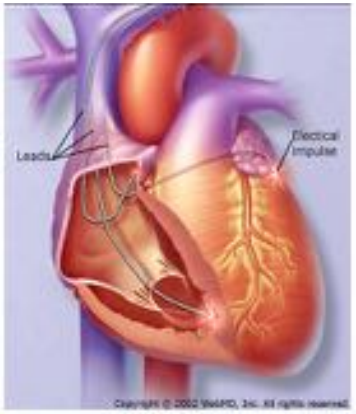
Venice Arrhythmias 2105

October 16 - 18
14th EDITION 2015

CONTEMPORARY AND CONTROVERSIAL ISSUES IN CARDIAC PACING

Upgrade from Conventional PM to CRT: When and How (CRT-P vs CRT-D)

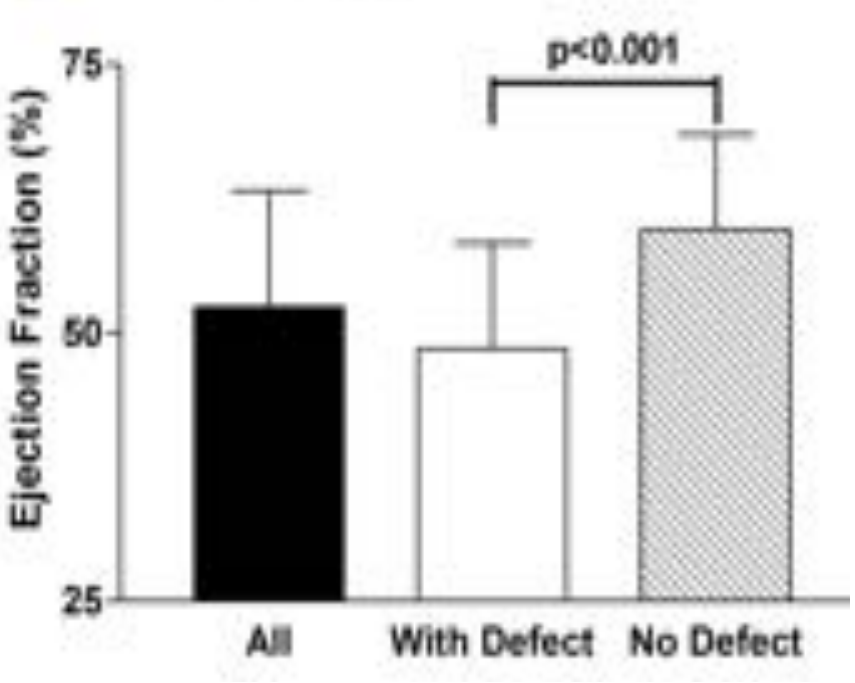


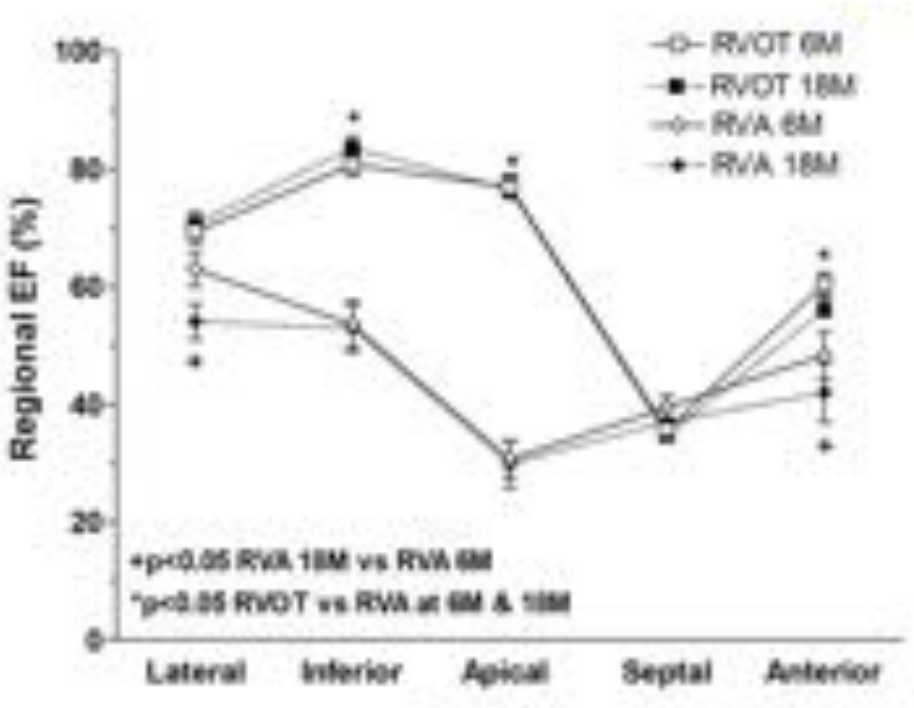
Hung-Fat Tse, MD, PhD
Chair, Professor of Cardiovascular Medicine
William MW Mong Professor in Cardiology
The University of Hong Kong
Queen Mary Hospital
Hong Kong

MY CONFLICTS OF INTEREST ARE

- Scientific Advisory Board: St. Jude Medical, Boston Scientific; Medtronic
- Scientific Research: St. Jude Medical, Boehringer Ingelheim; MSD, Bayer; Sanofi; GSK; BMS Pfizer; Boston Scientific; Medtronic
- Speaker's Bureau: St. Jude Medical, Boehringer Ingelheim; MSD, Bayer; Sanofi; GSK; BMS Pfizer; Boston Scientific; Medtronic, Daiichi

Long-term Effect of RVA Pacing



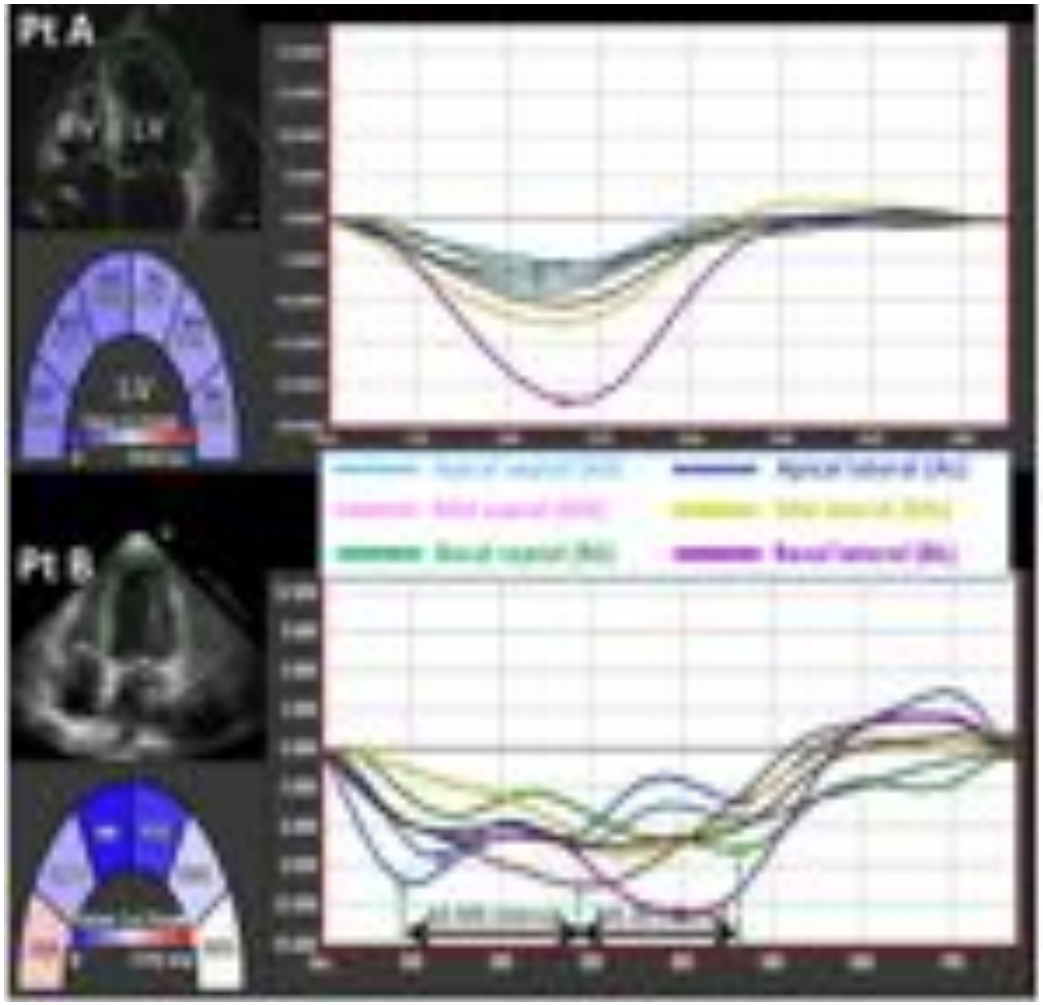


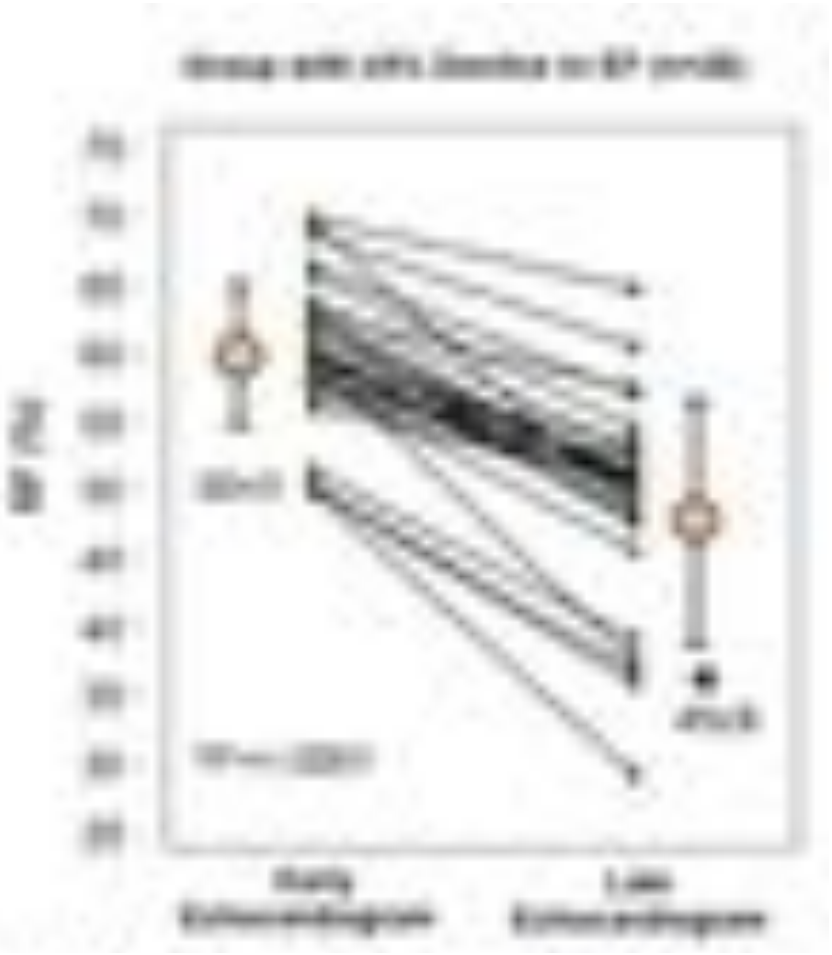
- Permanent RVA pacing →↑myocardial perfusion abnormalities
- Myocardial perfusion abnormalities→ regional wall dyskinesia and impair LVEF

