

Use of Cardiac Resynchronization Therapy in the Medicare Population

Appendices

Project ID: CRDT1013

April 24, 2015

Johns Hopkins University Evidence-based Practice Center

John Rickard, M.D., M.P.H.

Henry Michtalik, M.D., M.P.H., M.H.S.

Ritu Sharma, B.Sc.

Zackary Berger, M.D., Ph.D.

Emmanuel Iyoha, M.B.Ch.B., M.P.H.

Ariel R. Green, M.D., M.P.H.

Nowreen Haq, M.D., M.P.H.

Karen A. Robinson, Ph.D.

Appendix A: Detailed Electronic Database Search Strategies

PubMed Strategy

(Heart Failure [mh] OR "heart failure"[tiab] OR "Cardiac Failure" [tiab] OR "Myocardial Failure" [tiab] OR "Heart Decompensation"[tiab] OR "Left Ventricular Dysfunction" [tiab] OR cardiomyopathy[tiab]) AND ("cardiac resynchronization therapy"[mh] OR resynchronization [tiab] OR resynchronisation [tiab] OR defibrillators [mh] OR defibrillators [tiab] OR defibrillator [tiab] OR biventricular[tiab] OR pacing[tiab] OR "pacemaker"[tiab] OR "pacemakers"[tiab] OR pacemaker[mh]) AND "1995/01/01"[PDat] : "2014/12/31"[PDat] NOT (animals[mh] NOT Humans[mh]) AND English[lang] NOT (letter[pt] OR comment[pt] OR editorial[pt] OR review[pt])

Embase Strategy

'heart failure'/exp OR 'heart failure':ab,ti OR 'cardiac failure':ab,ti OR 'myocardial failure':ab,ti OR 'heart decompensation':ab,ti OR 'left ventricular dysfunction':ab,ti OR cardiomyopathy:ab,ti AND ('cardiac resynchronization therapy'/exp OR resynchronization:ab,ti OR resynchronisation:ab,ti OR 'defibrillator'/exp OR defibrillators:ab,ti OR defibrillator:ab,ti OR biventricular:ab,ti OR pacing:ab,ti OR pacemaker:ab,ti OR pacemakers:ab,ti OR 'artificial heart pacemaker'/exp) NOT ('animal'/exp NOT 'human'/exp) AND [english]/lim AND ([article]/lim OR [article in press]/lim) AND [embase]/lim AND [1995-2014]/py

The Cochrane Central Register of Controlled Trials (CENTRAL) Strategy

- #1 MeSH descriptor: [Heart Failure] explode all trees 5598
- #2 "heart failure":ti,ab,kw 10864
- #3 "Cardiac Failure":ti,ab,kw 450
- #4 "Myocardial Failure":ti,ab,kw 20
- #5 "Heart Decompensation":ti,ab,kw 4
- #6 "Left Ventricular Dysfunction":ti,ab,kw 875
- #7 cardiomyopathy:ti,ab,kw 1588
- #8 #1 or #2 or #3 or #4 or #5 or #6 or #7 12471
- #9 MeSH descriptor: [Cardiac Resynchronization Therapy] explode all trees 170
- #10 resynchronization:ti,ab,kw 515
- #11 resynchronisation:ti,ab,kw 31
- #12 MeSH descriptor: [Defibrillators] explode all trees 919
- #13 defibrillators:ti,ab,kw 1321
- #14 defibrillator:ti,ab,kw 1321
- #15 biventricular:ti,ab,kw 246
- #16 pacing:ti,ab,kw 2712
- #17 pacemaker:ti,ab,kw 1202
- #18 pacemakers:ti,ab,kw 1202
- #19 MeSH descriptor: [Pacemaker, Artificial] explode all trees 629
- #20 #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 4294
- #21 #8 and #20 Publication Date from 1995 to 2014 963

ClinicalTrials.gov Strategy

We reviewed ongoing trials listed in the clinicaltrials.gov website that contained either the search term “cardiac resynchronization therapy” or “CRT” or “biventricular pacing”, received from 01/22/2014 to 01/21/2015 and were conducted in those ≥ 18 years of age

Appendix B: Forms

Figure B1: Abstract Review Form

Does this article POTENTIALLY apply to ANY of the key questions?

