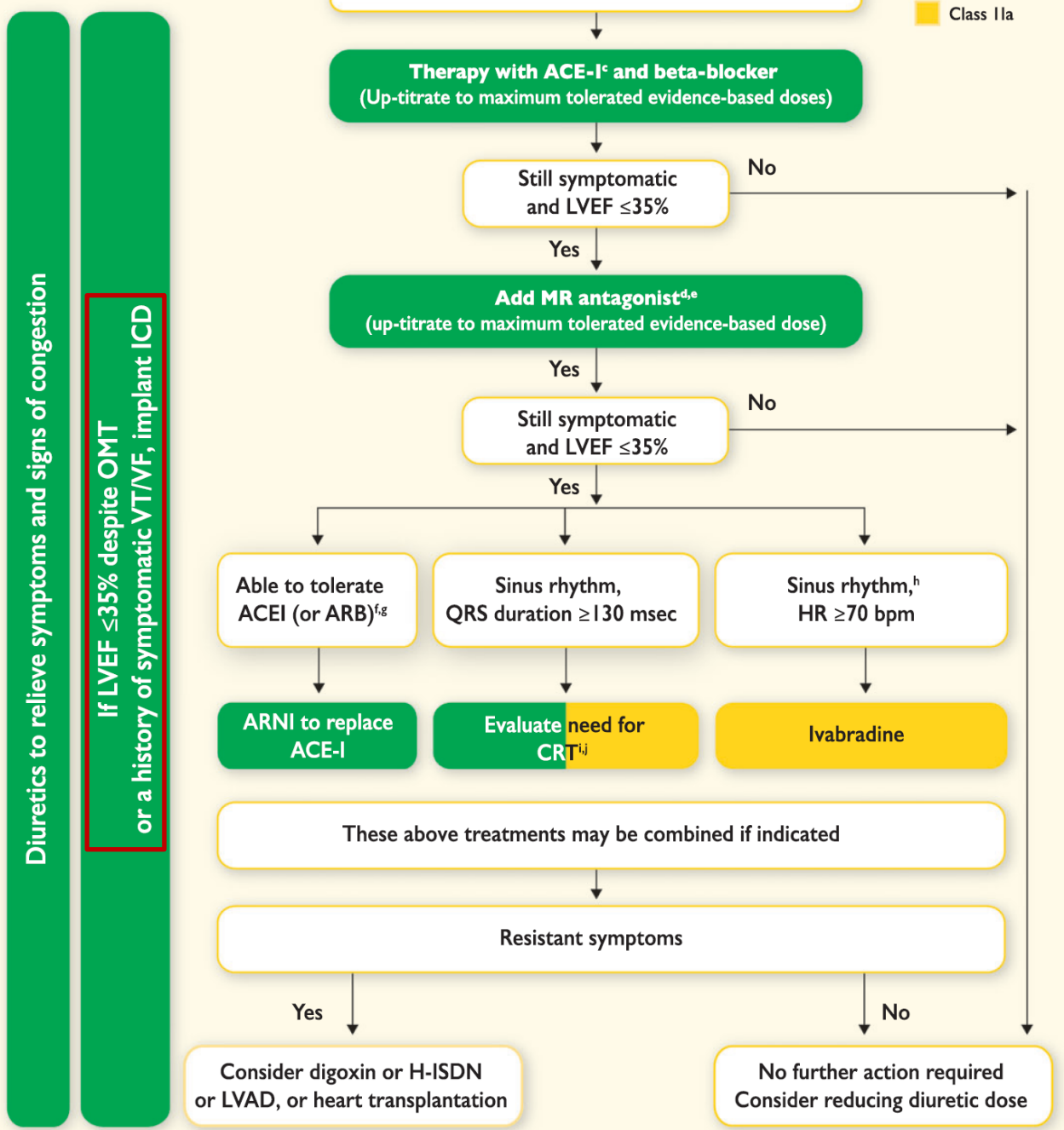
Primary Prevention ICD in Ischemic HF
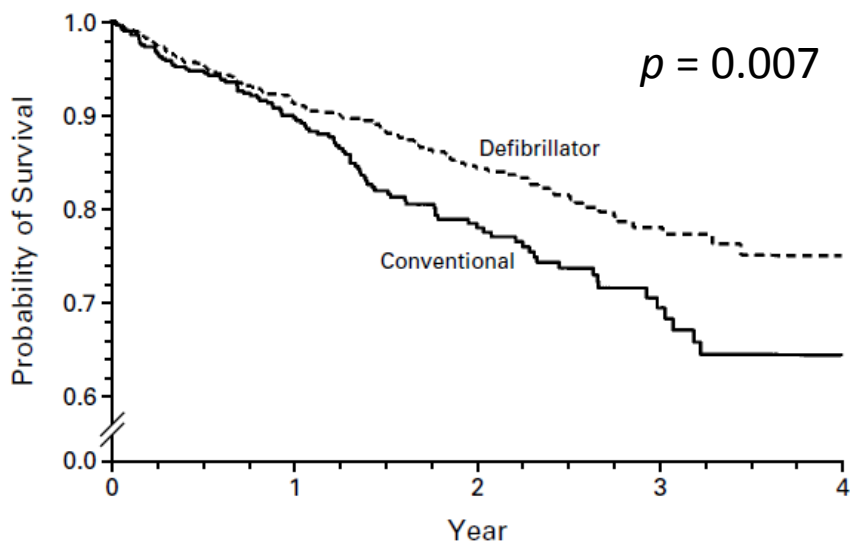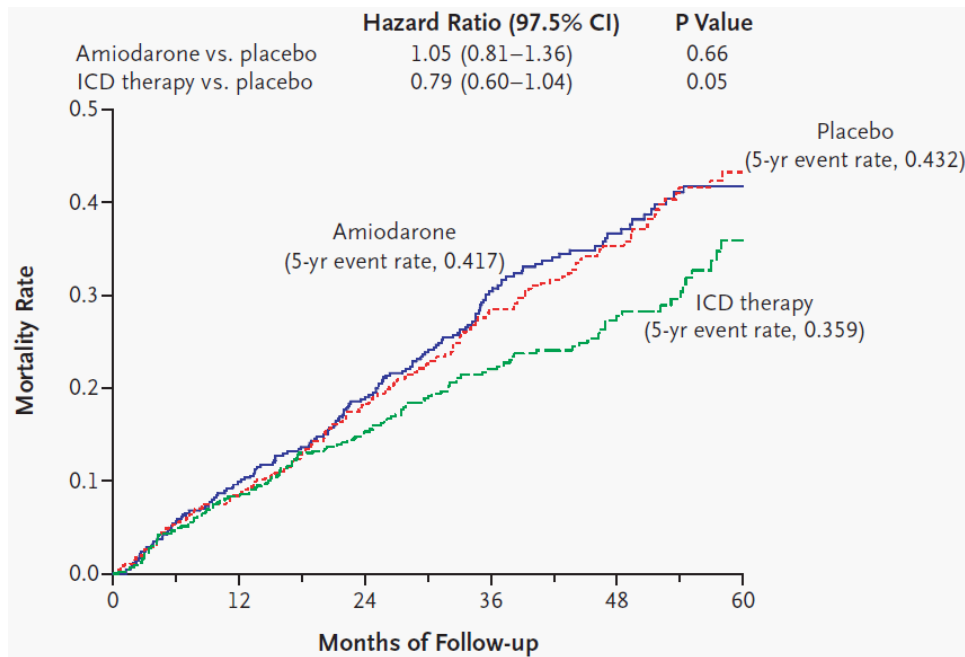
MADIT-II

SCD-HeFT

MADIT-II. N Engl J Med 2002;346:877-83   *SCD-HeFT. N Engl J Med 2005;352:225-37*

Primary Prevention ICD in Nonischemic HF

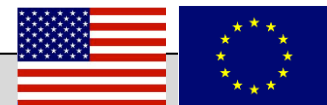| Study or Subgroup	ICD Total	Control Total	Weight	Hazard Ratio IV, Random, 95% CI	Year
CAT	50	54	12.0%	0.87 [0.54, 1.38]	2002
AMIOVIRT	52	51	6.8%	0.92 [0.49, 1.72]	2003
COMPANION	268	126	8.3%	0.50 [0.28, 0.88]	2004
DEFINITE	229	229	11.2%	0.65 [0.40, 1.06]	2004
SCD-HeFT	398	394	18.4%	0.73 [0.50, 1.07]	2005
DANISH	556	560	43.3%	0.87 [0.68, 1.11]	2016
Total (95% CI)	1553	1414	100.0%	0.78 [0.66, 0.92]	