Tse HF, et al. J Am Coll Cardiol 1997

Tse HF, et al. J Am Coll Cardiol 2002

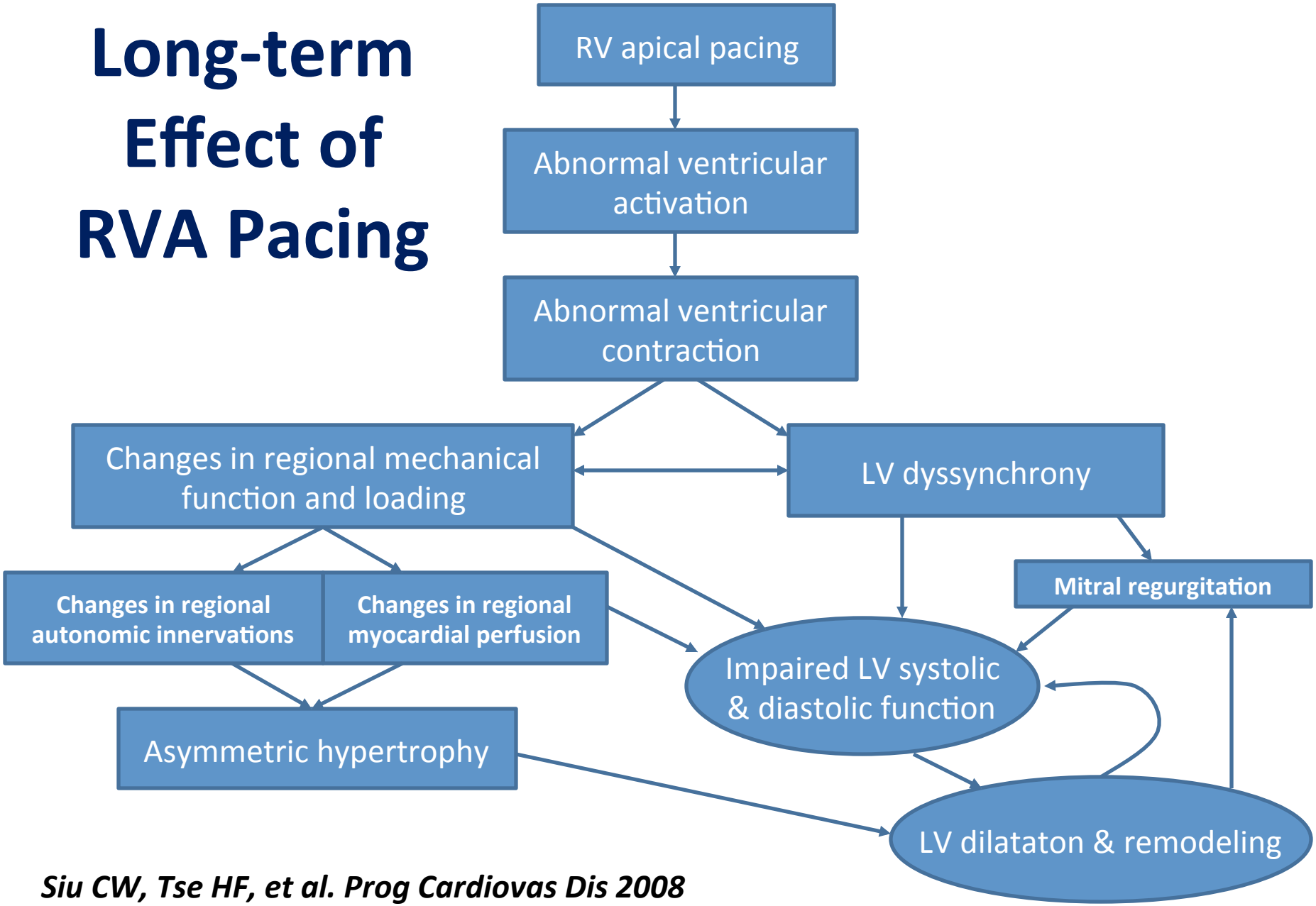
Worsening of LV Function with Chronic RVA Pacing Induced Dyssynchrony





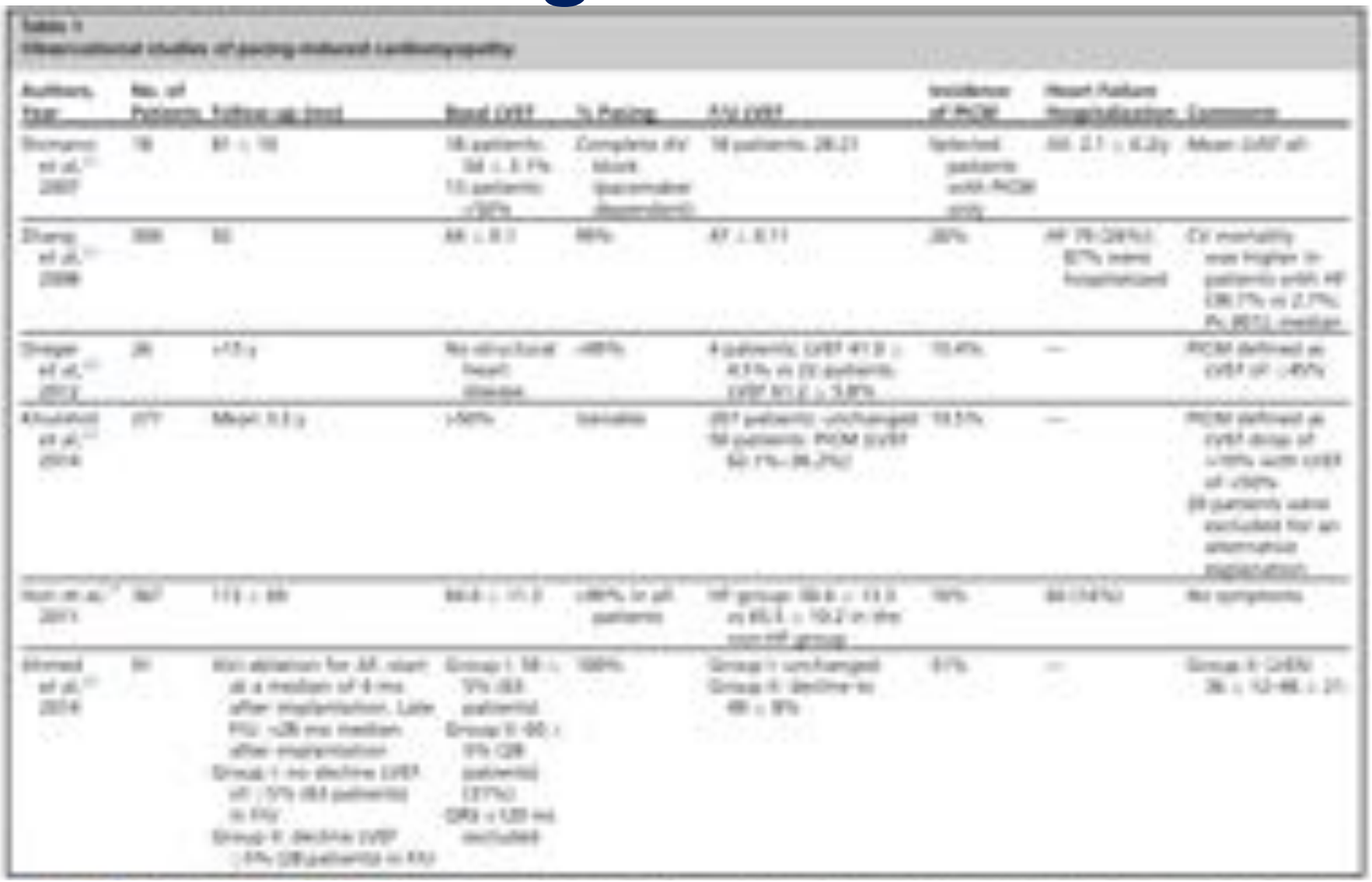
Ahmed M, et al. Heart Rhythm 2014

Long-term Effect of RVA Pacing



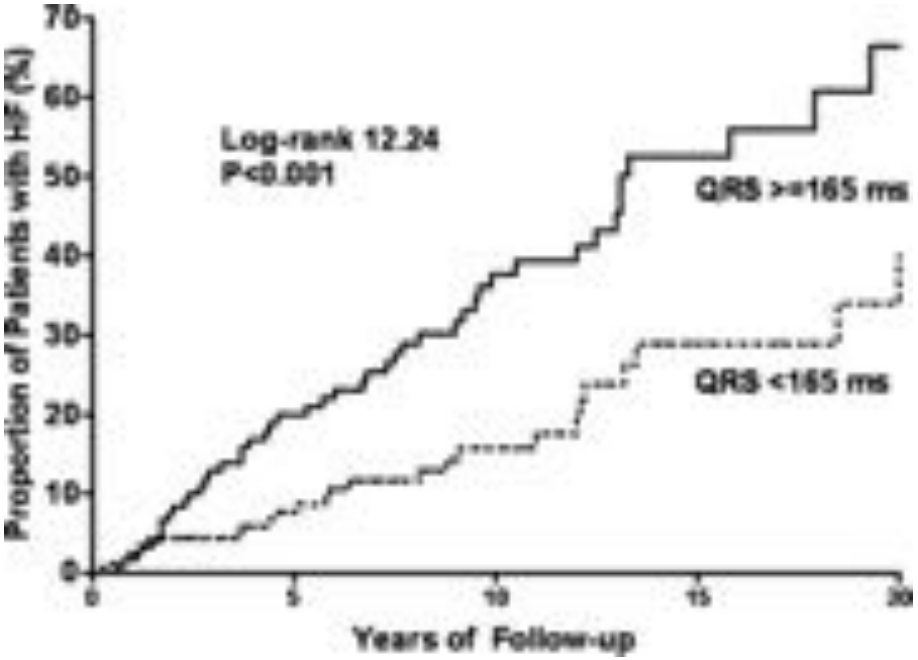
Siu CW, Tse HF, et al. Prog Cardiovas Dis 2008