- ☒ No
NO, this article DOES NOT apply to any of the Key Questions (check only one reason)
- ☐ Does not evaluate a CRT
 - ☐ Study published before 1995
 - ☐ No original data (systematic reviews, meta-analysis, editorial, commentary)
 - ☐ Not conducted in humans
 - ☐ Not in English
 - ☐ No full report (e.g. conference or meeting abstract)
 - ☐ Study of children only
 - ☐ Not relevant to key questions
 - ☐ Other: Please specify
- ☐ Yes-Include article for full text screening
- ☐ Unclear-No abstract or cannot tell from abstract alone --- get it for full-text screen

Flag excluded articles:

- ☐ Pull for hand searching "review that applies to one of the questions and likely to contain relevant studies
- ☐ Pull for citation for use in report (i.e., for background)
- [Clear Response](#)

Key Questions

KQ1a: Is cardiac resynchronization therapy with defibrillator (CRT-D) effective in reducing heart failure symptoms, improving myocardial function, reducing hospitalization and/or improving survival in patients with an LVEF≤35% and a QRS duration≥120ms?

KQ1b: What are the clinical predictors of response in Medicare eligible patients who are deemed appropriate candidates for CRT-D devices?

KQ2: What are the adverse effects or complications associated with CRT-D implantation in the Medicare population?

KQ3a: Is cardiac resynchronization therapy in the absence of defibrillator capacity (CRT-P) effective in reducing heart failure symptoms, improving myocardial function, reducing hospitalization and/or improving survival in patients with LVEF≤35% and a QRS duration≥120ms?

KQ3b: What are the clinical predictors of response in Medicare eligible patients who are deemed appropriate candidates for CRT-P devices?

KQ4: What are the adverse effects or complications associated with CRT-P implantation in the Medicare population?

KQ5: What is the effectiveness of CRT-D versus CRT-P in reducing heart failure symptoms, improving myocardial function, reducing hospitalization and/or improving survival in patients with LVEF≤35% and a QRS duration≥120ms?

KQ6: What are the adverse effects or complications associated with CRT-D versus CRT-P implantation in the Medicare population?

and go to or [Skip to Next](#)

Figure B2:Article Review Form

Does this article POTENTIALLY apply to ANY of the key questions?

☒ No

NO, this article DOES NOT apply to any of the Key Questions (check only one reason)

- ☐ Does not evaluate a CRT
- ☐ Study published before 1995
- ☐ No original data (systematic reviews, meta-analysis, editorial, commentary)
- ☐ Not conducted in humans
- ☐ Not in English
- ☐ No full report (e.g. conference or meeting abstract)
- ☐ Study of children only
- ☐ Not relevant to key questions
- ☐ Single case study
- ☐ Addresses effectiveness questions (KQ1a, 3a, and 5) only and is not RCT
- ☐ Other: Please specify
- ☐ Population inclusion criteria do not fall within the QRS $\geq$ 120ms range and LVEF
- ☐ Address remodeling outcomes but response definition not within range of LVESV $\geq$ 10%, LVEDV $\geq$ 10% or EF $\geq$ 5%
- ☐ Study does not adjust via model or participant selection for at least 2 predictor of Gender, QRS Duration and/or Morphology (LBB or not) and does not include at least 30 patients.

☐ Yes

Flag excluded articles:

- ☐ Pull for hand searching & review that applies to one of the questions and likely to contain relevant studies
- ☐ Pull for citation for use in report (i.e., for background)

[Clear Response](#)

Data Abstraction Form

Table B1:Study characteristics

- Author, Year, RefID
- Does this study have a name? If YES please specify
- Is this a secondary study of a large clinical trial? -If YES please specify
- Planned length of follow-up -specify (months)
- Study Design
- Other Study design-Specify
- Device type
- Device Name
- Other Device Name
- Funding source
- OtherFunding-Specify

Table B2: Participants characteristics

- Author, Year, Refid
- Arm
- Arm name
- Number at baseline
- Women, n
- Women, (%)
- Mean Age, years
- Median Age, years
- Range Age, years
- SD Age, years
- White, n
- White, (%)
- African-American, n
- African-American, (%)
- Other, n,
- Other, (%)
- Ischemic cardiomyopathy n
- Ischemic cardiomyopathy (%)
- Atrial fibrillation, n
- Atrial fibrillation, (%)
- QRS interval, mean; QRS interval, median; QRS interval, range; QRS interval, SD
- Creatinine ; Creatinine-unit
- LBBB, n; LBBB, %
- RBBB, n; RBBB, (%)
- QRS morphology -IVCD, n; QRS morphology -IVCD, %
- QRS morphology -PBBBblock, n; QRS morphology -PBBBblock, %
- NYHA class I, n; NYHA class I, (%)
- NYHA class II, n; NYHA class II, (%)
- NYHA class III, n; NYHA class III, (%)
- NYHA class IV, n; NYHA class IV, (%)
- LVEF, mean; LVEF, median LVEF, range
- GFR (Glomerular filtration rate); GFR -Please enter UNIT
- Other - please specify

Table B3: Effectiveness outcomes

The following apply to the outcomes of, 6 minute hall walk distance, Minnesota living with Heart failure Inventory score (MLHFI), SF-36, LVESV/volume index, LVEDV/volume index, LVEF, Clinical composite score.