Heterogeneity: Tau² =0.51); I² = 0%
Test for overall effect:

Hazard Ratio IV, Random, 95% CI — 0.2 0.5 1 2 5 — Favors ICD Favors control
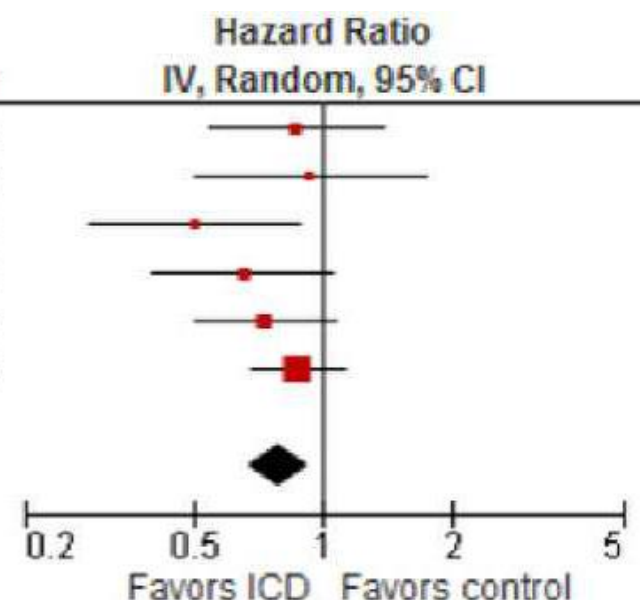
J Cardiovasc Electrophysiol 2017 [Epub ahead of print]

Primary Prevention ICD in HF in Korea

Table 2. Outcomes of the Patients in Each Group

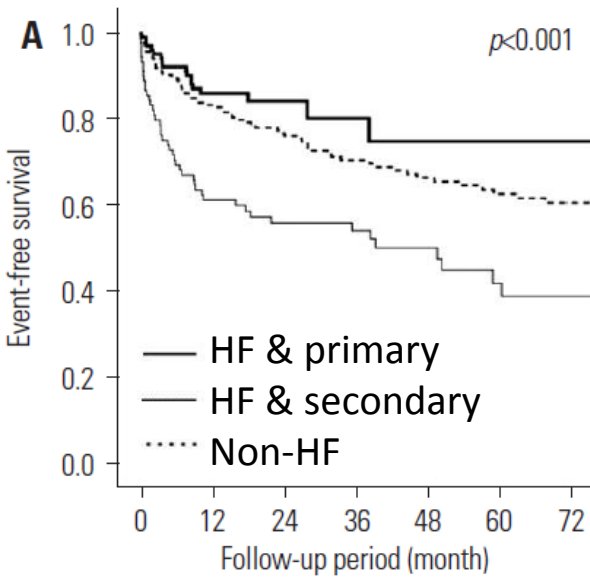|	Group 1 (n=118)	Group 2 (n=93)	Group 3 (n=194)	*p* value
Follow-up period (months)	31.7±33.5	61.8±42.7	73.9±54.4	<0.001*
Patients who experienced appropriate ICD therapy, annual (%)	6.1	10.4	5.9	<0.001[†]
Patients who experienced inappropriate ICD therapy, annual (%)	3.2	4.2	3.2	0.171
Annual mortality (%)	4.5	3.8	0.4	<0.001[‡]

ICD, implantable cardioverter-defibrillator.

*The three groups are significantly different from each other, [†]Group 2 is significantly different from groups 1 and 3, [‡]Group 3 is significantly different from groups 1 and 2.

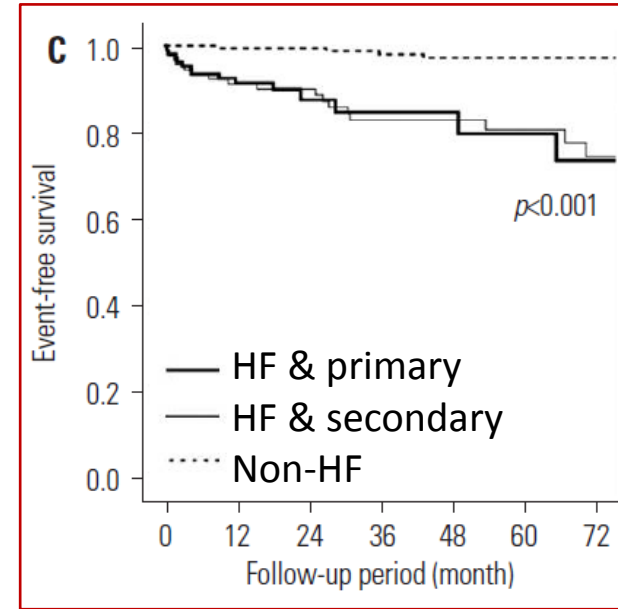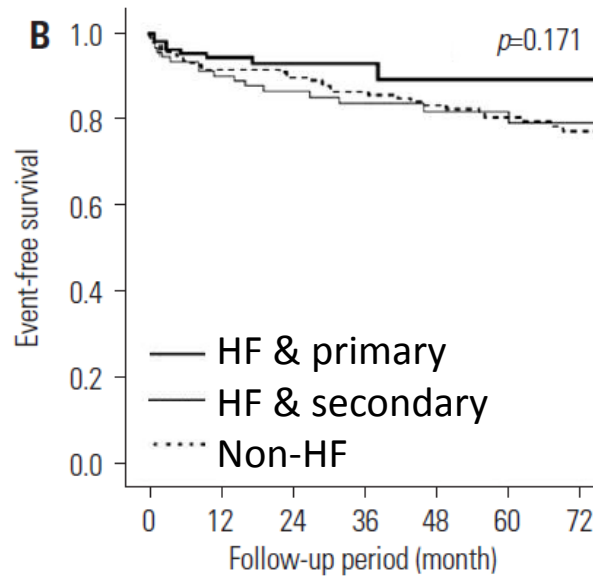*Severance ICD/CRT Registry. Yonsei Med J. 2017;58:514-20*