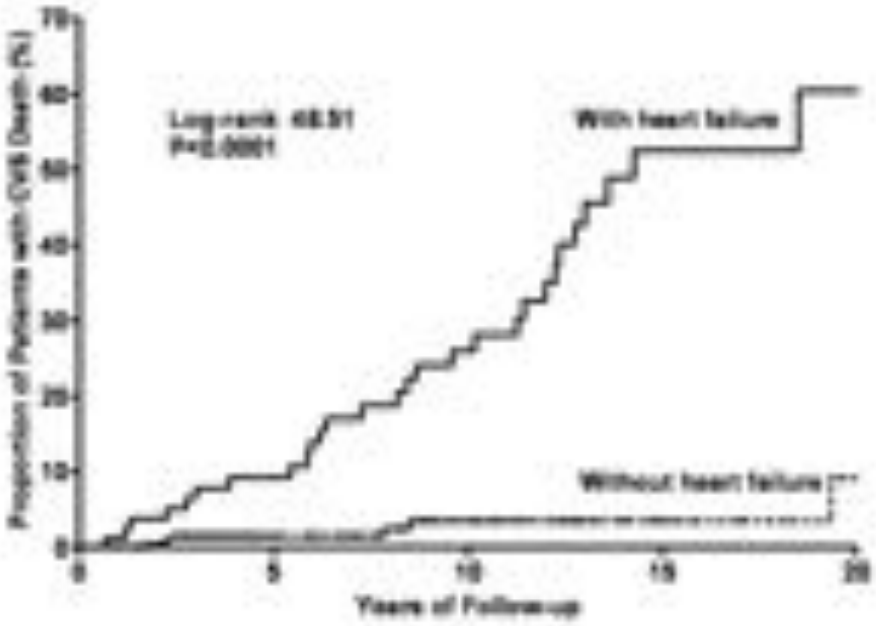
RV Pacing-Induced CMP



Herweg B, et al. Card Electrophysiol Clin. 2015

New Onset HF after Permanent RV Pacing

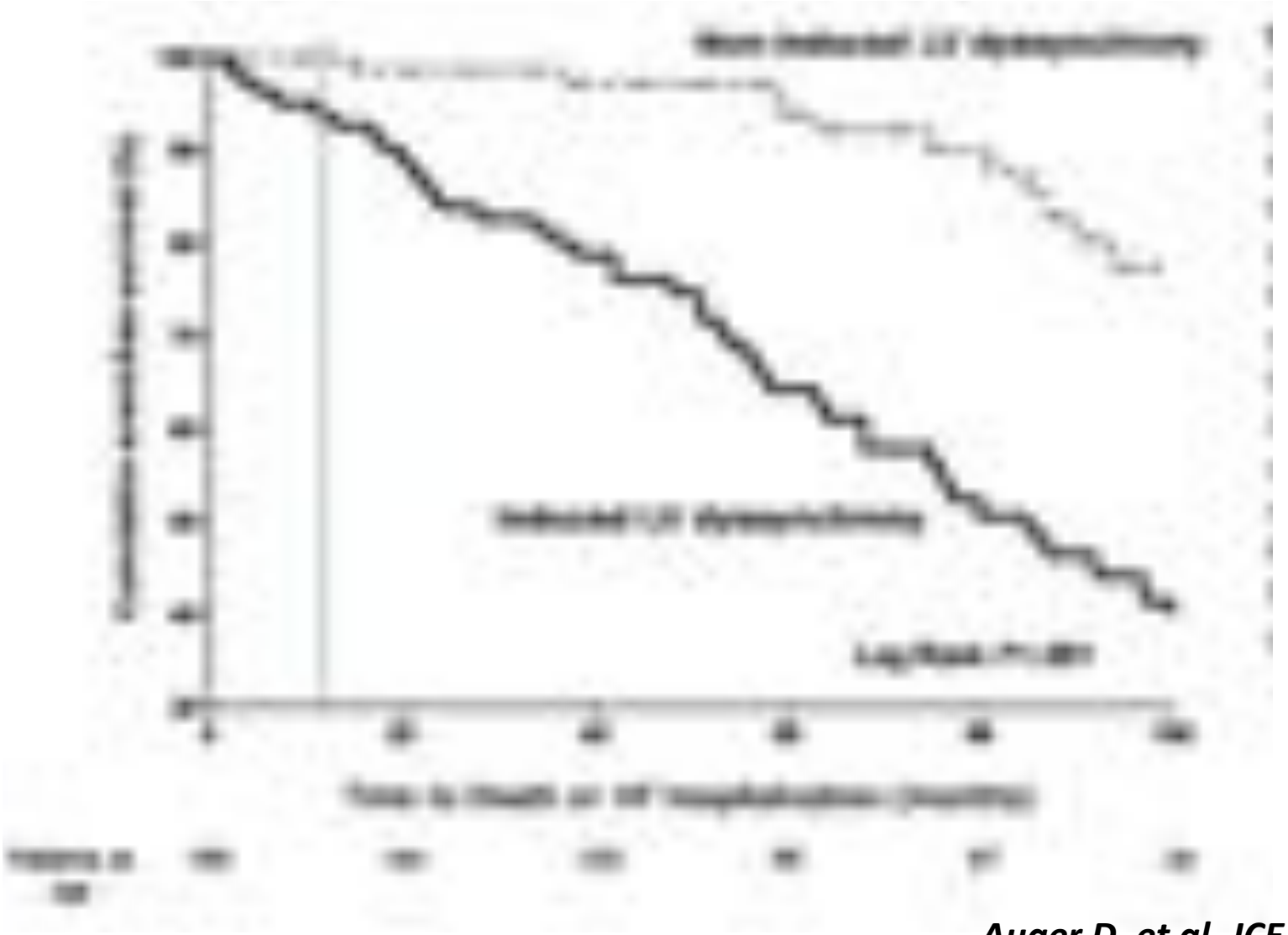




- After 7.8 yrs FU, permanent RV apical pacing (>90%) was associated with new-onset HF in 26% of patients (3.3% per yr)
- Predictors for HF: Elderly age at the time of implant, a wider paced QRS duration and the presence of CAD independently predicted new-onset HF
- HF after RV apical pacing was associated with a higher cardiovascular mortality

Zhang XH, …..Tse HF, et al. JCE 2008

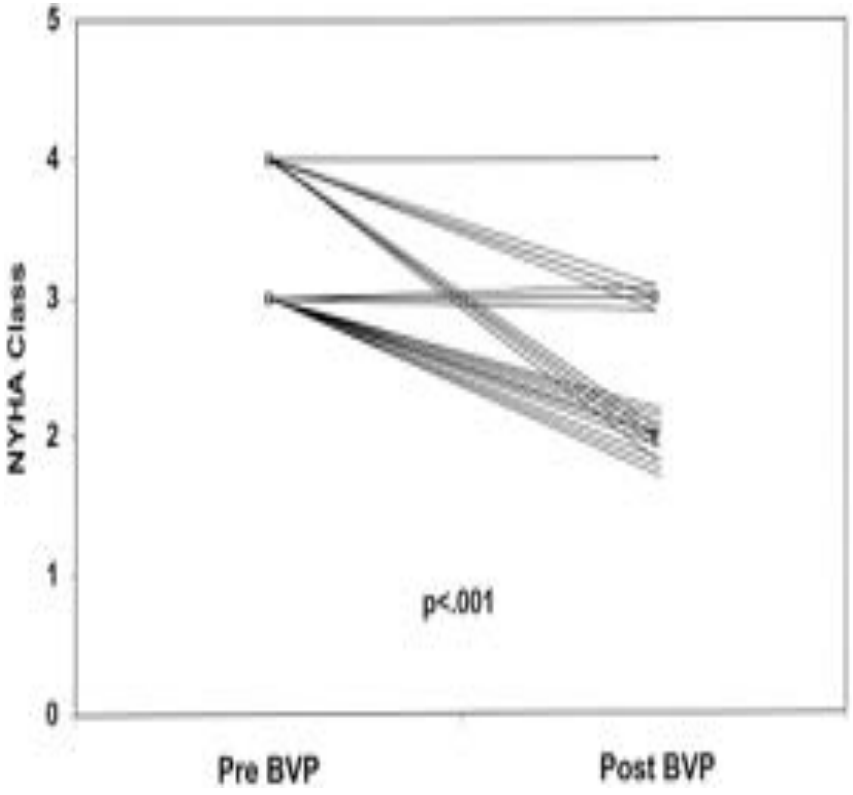
Adverse Outcomes with RV Pacing-Induced Cardiomyopathy