- Author, year, RefID
- Arm name
- Outcome unit -if applicable
- Baseline N
- Baseline outcome, mean
- Baseline outcome, SD
- Timepoint(s)
- N at time point(s)
- mean-Outcome at timepoint(s)
- SD-Outcome at timepoint(s)
- Within arm comparison-Select Measurement
 - Within arm comparison-Enter Value Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value
- Between arm comparison - Select Measurement
 - Between arm comparison - Enter Valuse
 - Comparator Arm
 - Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value

Table B4: Hospitalization for heart failure and All-cause mortality outcome

- Author, year, RefID
- Arm name
- N for analysis
- Time point
- n of PATIENTS with outcomes
- % of PATIENTS with outcomes
- n of EVENTS with outcomes
- % of EVENTS with outcomes
- Within arm comparison-Select Measurement
 - Within arm comparison-Enter Value Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value
- Between arm comparison - Select Measurement
 - Between arm comparison - Enter Valuse
 - Comparator Arm
 - Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value

Table B5: Harms Outcomes

- Author, year, RefID
- Overall Study-If applicable
- Arm name
- Select Outcome
- IF Length of hospital stay -Enter Value
- IF Length of hospital stay -Select Unit
- N for analysis
- Time point (s)
- n of PATIENTS with outcomes
- % of PATIENTS with outcomes
- n of EVENTS with outcomes
- % of EVENTS with outcomes
- Within arm comparison-Select Measurement
 - Within arm comparison-Enter Value Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value
- Between arm comparison - Select Measurement
 - Between arm comparison - Enter Valuse
 - Comparator Arm
 - Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value

Table B6: Predictors outcomes

- Author, year, RefID
- Overall study -If applicable
- Arm name Select predictor
- Define predictor -If applicable
- Enter unit- if applicable
- N for analysis
- Time point (s)
- Proportion of responder, %
- Select the Model
- Other moder-specify
- Unadjusted result
 - Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value
- Fully adjusted result
 - Relative risk
 - Relative hazard
 - Odd ratio
 - risk difference
 - 95% CI
 - Standard error
 - Standard deviation
 - p value

Appendix C: List of Excluded Studies

Does not evaluate a CRT

Significant lead-induced tricuspid regurgitation is associated with poor prognosis at long-term follow-up.

Hoke, U., Auger, D., Thijssen, J., Wolterbeek, R., van der Velde, E. T., Holman, E. R., Schalij, M. J., Bax, J. J., Delgado, V., and Marsan, N. A.. *Heart* 2014 :

Impact of atrial fibrillation on early complications and one year-survival after cardioverter defibrillator implantation: results from the German DEVICE registry. Kobe, J., Wasmer, K., Andresen, D., Kleemann, T., Spitzer, S. G., Jehle, J., Brachmann, J., Stellbrink, C., Hochadel, M., Senges, J., Klein, H. U., and Eckardt, L.. *Int J Cardiol* 2013 :4184-90

Association of single- vs dual-chamber ICDs with mortality, readmissions, and complications among patients receiving an ICD for primary prevention. Peterson, P. N., Varosy, P. D., Heidenreich, P. A., Wang, Y., Dewland, T. A., Curtis, J. P., Go, A. S., Greenlee, R. T., Magid, D. J., Normand, S. L., and Masoudi, F. A.. *JAMA* 2013 :2025-34

Predictors of left ventricular function deterioration in patients with left bundle branch block and ejection fraction >50%. Angheloiu, G. O., Saul, M., Edelman, K., Shah, H., Mezu, U. L., and Saba, S.. *Congest Heart Fail* 2013 :E1-4

Prognostic Estimation of Advanced Heart Failure With Low Left Ventricular Ejection Fraction and Wide QRS Interval. Oh, C., Chang, H. J., Sung, J. M., Kim, J. Y., Yang, W., Shim, J., Kang, S. M., Ha, J., Rim, S. J., and Chung, N.. *Korean Circ J* 2012 :659-67