Primary Prevention ICD in HF in Korea

A. Appropriate ICD therapy **B. Inappropriate ICD therapy** **C. Mortality**

Severance ICD/CRT Registry. Yonsei Med J. 2017;58:514-20

All-cause Mortality in HF in Korea
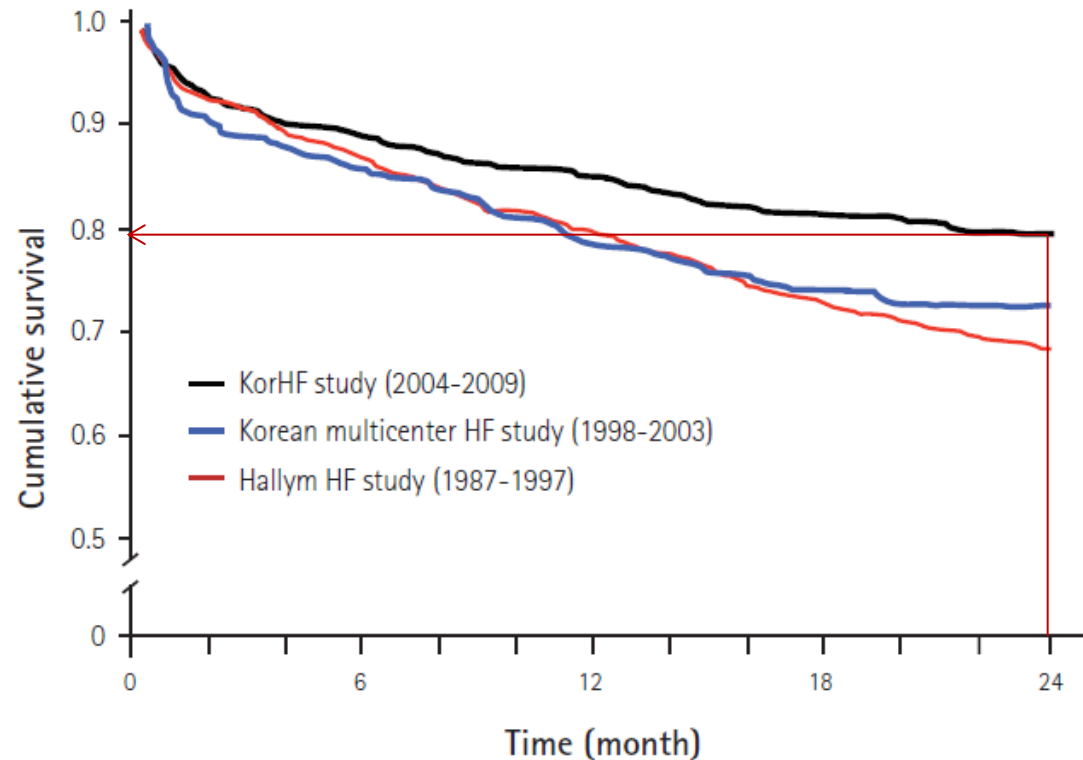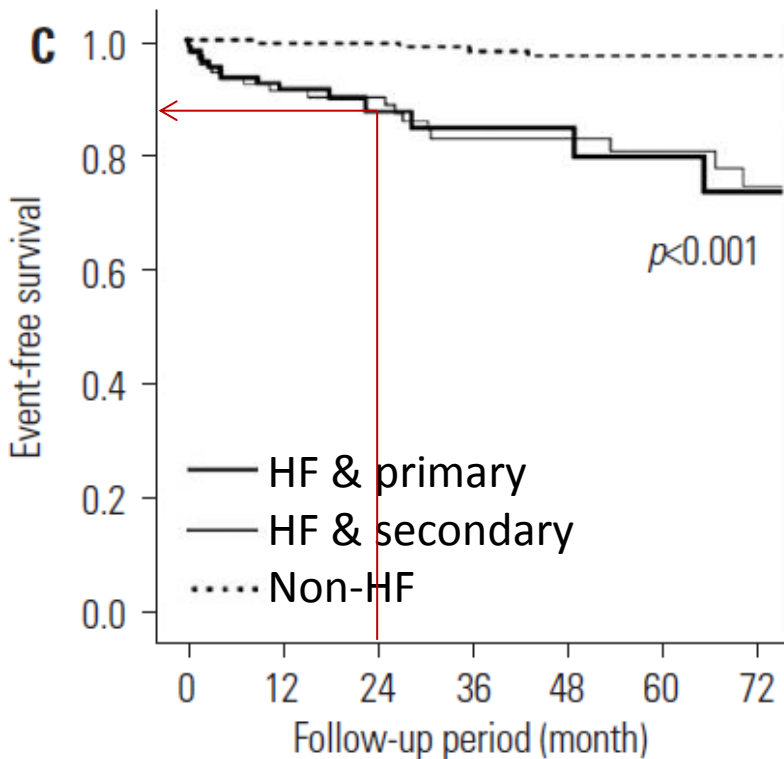
Primary Prevention ICD in NIHF & IHF in Korea

A. Appropriate ICD therapy   **B. Inappropriate ICD therapy** **C. Mortality**

Severance ICD/CRT Registry. Unpublished data

Primary Prevention ICD in Japan

A. Appropriate ICD therapy

B. Mortality

An Y, et al. J Arrhythm. 2017;33:17-22
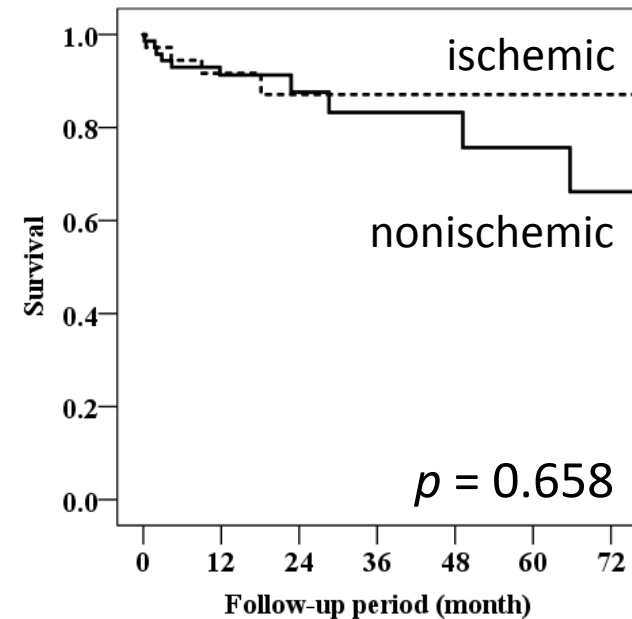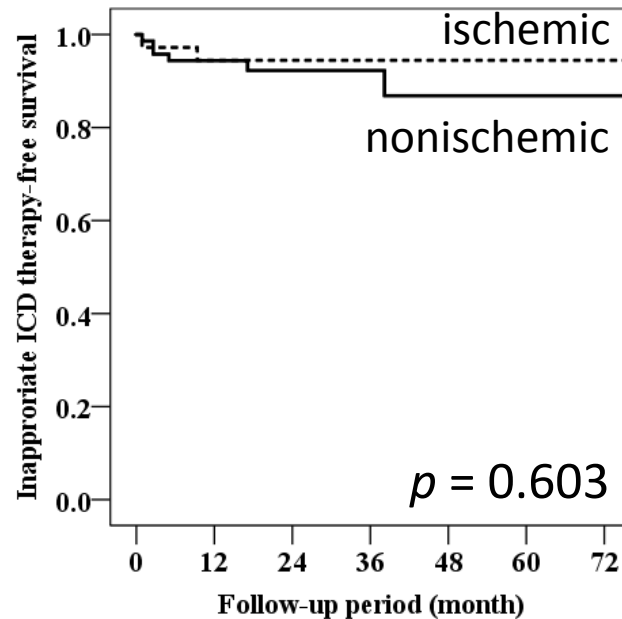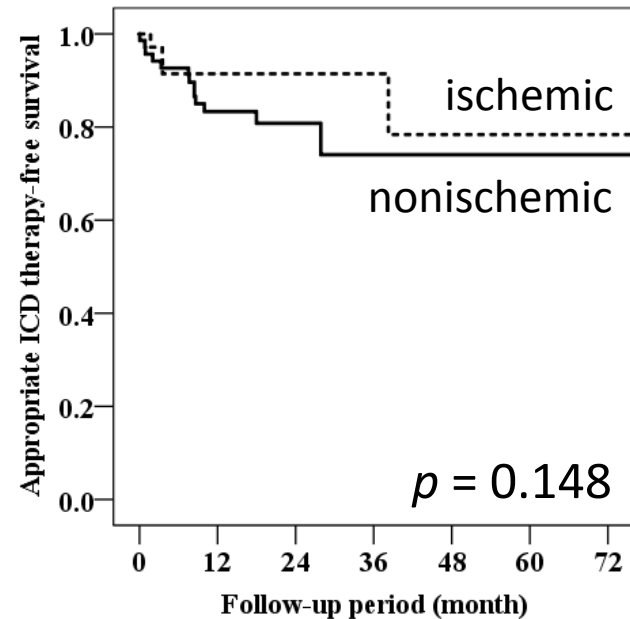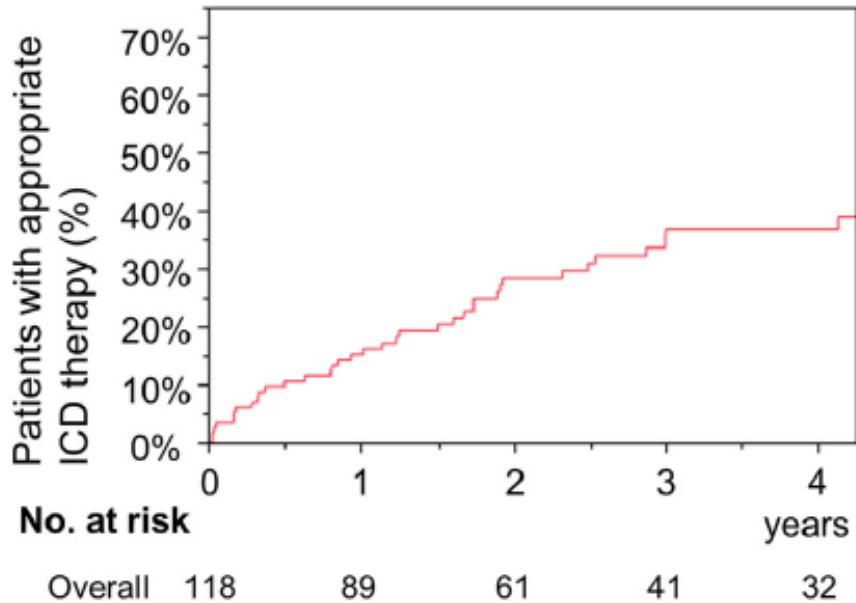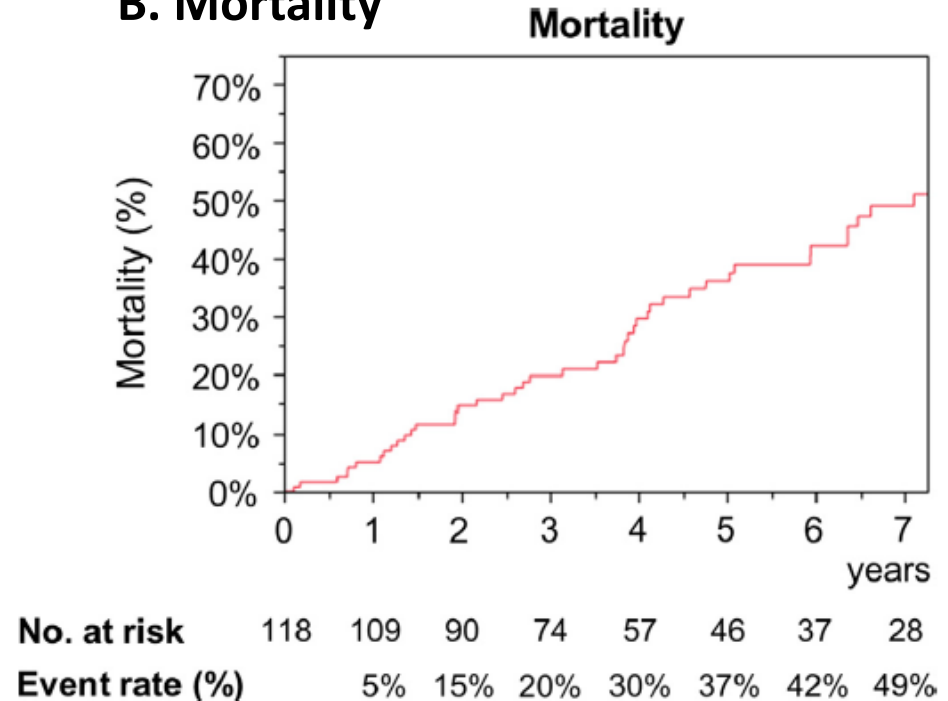
Original article