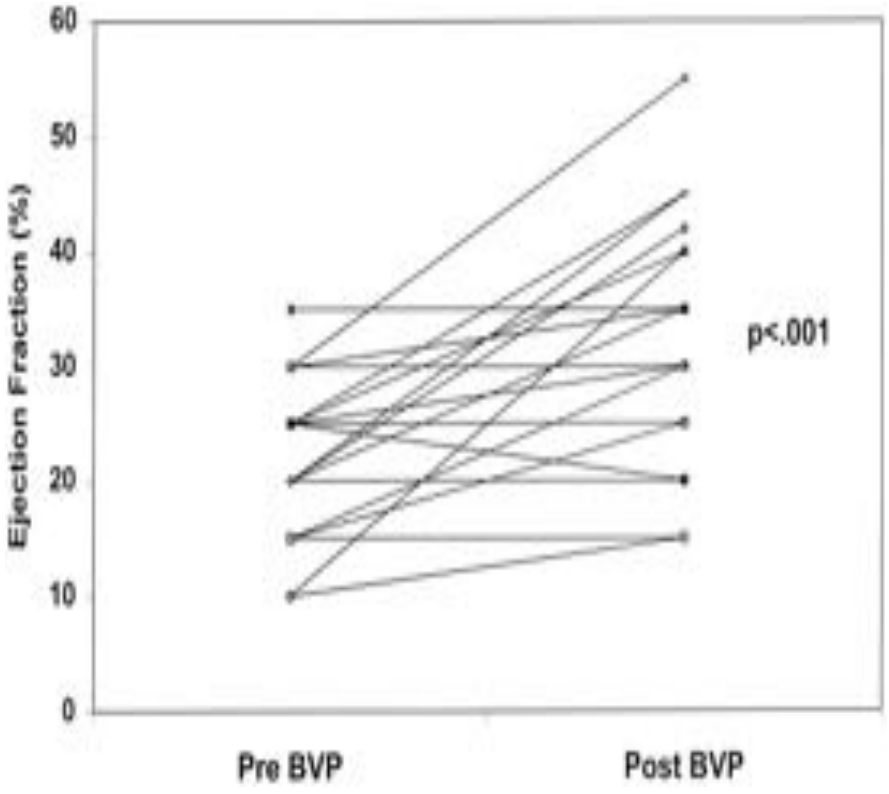
Auger D, et al. JCE 2014

Effect of Upgrading to CRT after Chronic RVA Pacing

NYHA

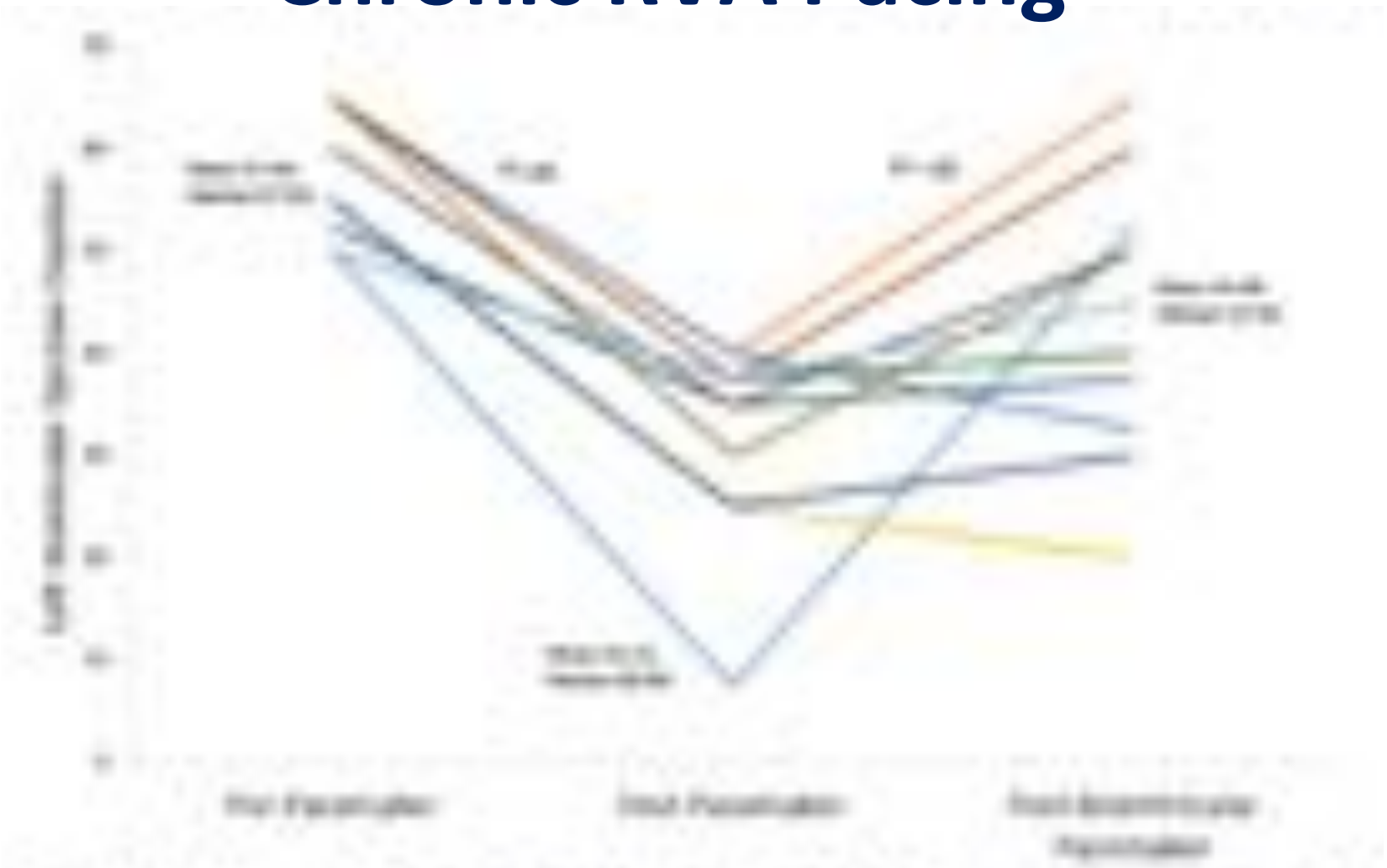


LVEF



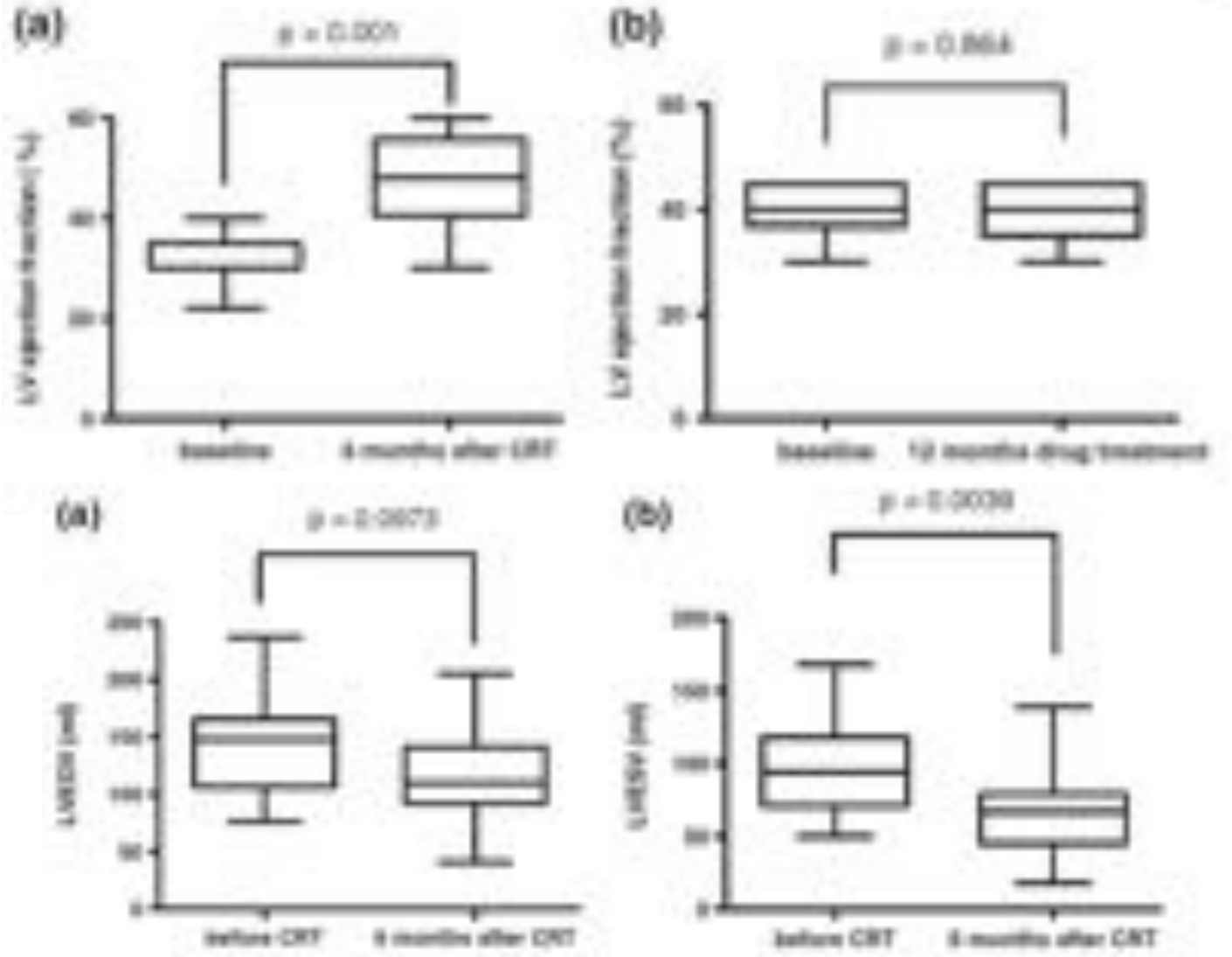
Leon AR, et al JACC 2002;39:1529

Effect of Upgrading to CRT after Chronic RVA Pacing



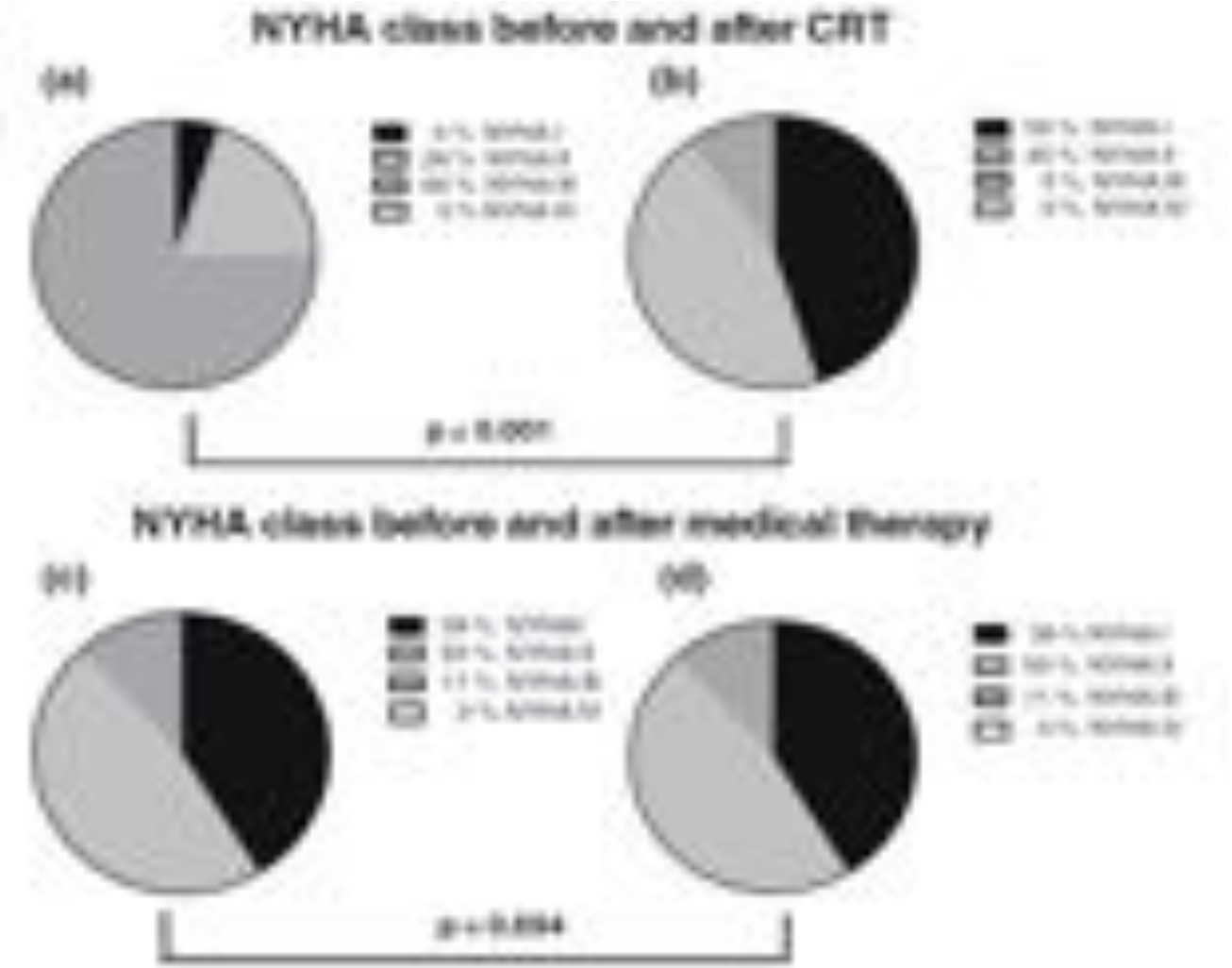
Khurshid S, et al. Heart Rhythm 2014

OMT vs CRT Upgrade in Pacemaker Induced Cardiomyopathy



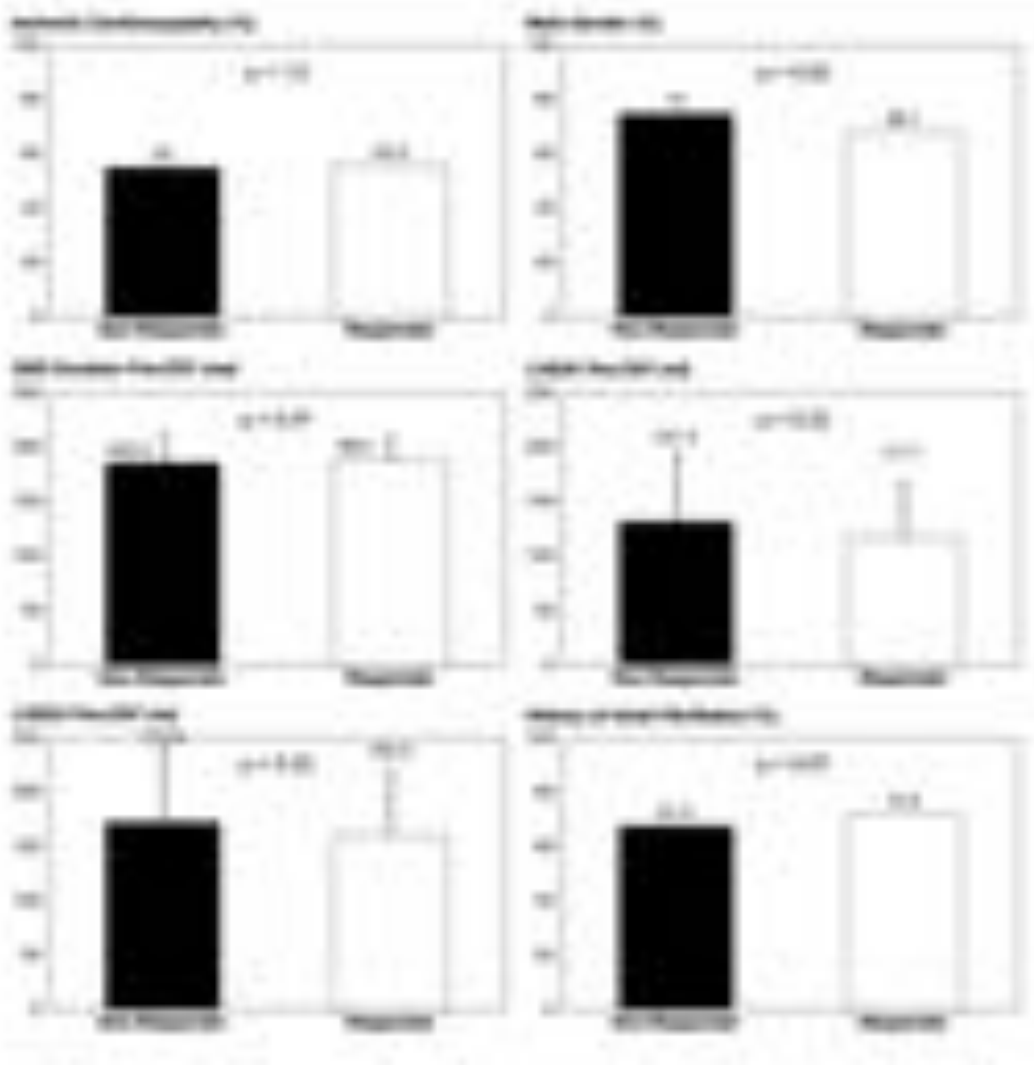
Schwerg M, et al. J Interv Card Electrophysiol 2015