Incremental Reduction in Risk of Death Associated With Use of Guideline-Recommended Therapies in Patients With Heart Failure: A Nested Case-Control Analysis of IMPROVE HF. Fonarow, G. C., Albert, N. M., Curtis, A. B., Gheorghiade, M., Liu, Y., Mehra, M. R., O'Connor, C. M., Reynolds, D., Walsh, M. N., and Yancy, C. W.. *J Am Heart Assoc* 2012 :16-26

The risk of delayed atrioventricular and intraventricular conduction block following ablation of bundle branch reentry. Reithmann, C., Herkommer, B., Huemmer, A., von Hoch, F., and Fiek, M.. *Clin Res Cardiol* 2013 :145-53

Influence of heart failure etiology on the effect of upgrading from right ventricular apical to biventricular or bifocal pacing in patients with permanent atrial fibrillation and advanced heart failure. Malecka, B., Zabek, A., Maziarz, A., and Lelakowski, J.. *Pol Arch Med Wewn* 2012 :89-97

Appropriate therapies predict long-term mortality in primary and secondary prevention of sudden cardiac death. Stabile, G., D'Agostino, C., Gallo, P., Marrazzo, N., Iuliano, A., De Simone, A., Turco, P., Palella, M., Donnici,

G., Ciardiello, C., Napolitano, G., and Solimene, F.. *J Cardiovasc Med (Hagerstown)* 2013 :110-3

Risk stratification of ischaemic patients with implantable cardioverter defibrillators by C-reactive protein and a multi-markers strategy: results of the CAMI-GUIDE study. Biasucci, L. M., Bellocci, F., Landolina, M., Rordorf, R., Vado, A., Menardi, E., Giubilato, G., Orazi, S., Sassara, M., Castro, A., Massa, R., Kheir, A., Zacccone, G., Klersy, C., Accardi, F., and Crea, F.. *Eur Heart J* 2012 :1344-50

16-year trends in the infection burden for pacemakers and implantable cardioverter-defibrillators in the United States 1993 to 2008. Greenspon, A. J., Patel, J. D., Lau, E., Ochoa, J. A., Frisch, D. R., Ho, R. T., Pavri, B. B., and Kurtz, S. M.. *J Am Coll Cardiol* 2011 :1001-6

Effect of elapsed time from coronary revascularization to implantation of a cardioverter defibrillator on long-term survival in the MADIT-II trial. Barsheshet, A., Goldenberg, I., Moss, A. J., Huang, D. T., Zareba, W., McNitt, S., Klein, H. U., and Guetta, V.. *J Cardiovasc Electrophysiol* 2011 :1237-42

Primary prevention of sudden cardiac death by implantable cardioverter-defibrillator therapy in Chinese patients with heart failure: a single-center experience. Chen, T. B., Cheng, K. A., Gao, P., Cheng, Z. W., Fan, J. B., Jiang, X. C., and Fang, Q.. *Chin Med J (Engl)* 2010 :848-51

Echocardiography and risk prediction in advanced heart failure: incremental value over clinical markers. Agha, S. A., Kalogeropoulos, A. P., Shih, J., Georgiopolou, V. V., Giamouzis, G., Anarado, P., Mangalat, D., Hussain, I., Book, W., Laskar, S., Smith, A. L., Martin, R., and Butler, J.. *J Card Fail* 2009 :586-92

Quantification of left ventricular systolic dyssynchrony by real-time three-dimensional echocardiography. Soliman, O. I., van Dalen, B. M., Nemes, A., Zwaan, H. B., Vletter, W. B., ten Cate, F. J., Theuns, D. A., Jordaens, L. J., and Geleijnse, M. L.. *J Am Soc Echocardiogr* 2009 :232-9

Relationship between QRS complex notch and ventricular dyssynchrony in patients with heart failure and prolonged QRS duration. Fazelifar, A. F., Bonakdar, H. R., Alizadeh, K., Azarnik, H., Haghjoo, M., Abkenar, H. B., Samiei, N., and Sadr-Ameli, M. A.. *Cardiol J* 2008 :351-6

Short-term mortality and cost associated with cardiac device implantation in patients hospitalized with heart failure. Swindle, J., Burroughs, T. E., Schnitzler, M. A., and Hauptman, P. J.. *Am Heart J* 2008 :322-8

Incidence and predictors of in-hospital events after first implantation of pacemakers. van Eck, J. W., van Hemel, N. M., Zuithof, P., van Asseldonk, J. P., Voskuil, T. L., Grobbee, D. E., and Moons, K. G.. *Europace* 2007 :884-9