Primary prevention of sudden cardiac death by implantable cardioverter-defibrillator therapy in Chinese patients with heart failure: a single-center experience

CHEN Tai-bo, CHENG Kang-an, GAO Peng, CHENG Zhong-wei, FAN Jing-bo, JIANG Xiu-chun and FANG Quan

Background   An implantable cardioverter-defibrillator (ICD) has been suggested for heart failure patients for primary prevention of sudden cardiac death. However, few data have been reported on the application of ICD as primary prevention of sudden cardiac death in China. We evaluated the value of primary prevention ICD therapy in Chinese patients with heart failure.
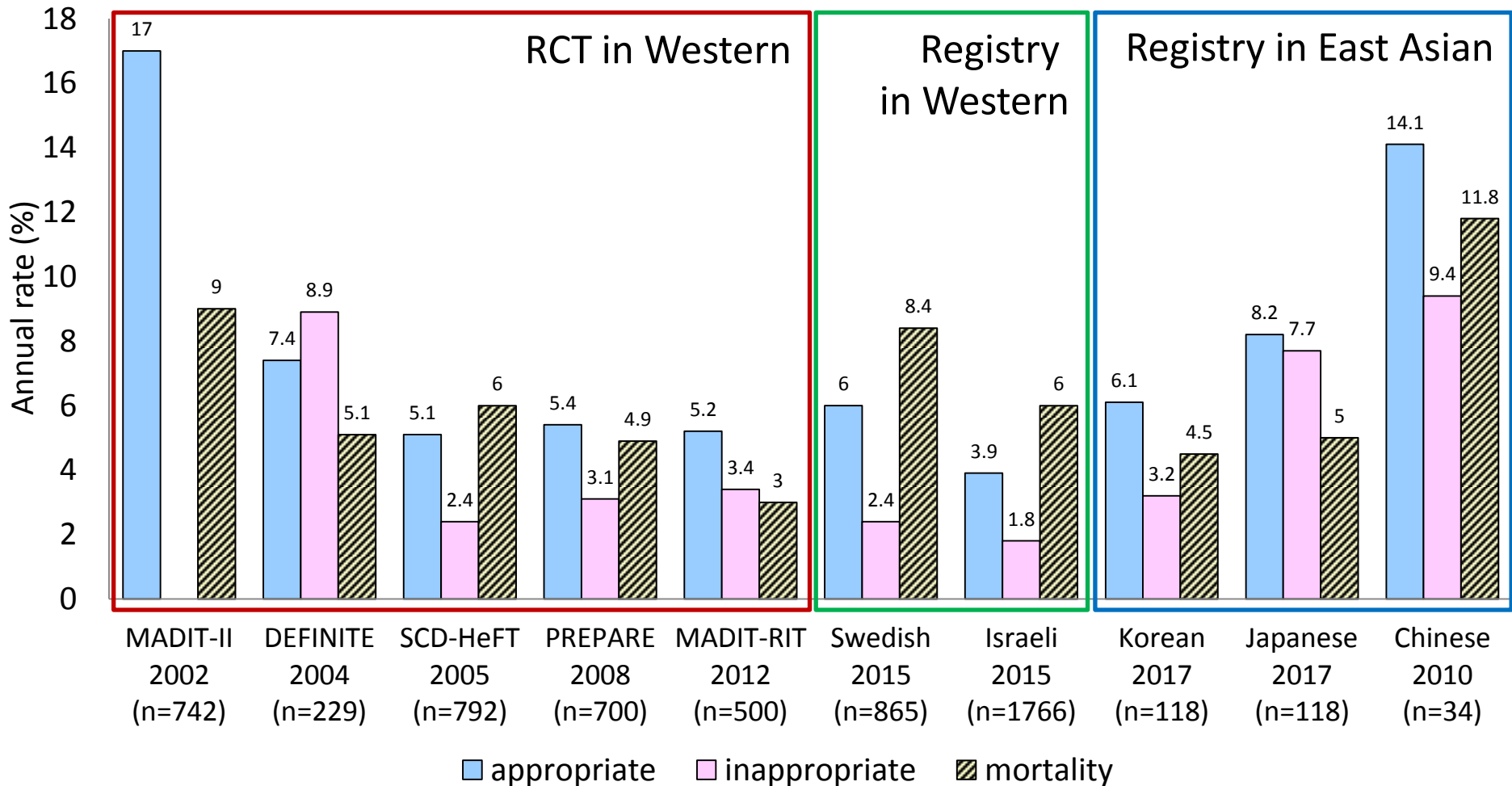
Methods   Thirty-four patients at an average age of (60.2±13.7) years seen in Peking Union Medical College Hospital were treated with ICD implantation for primary prevention of sudden cardiac death from November 2005 to July 2009. Single-chamber ICDs were implanted in 16 (47.0%) cases, and dual-chamber or cardiac resynchronization therapy defibrillators in 18 (53.0%) cases. The patients had an average left ventricular ejection fraction of (26.9±5.5)% (11% to 35%), of which 18 (53.0%) patients had ischemic cardiomyopathy and 16 (47.0%) patients had non-ischemic cardiomyopathy. All patients were followed up at three months after the implantation and every six months thereafter or when prompted by an ICD event.

Results   There were five (14.7%) deaths, including two of heart failure and three with a non-cardiac course, during an average follow-up of (15.0±11.9) months. Forty-one ICD therapy events were recorded, including 19 (46.3%) appropriate ICD therapies in six patients and 22 (53.7%) inappropriate ICD therapies in four patients with single chamber leads. Inappropriate ICD therapies were mainly due to supraventricular tachyarrhythmias, especially atrial fibrillation. Patients with ischemic cardiomyopathy and non-ischemic cardiomyopathy did not differ in the incidence of either appropriate or inappropriate therapy.

Conclusions   ICD for primary prevention of sudden cardiac death in China prevents patients from arrhythmia death. Relatively high incidence of inappropriate therapies highlights the importance of an atrial lead.

Primary Prevention ICD Studies

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CRT in Asian HF Patients?