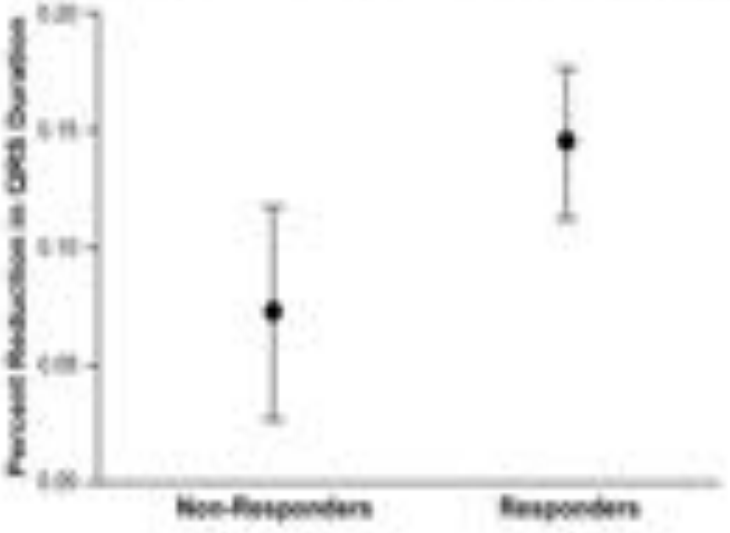
OMT vs CRT Upgrade in Pacemaker Induced Cardiomyopathy



Schwerg M, et al. J Interv Card Electrophysiol 2015

Predictors for Response: CRT Upgrade in Pacemaker Induced Cardiomyopathy

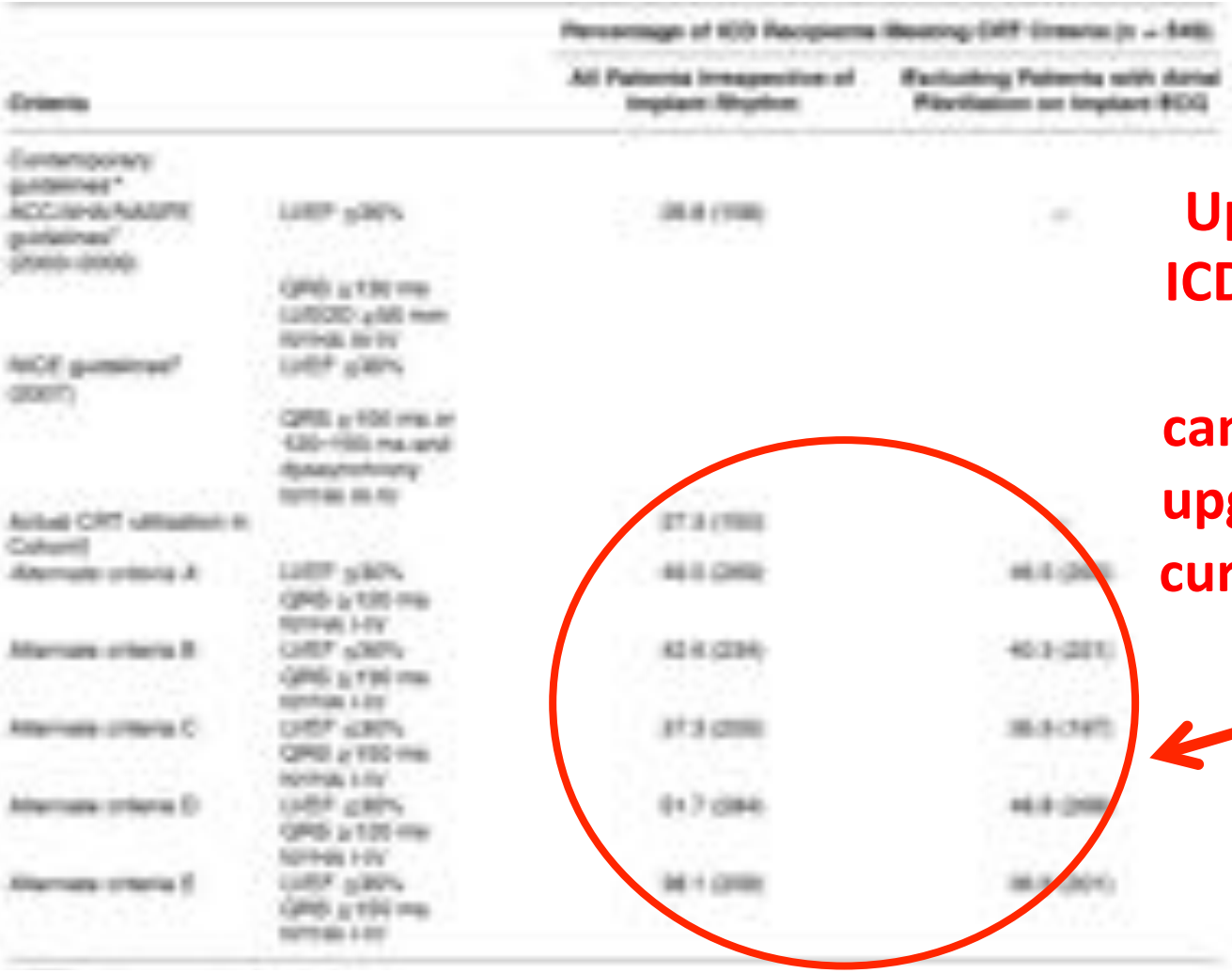




- **Reversal of electrical dyssynchrony predicts response to CRT upgrade.**
- **Traditional factors associated with a favorable response to CRT in de novo implants are not predictors for CRT upgrade response**

Rickard J, et al. Heart Rhythm 2013

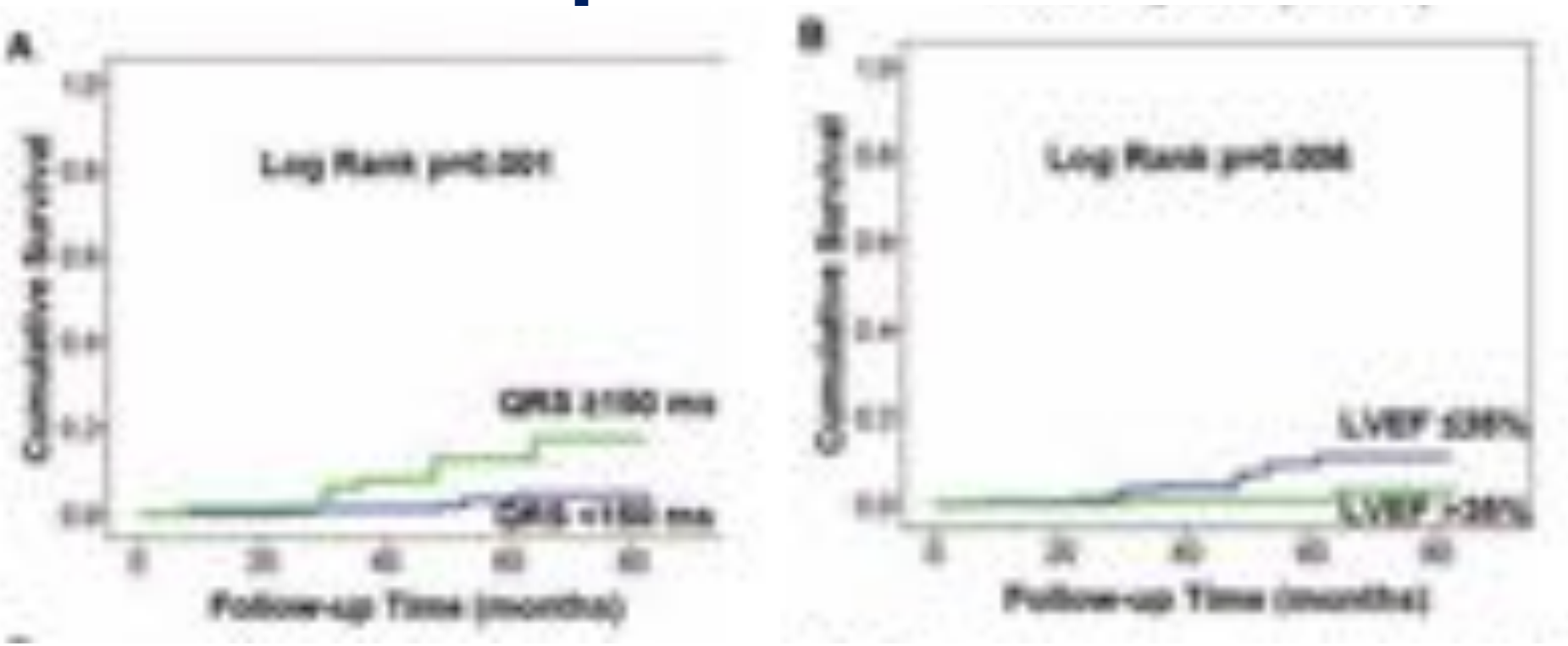
Potential Candidates for CRT-D Upgrade in ICD Recipients



Up to 35-50% of ICD recipients are potential candidates of CRT upgrade based on current guidelines for CRT

Scott PA, et al. PACE 2012

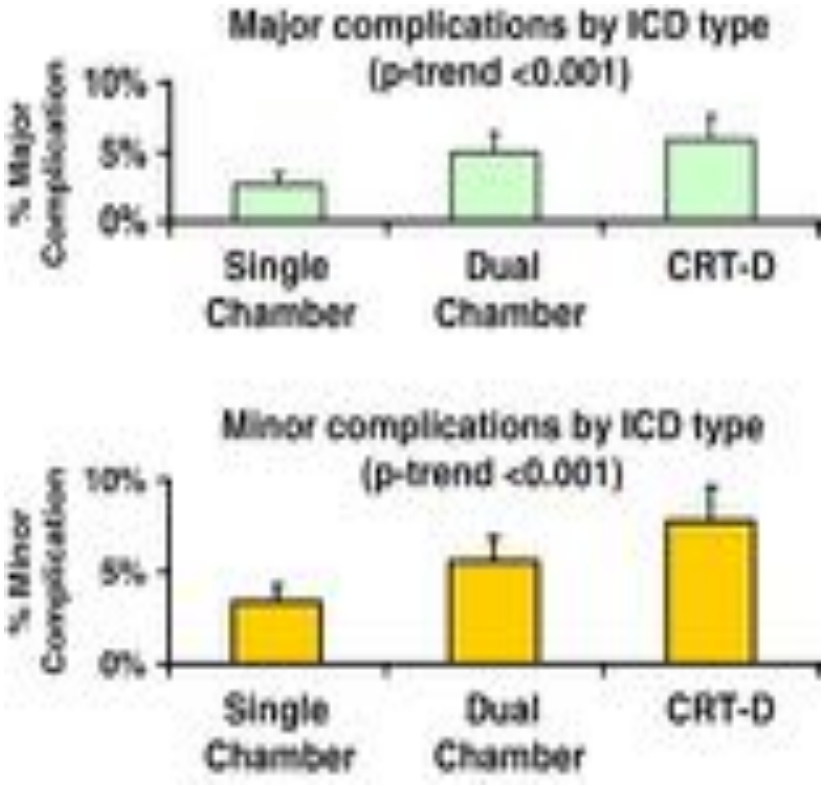
Rates of Upgrade of ICD Recipients to CRT

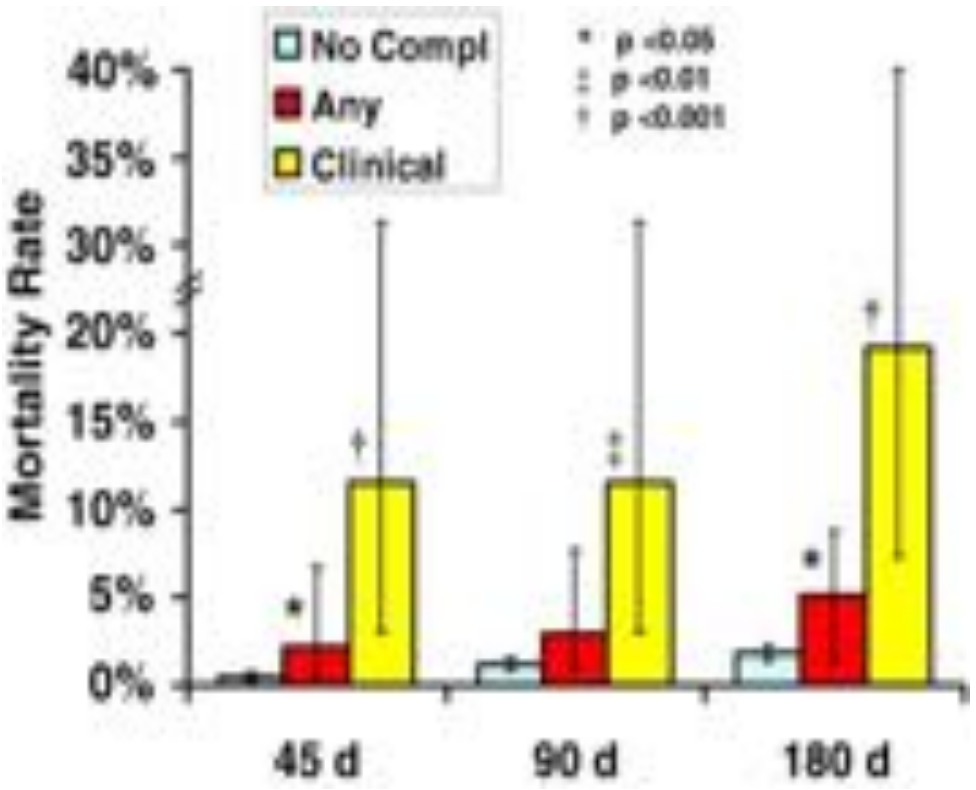


Upgrade rates at 1, 3, and 5 years were 0.03%, 2.4%, and 5.1%, respectively

Scott PA, et al. PACE 2012

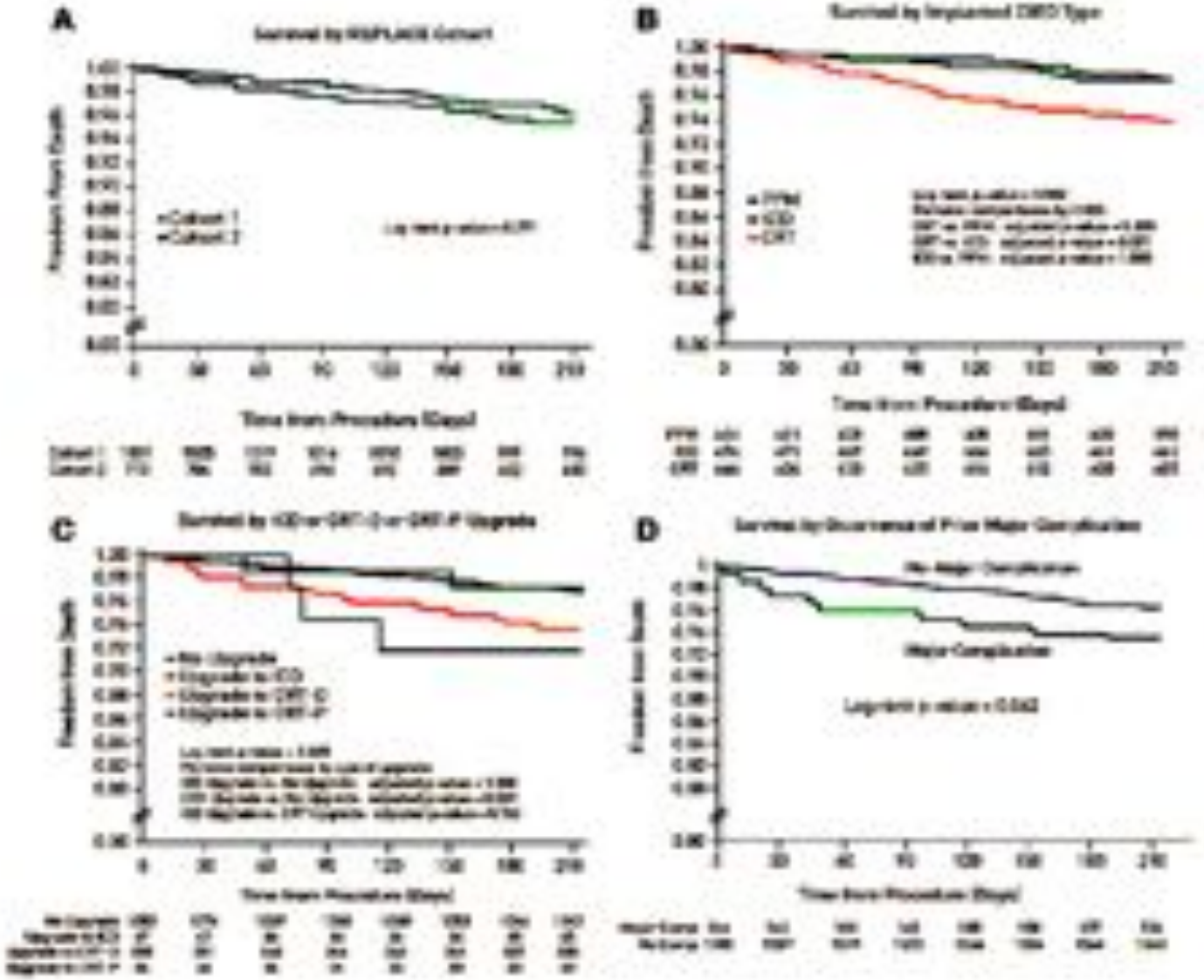
Early Complications of de Novo ICD Implantation





Lee DS, et al. JACC 2010;55:774-82

REPLACE DARE study



Chung MK, et al. Cir EP 2014

RAFT Upgrade Substudy

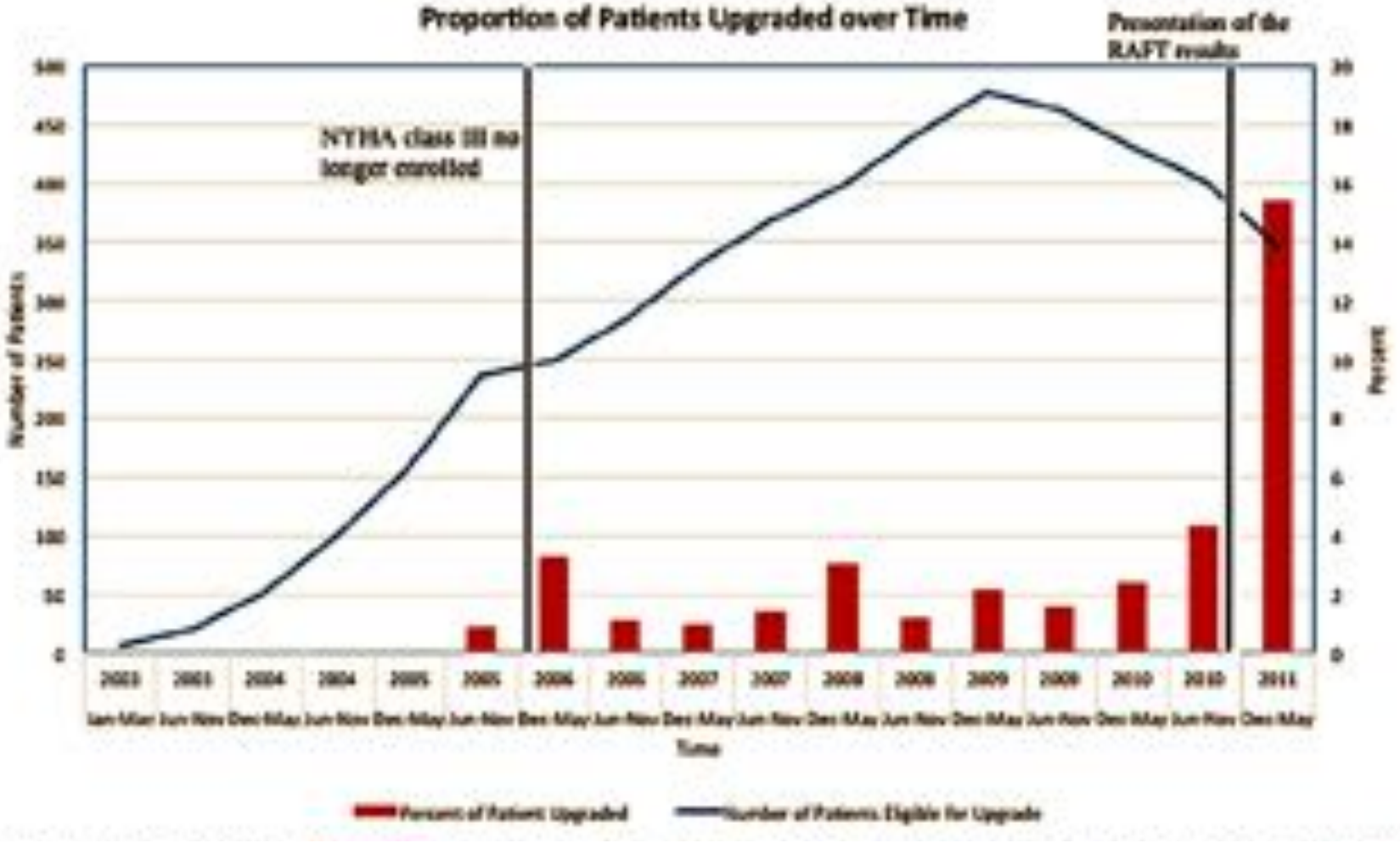
Reasons for Unsuccessful Upgrade

	De Novo CRT-D Implant in RAFT (1st attempt), n=644	Upgrade During RAFT (1st attempt), n=80	Upgrade After Presentation of RAFT Results, n=60
Successful initial CRT implant, n, % (95% CI)	586, 91.0 (88.8–93.0)	74, 92.5 (84.3–96.8)	54, 90.0 (79.5–95.7)
Reasons for unsuccessful upgrade	n=58*	n=6†	n=6‡
Inability to cannulate coronary sinus	26 (44.8)	1 (16.7)	4 (66.7)
Inability to place LV lead	15 (25.9)	1 (16.7)	1 (16.7)
Coronary sinus dissection	7 (12.1)	0	0
LV lead dislodgement	3 (5.2)	1 (16.7)	0
Occlusion of left subclavian vein	0	2 (33.3)	1 (16.7)
Clinically unstable patient	1 (1.7)	1 (16.7)	0
Other§	6 (10.3)	0	0

	De Novo CRT-D Implant in RAFT, n=644	Upgrade During RAFT, n=80	Upgrade After Presentation of RAFT Results, n=60
Patients with adverse events at 30 Days, n, % (95% CI)	169, 26.2 (23.0, 29.6)	15, 18.8 (11.6, 28.8)	2, 3.3 (0.3, 12.0)
Adverse events at 30 days	190	15	2
Hemo/pneumothorax	12 (1.9)	2 (2.5)	0
Requiring chest tube	7 (1.1)	0	
Pocket hematoma (requiring intervention)	8 (1.2)	0	0
Requiring surgery	3 (0.5)		
Requiring hosp.	5 (0.8)		
Pocket infection (requiring intervention)	19 (3.0)	0	0
Requiring surgery	4 (0.6)		
Requiring IV antibiotics	2 (0.3)		
Requiring oral antibiotics	13 (2.0)		
Tamponade	1 (0.2)	0	0
Lead dislodgement (requiring intervention)	56 (8.7)	4 (5.0)	1 (1.7)
Coronary sinus dissection	8 (1.2)	0	0
Congestive heart failure exacerbation (requiring longer hospitalization)	3 (0.5)	2 (2.5)	1 (1.7)
Other‖	83 (12.9)	7 (8.8)	0