2016 ESC guidelines for HF.
Eur Heart J 2016;37:2129-200
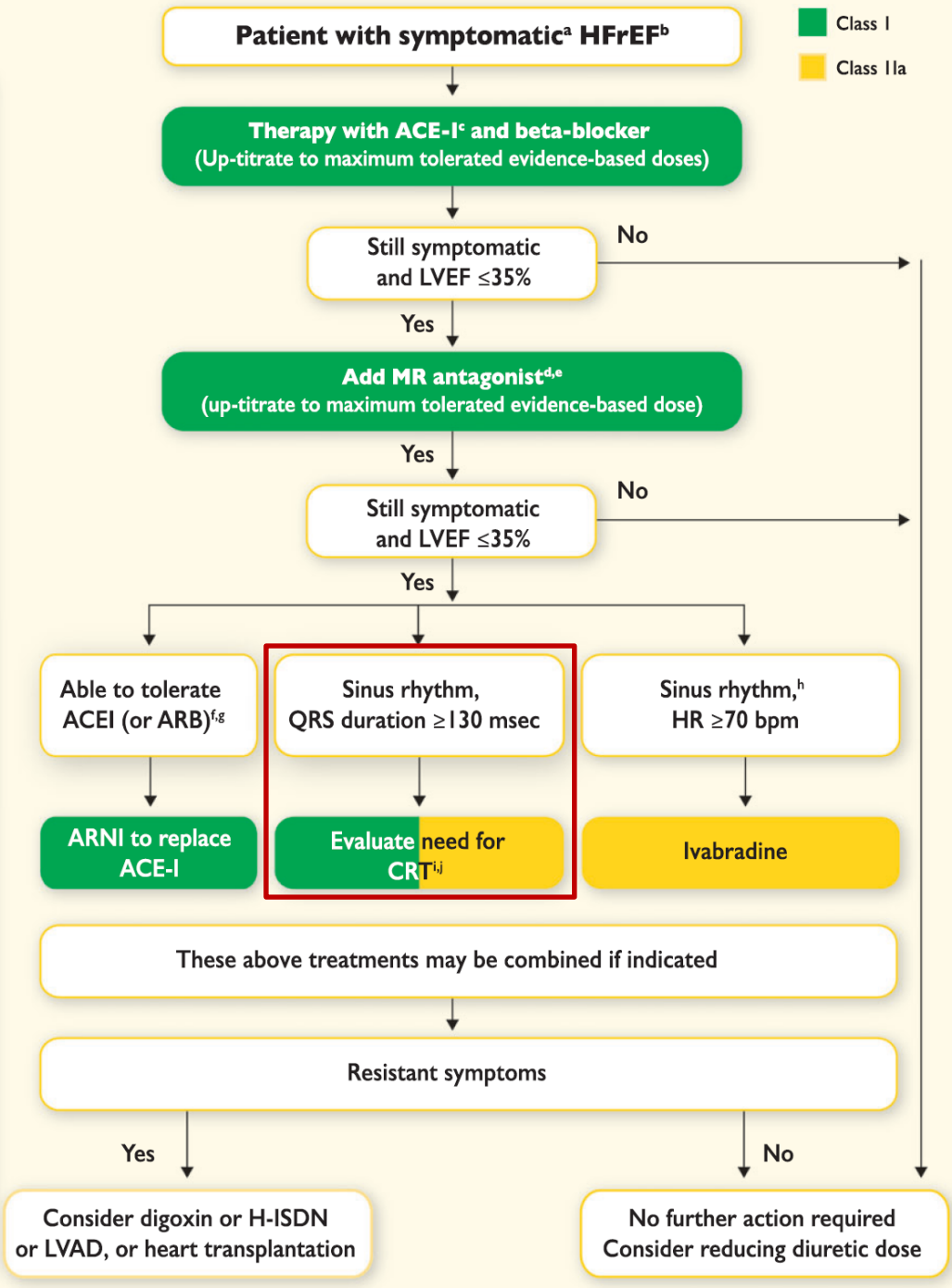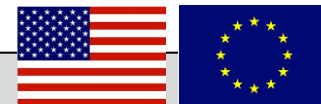
Outcomes in CRT Patients in US & EU
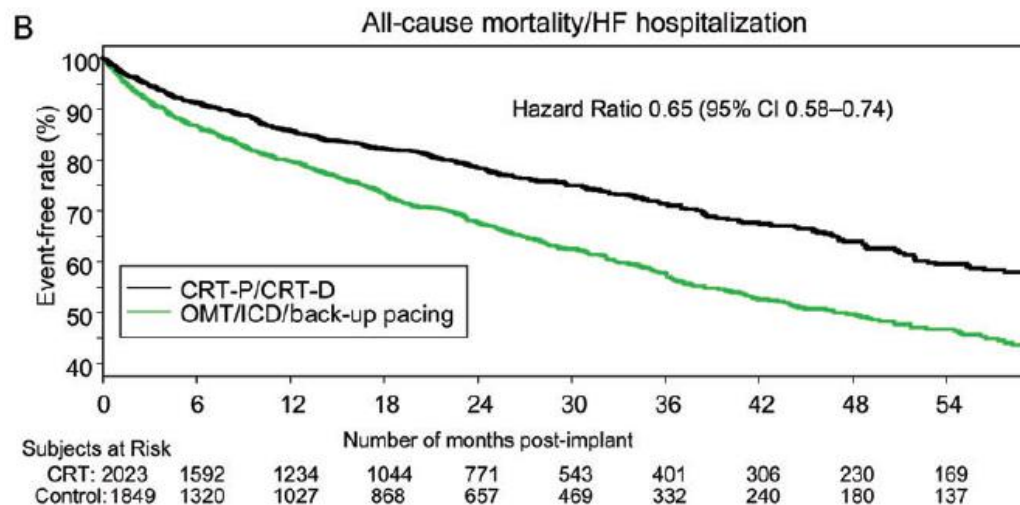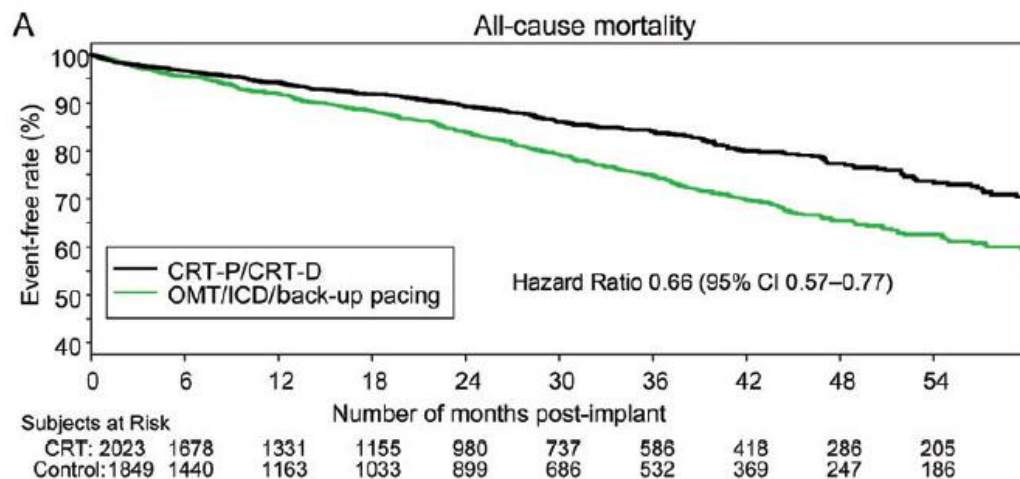
Meta-analysis of MIRACLE, CARE-HF, REVERSE & RAFT.
Eur Heart J 2013;34:3547-56

Outcomes in CRT Patients in US & EU

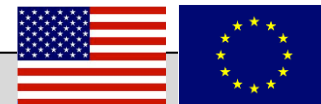| Study or Subgroup	CRT-D Events	Total	ICD Events	Total	Weight	Odds Ratio M-H, Fixed, 95% CI	Year	Odds Ratio M-H, Fixed, 95% CI
RAFT 2010	193	708	253	730	44.0%	0.71 [0.56, 0.88]	2010	
MADIT-CRT 2014	187	1089	185	731	44.5%	0.61 [0.49, 0.77]	2014	
REVERSE 2015	67	419	41	191	11.5%	0.70 [0.45, 1.07]	2015	
Total (95% CI)		2216		1652	100.0%	0.66 [0.57, 0.77]		
Total events	447		479					

Heterogeneity: Chi^2 = 0.83, df = 2 (P = 0.66); I^2 = 0%
Test for overall effect: Z = 5.34 (P < 0.00001)

Favours CRT-D   Favours ICD]

WP Sun, et al. Heart Fail Rev 2016;21:447-53

Outcomes in CRT Patients in US & EU
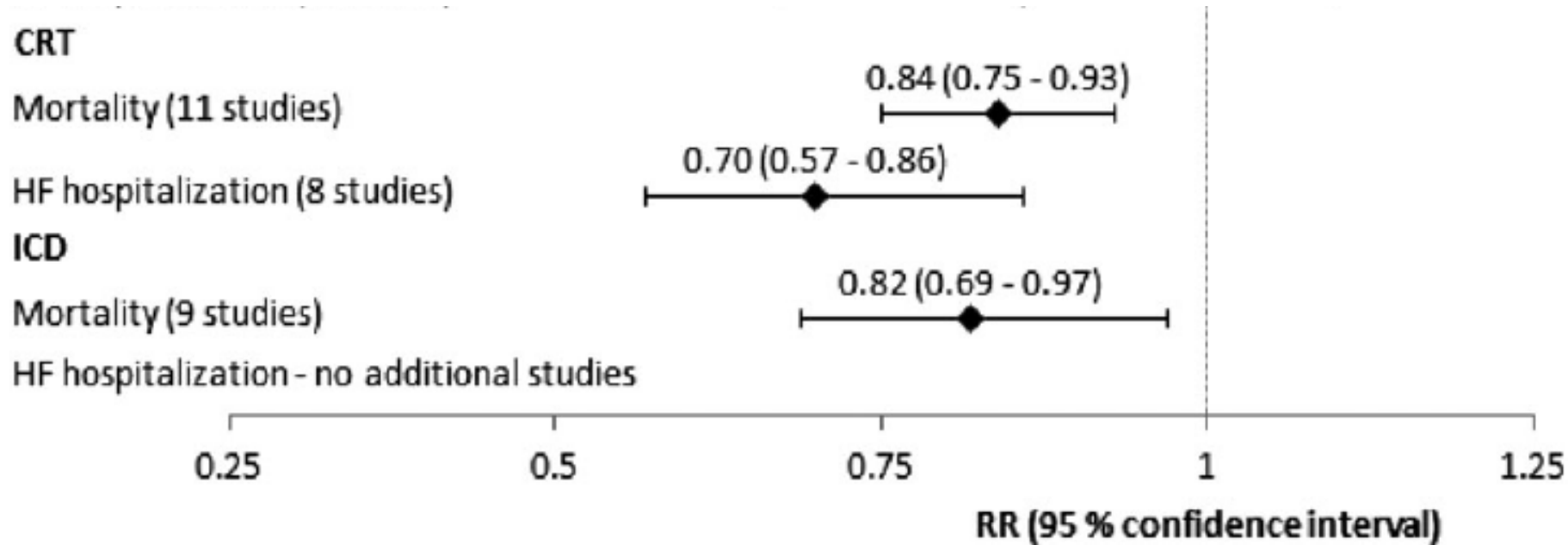
Outcomes in CRT Patients in Korea
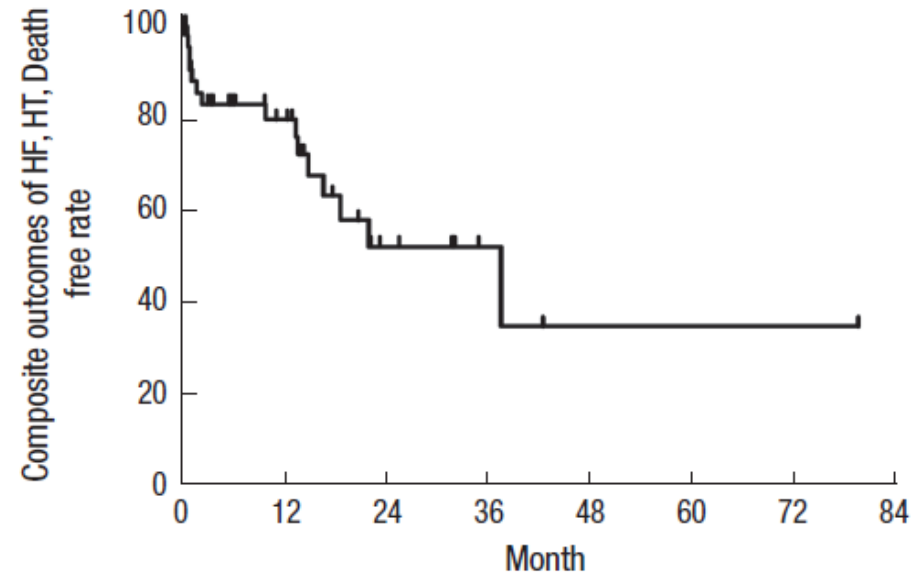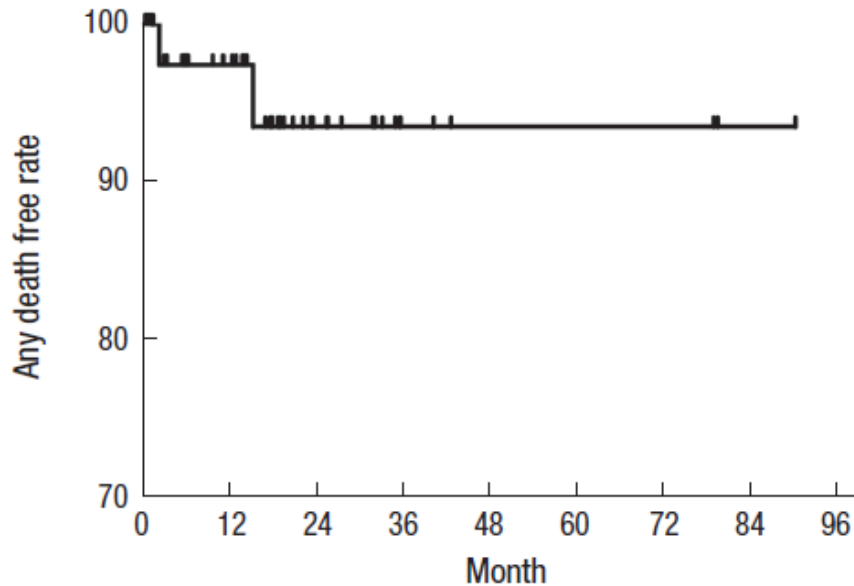
SH Lee, et al. J Korean Med Sci 2014;29:1651-7
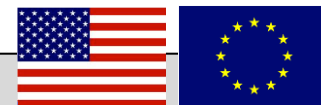
|	Study	% Non-responders	Based on
Studies that quoted 'Up to X%'	K. O'Connor et al.	Up to 40	Does not specify
	M. Pu and W.T. Abraham	Up to one-third	Does not specify
	M. Becker et al.	Up to one-third	Echo and clinical
	N. Reinsch et al.	Up to 30	Clinical
	M. Sermesant et al.	Up to 30	Echo and clinical
	N.R. Van de Veire et al.	Up to 30	Echo and clinical
	C. Yperburg et al.	Up to 50	Echo
	J. Holzmeister and C. Leclercq	Up to 35	Clinical
	Mean % non-responders: up to 35.2		Minimum response rate: 64.8%
Studies that quoted 'X%'	J. Janoušek et al.	18.5	Echo and clinical
	M.G. Scheffer et al.	20.5	Echo and clinical
	A. Auricchio et al.	30	Does not specify
	S. Kirubakaran et al.	30	Does not specify
	R. Manzke et al.	70	Does not specify
	M. Moonen et al.	30	Does not specify
	N.M. van Hemel and M. Scheffer	30	Echo and clinical
	R. Chung et al.	30	Does not specify
	H. Wiggers et al.	30	Clinical
	R.J. van Bommel et al.	38	Echo and clinical
	R. Gradaus et al.	30	Echo and clinical
	G.B. Bleeker et al.	30	Clinical