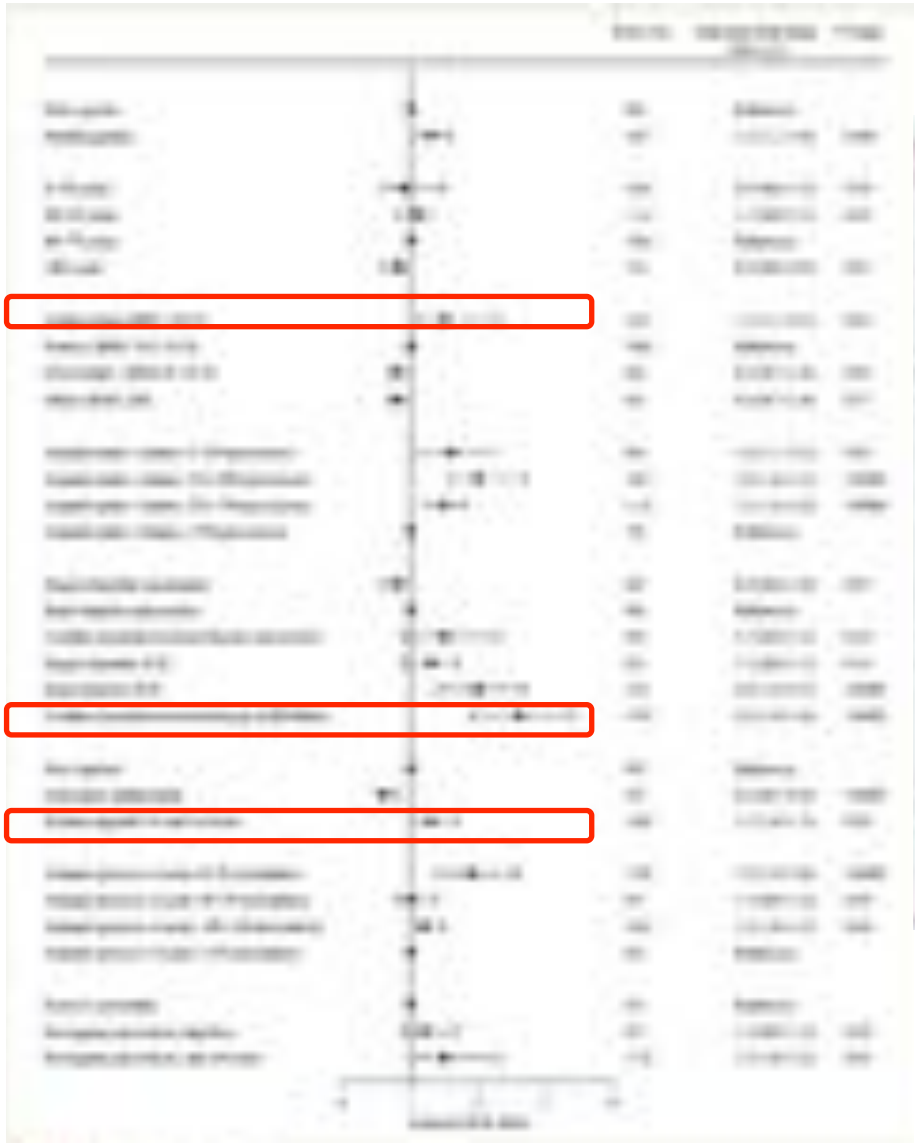
Essebag V, et al. Cir EP 2015

RAFT Upgrade Substudy



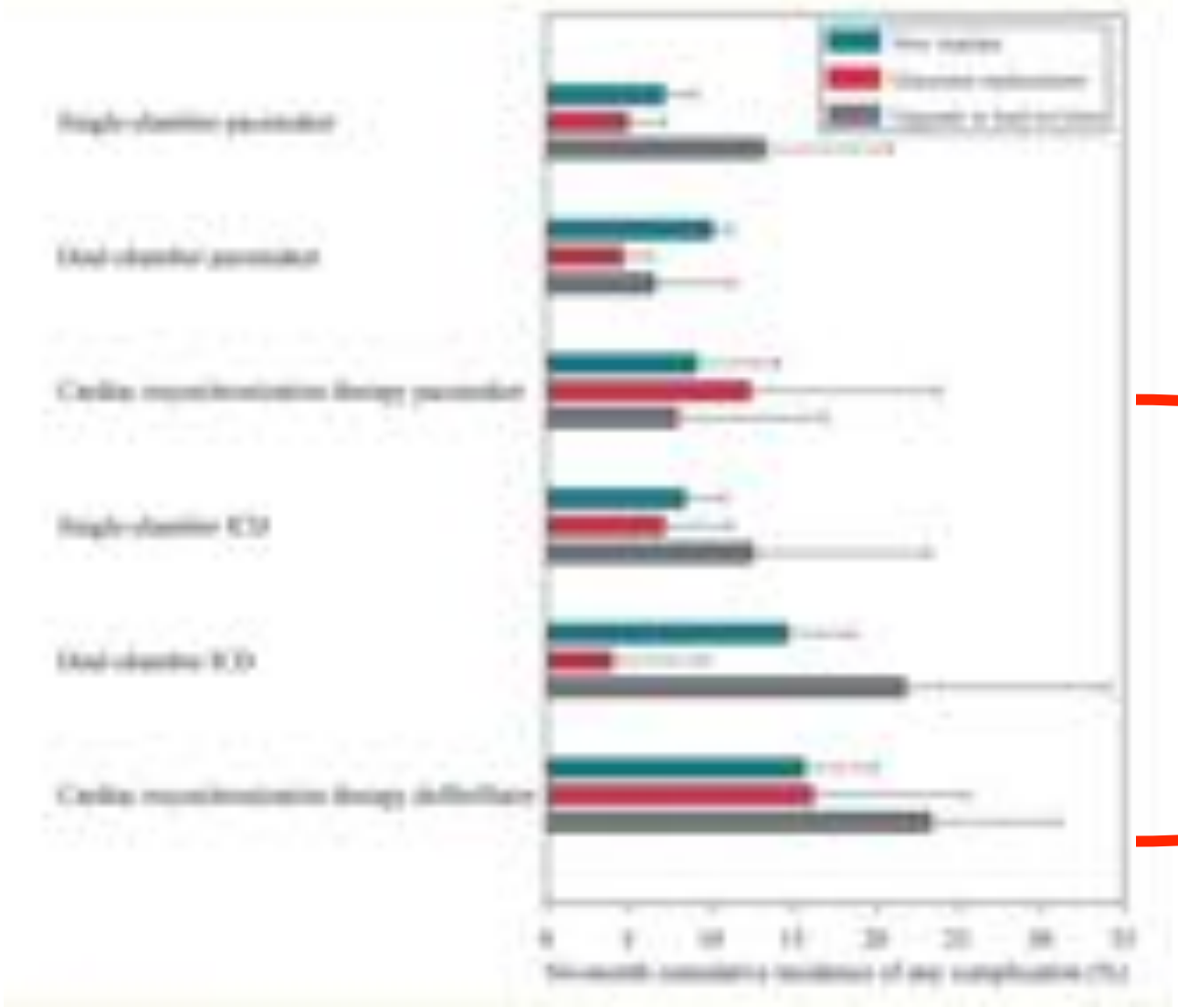
Essebag V, et al. Cir EP 2015

CRT-P Vs. CRT-D Upgrade



Kirkfeldt RE, et al. Eur Heart J 2015

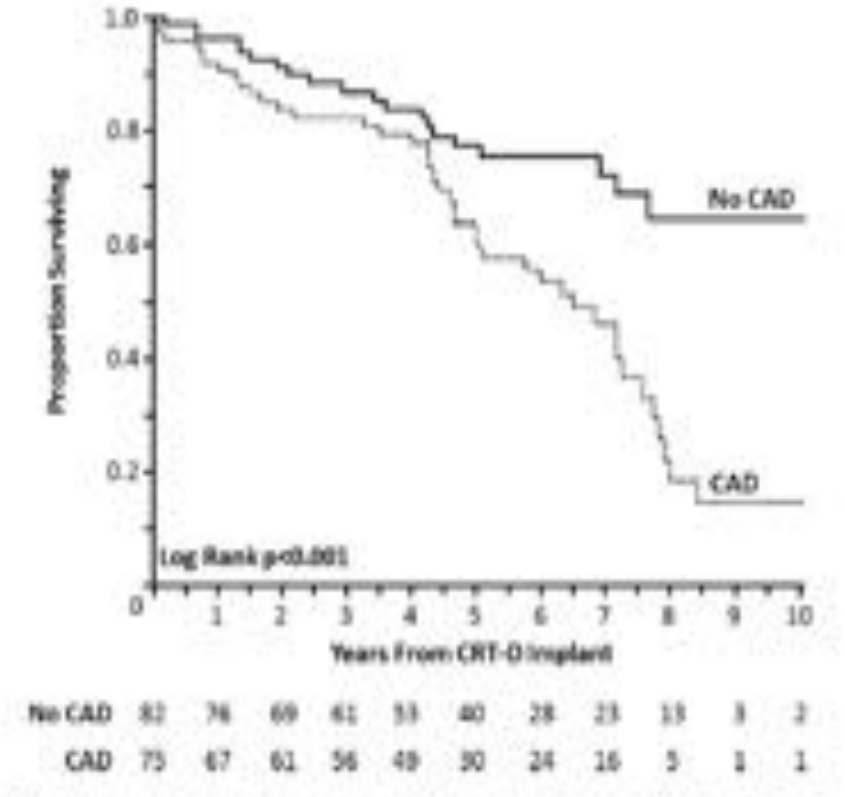
CRT-P Vs. CRT-D Upgrade

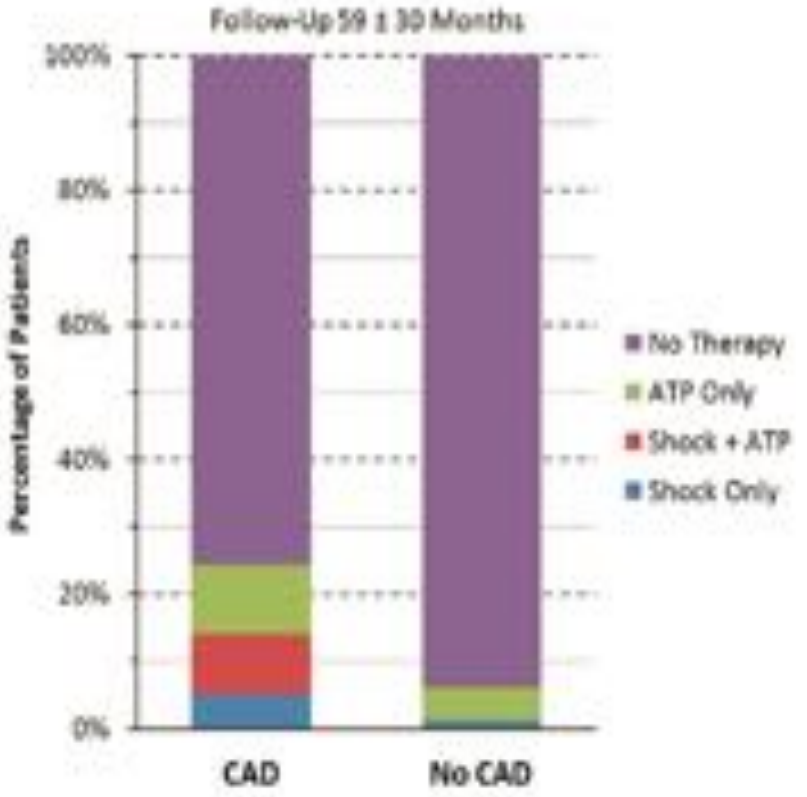


Higher complications rates with CRT-D upgrade vs CRT-P upgrade

Kirkfeldt RE, et al. Eur Heart J 2015

CRT-P Vs. CRT-D Upgrade





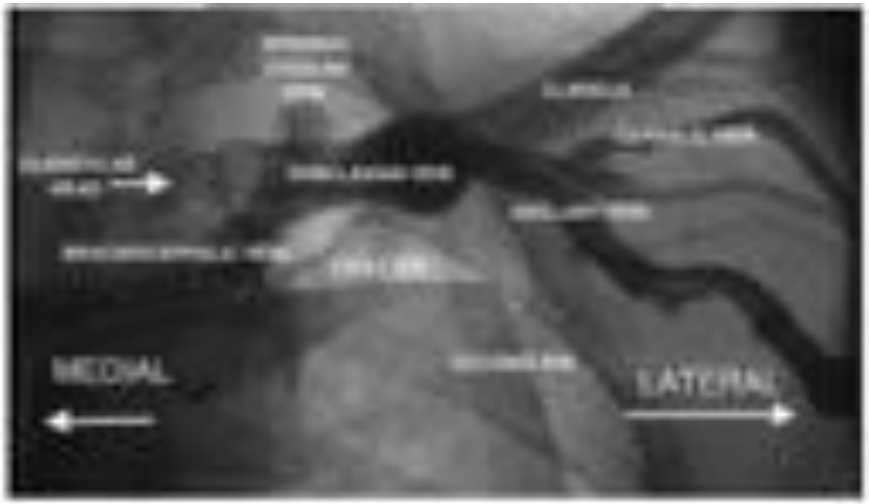
- Among pacemaker-dependent patients with no prior ventricular arrhythmias upgraded from a pacemaker to a CRT-defibrillator, patients without significant CAD have fewer comorbidities, longer survival, and low risk of appropriate shocks than do patients with CAD.
- CRT-pacemakers may be appropriate in such patients without CAD.

Adelstein E, et al. Heart Rhythm 2014