CRT Responsiveness in Korea

Clinical Response to CRT in Japan
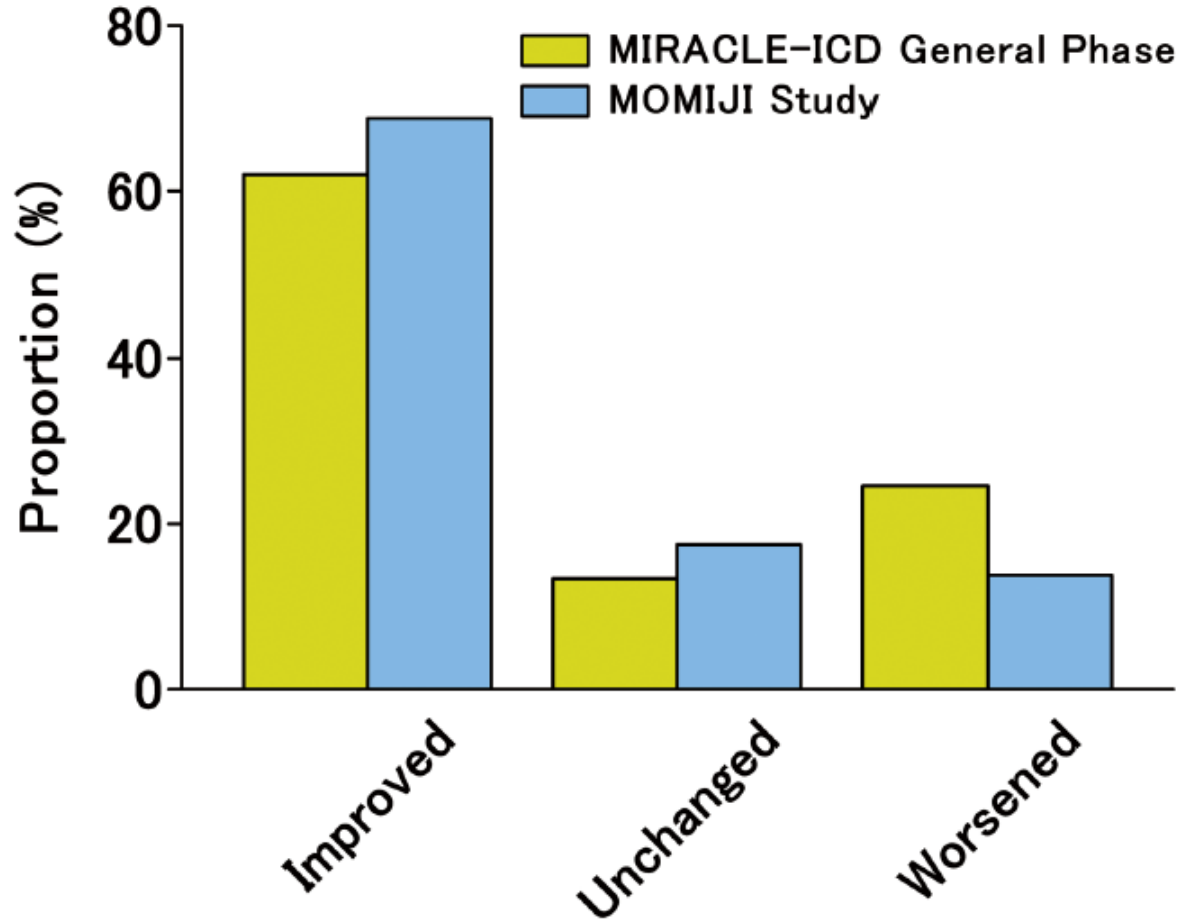
MOMIJI study. Circ J 2012;76:1911-9
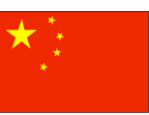
A new score system for predicting response to cardiac resynchronization therapy

Yu Kang[1,2]*, Leilei Cheng[2]*, Jie Cui[3], Lin Li[2], Shengmei Qin[3], Yangang Su[3], Jialiang Mao[1], Xue Gong[2], Haiyan Chen[2], Cuizhen Pan[2], Xuedong Shen[1], Ben He[1], Xianhong Shu[2]

Background: *The aim of this study was to establish a score system derived from clinical, echocardiographic and electrocardiographic indexes and evaluate its clinical value for cardiac resynchronization therapy (CRT) patient selection.*

Methods: *Ninety-three patients receiving CRT were enrolled. A patient selection score system was generated by the clinical, echocardiographic and electrocardiographic parameters achieving a significant level by univariate and multivariate Cox regression model. The positive response to CRT was a left ventricular end systolic volume decrease of ≥ 15% and not reaching primary clinical endpoint (death or re-hospitalization for heart failure) at the end of follow-up.*

Results: *Thirty-nine patients were CRT non-responders (41.94%) and 54 were responders (58.06%). A 4-point score system was generated based on tricuspid annular plane systolic excursion (TAPSE), longitudinal strain (LS), and complete left bundle branch block (CLBBB) combined with a wide QRS duration (QRSd). The sensitivity and specificity for prediction of a positive response to CRT at a score > 2 were 0.823 and 0.850, respectively (AUC: 0.922 95% CI 0.691–0.916, p < 0.001).*

Conclusions: *A patient selection score system based on the integration of TAPSE, LS and CLBBB combined with a wide QRSd can help to predict positive response to CRT effectively and reliably. (Cardiol J 2015; 22, 2: 179–187)*

Responsiveness & Mortality in CRT

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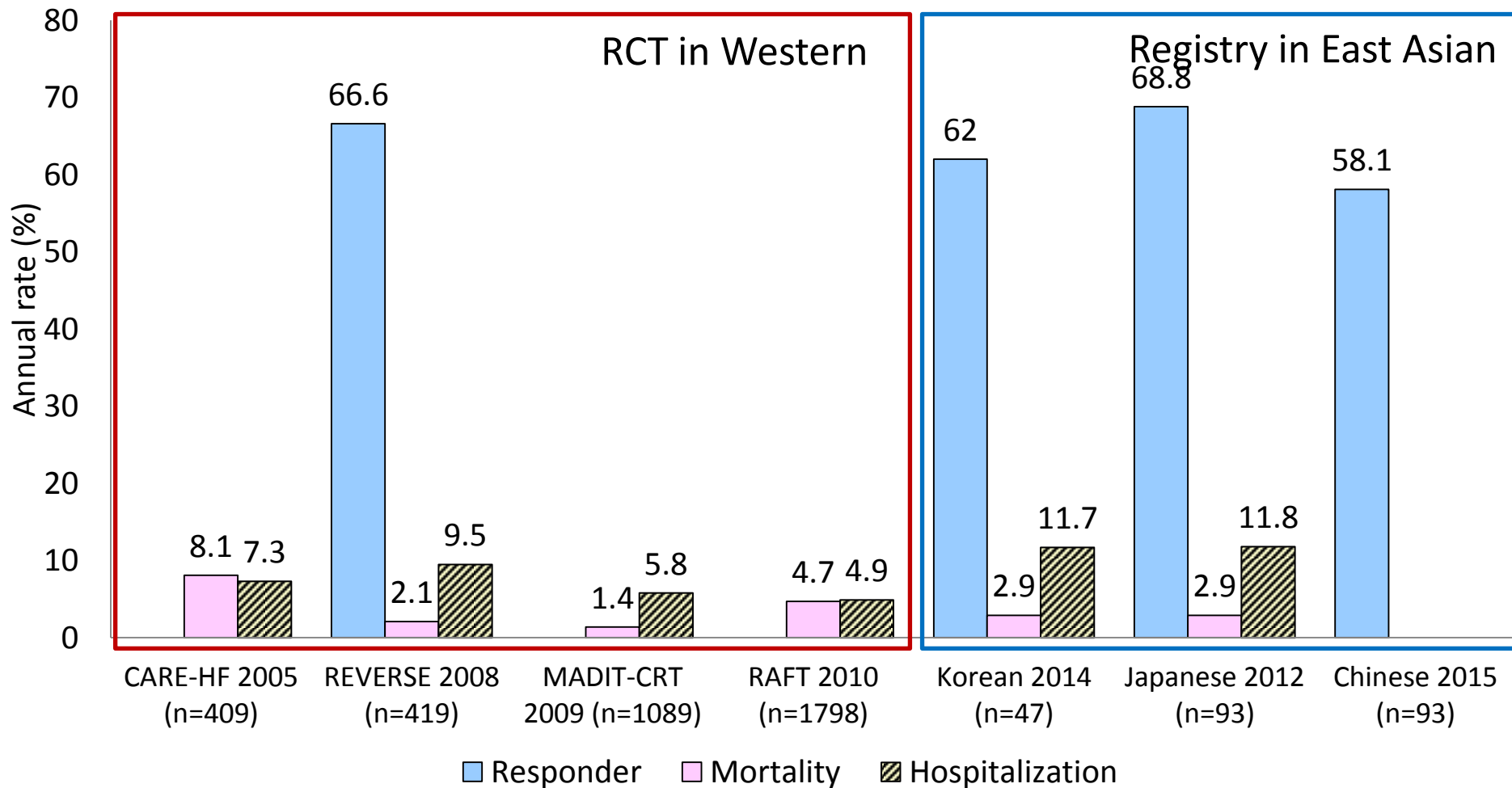
Summary

- 아시아 환자에서 ICD, CRT의 대규모 전향적 연구 결과는 부족하다.

- 아시아 환자에서 ICD, CRT의 효과는 적어도 미국, 유럽의 환자에 비하여 못 하지는 않은 것 같다.

- 앞으로 아시아 환자에서 ICD, CRT에 대한 대규모 연구가 필요하다.

경청해 주셔서 감사합니다.

Primary Prevention ICD in HF Patients

■ An ICD is recommended for primary prevention of SCA in patients with HF (NYHA II-III) & EF ≤ 35% despite ≥ 3 months of OMT.

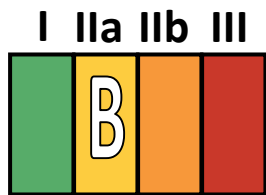I IIa IIb III

A

- IHD (I-A)

I IIa IIb III

B

- DCMP (I-B)

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CRT in Patients with HF

I IIa IIb III

A

I IIa IIb III
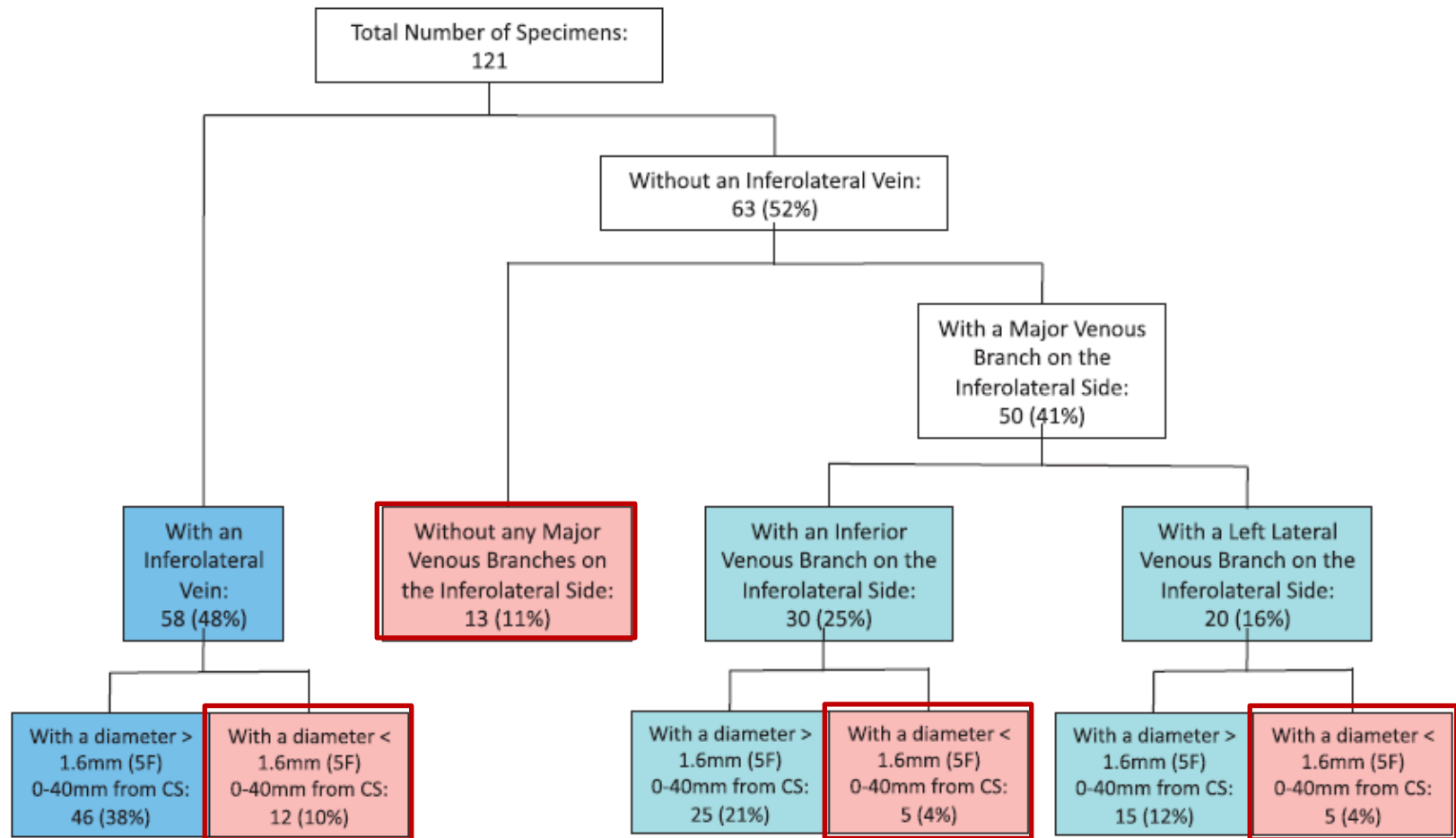
B

I IIa IIb III

B

I IIa IIb III

B

- CRT is recommended for symptomatic patients with HF in sinus rhythm and with EF ≤ 35% despite OMT

  - QRS ≥ 150 ms & LBBB (I-A)

  - QRS ≥ 150 ms & non-LBBB (IIa-B)

  - QRS of 130-149 ms & LBBB (I-B)

  - QRS of 130-149 ms & non-LBBB (IIb-B)
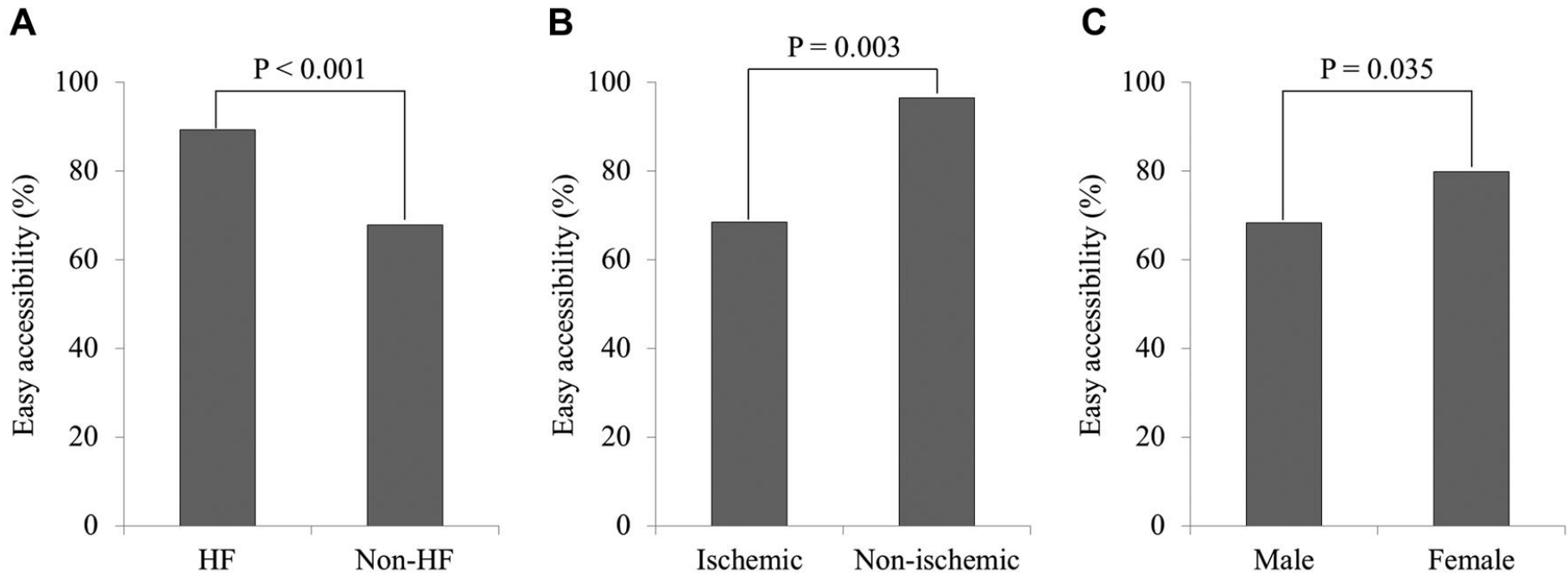
2016 ESC guidelines for HF. Eur Heart J 2016;37:2129-200

Accessibility to Cardiac Veins for CRT

JH Spencer, et al. Heart Rhythm 2014;11:282-8

Accessibility to Cardiac Veins for CRT

JS Uhm, et al. PACE 2016;39:513-21