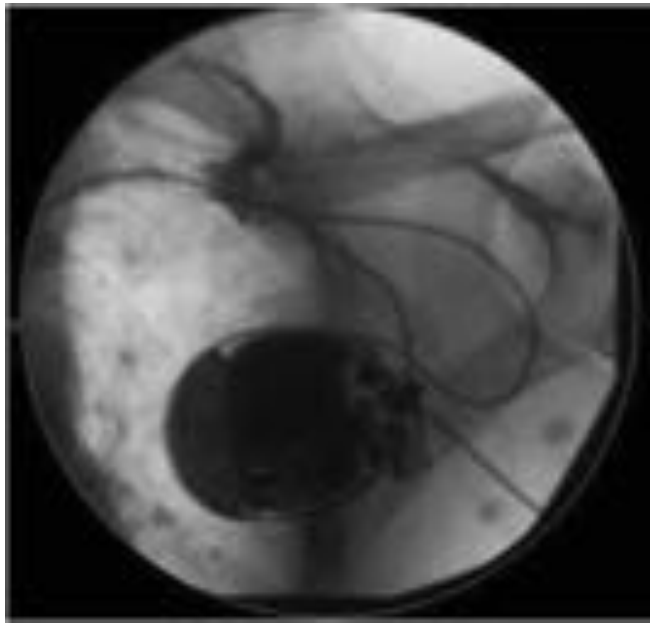
Contralateral Approach for Device Upgrade

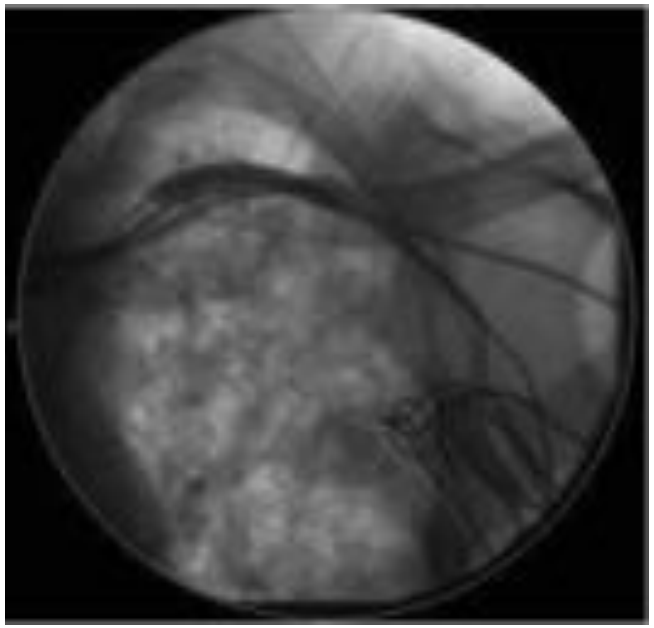
Clinical Cardiac Pacing, Defibrillation and Resynchronization Therapy

Lateral Infraclavicular Puncture for Device Upgrade

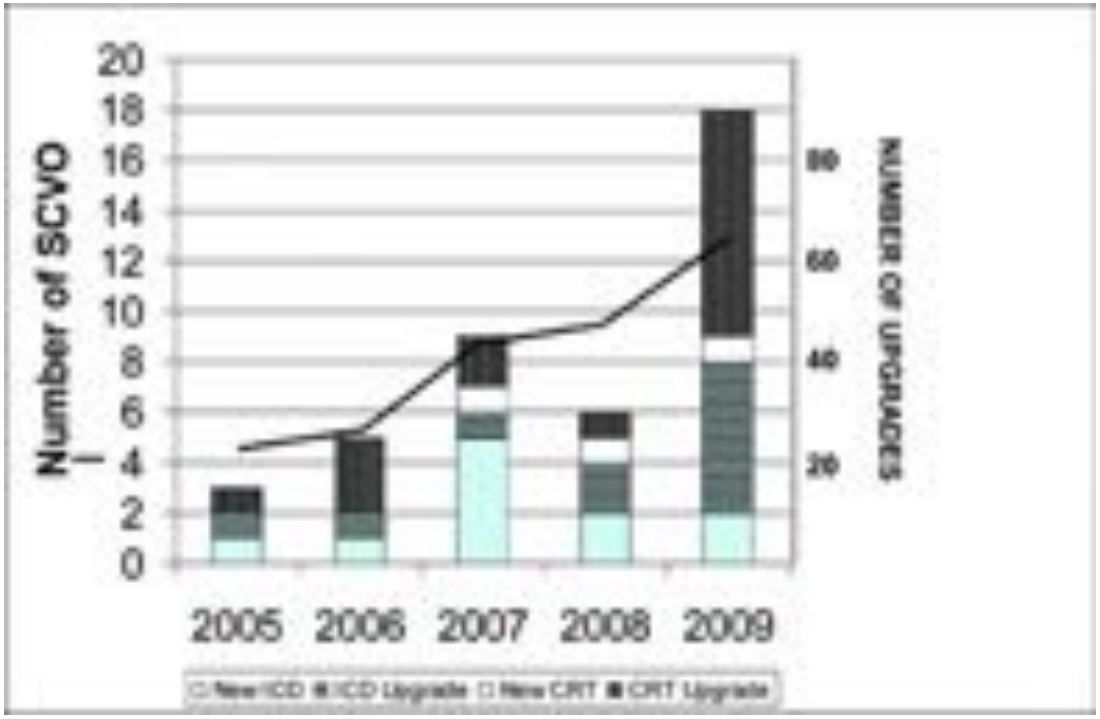


Bernstein NE, et al. PACE 2014



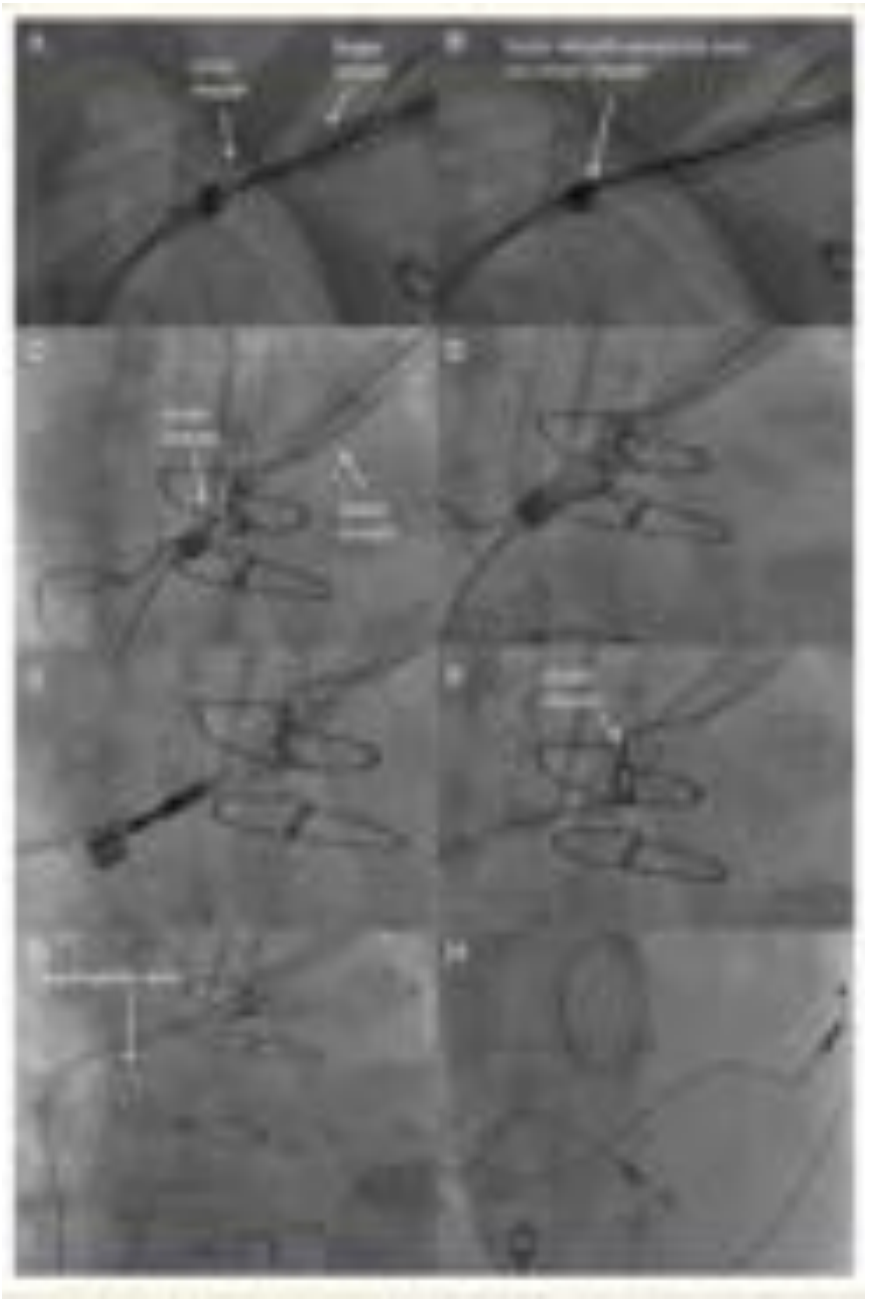


Subclavian Venoplasty May Reduce Implant Times and Implant Failures in the Era of Increasing Device Upgrades



Ji SA, et al. PACE 2014

Lead Extraction for Device Upgrade



Sohal M, et al. Europace 2014

Conclusions

In pts with RV pacing induced CMP:

- CRT upgrade improves symptoms and LV function
- Under utilization of CRT upgrade in RV pacing induced CMP
- CRT upgrade, especially with CRT-D is associated with increased risk of complications
- Various techniques can facilitate successful CRT upgrade