Prevalence and characterization of asymptomatic pacemaker and ICD lead perforation on CT. Hirschl, D. A.,

Jain, V. R., Spindola-Franco, H., Gross, J. N., and Haramati, L. B.. *Pacing Clin Electrophysiol* 2007 :28-32

Integration of three-dimensional coronary venous angiography with three-dimensional echocardiography for biventricular device implantation. Mansour, M., Rasche, V., Picard, M. H., and Ruskin, J. N.. *Heart Rhythm* 2006 :1391-2

A unique method by which to quantitate synchrony with equilibrium radionuclide angiography. O'Connell, J. W., Schreck, C., Moles, M., Badwar, N., DeMarco, T., Olgin, J., Lee, B., Tseng, Z., Kumar, U., and Botvinick, E. H.. *J Nucl Cardiol* 2005 :441-50

Single-chamber versus dual-chamber pacing for high-grade atrioventricular block. Toff, W. D., Camm, A. J., and Skehan, J. D.. *N Engl J Med* 2005 :145-55

Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. Bardy, G. H., Lee, K. L., Mark, D. B., Poole, J. E., Packer, D. L., Boineau, R., Domanski, M., Troutman, C., Anderson, J., Johnson, G., McNulty, S. E., Clapp-Channing, N., Davidson-Ray, L. D., Fraulo, E. S., Fishbein, D. P., Luceri, R. M., and Ip, J. H.. *N Engl J Med* 2005 :225-37

Outcome of right ventricular bifocal pacing in patients with permanent atrial fibrillation and severe dilated cardiomyopathy due to Chagas disease: three years of follow-up. da Silva Menezes, A.. *J Interv Card Electrophysiol* 2004 :193-8

Relationship between QRS duration and left ventricular dyssynchrony in patients with end-stage heart failure. Bleeker, G. B., Schalij, M. J., Molhoek, S. G., Verwey, H. F., Holman, E. R., Boersma, E., Steendijk, P., Van Der Wall, E. E., and Bax, J. J.. *J Cardiovasc Electrophysiol* 2004 :544-9

Systolic and diastolic regional myocardial motion of pacing-induced versus idiopathic left bundle branch block with and without left ventricular dysfunction. Kang, S. J., Song, J. K., Yang, H. S., Song, J. M., Kang, D. H., Rhee, K. S., Nam, G. B., Choi, K. J., Kim, J. J., and Kim, Y. H.. *Am J Cardiol* 2004 :1243-6

Myocardial perfusion reserve and oxidative metabolism contribute to exercise capacity in patients with dilated cardiomyopathy. Stolen, K. Q., Kemppainen, J., Kalliokoski, K. K., Hallsten, K., Luotolahti, M., Karanko, H., Lehtikainen, P., Viljanen, T., Salo, T., Airaksinen, K. E., Nuutila, P., and Knuuti, J.. *J Card Fail* 2004 :132-40

Echocardiographic features of patients with heart failure who may benefit from biventricular pacing. Makaryus, A. N., Arduini, A. D., Mallin, J., Chung, E., Kort, S., Shi, Q., Jadonath, R., and Mangion, J.. *Echocardiography* 2003 :217-23

The prevalence of heart failure and asymptomatic left ventricular systolic dysfunction in a typical regional pacemaker population. Thackray, S. D., Witte, K. K., Nikitin, N. P., Clark, A. L., Kaye, G. C., and Cleland, J. G.. *Eur Heart J* 2003 :1143-52

Which patients with congestive heart failure may benefit from biventricular pacing?. Galizio, N. O., Pesce, R., Valero, E., Gonzalez, J. L., Favalaro, R. R., Favalaro, L., Perrone, S., Davila, P., and Godoy, M.. *Pacing Clin Electrophysiol* 2003 :158-61

How many patients with dilated cardiomyopathy may potentially benefit from cardiac resynchronization therapy?. Grimm, W., Sharkova, J., Funck, R., and Maisch, B.. *Pacing Clin Electrophysiol* 2003 :155-7

Proportion of candidates for cardiac resynchronization therapy. Erdogan, A., Rueckleben, S., Tillmanns, H. H., and Waldecker, B.. *Pacing Clin Electrophysiol* 2003 :152-4

MADIT-II: clinical implications. Moss, A. J., Daubert, J., and Zareba, W.. *Card Electrophysiol Rev* 2002 :463-5

Long-term survival after permanent pacemaker implantation: analysis of predictors for increased mortality. Pyatt, J. R., Somauroo, J. D., Jackson, M., Grayson, A. D., Osula, S., Aggarwal, R. K., Charles, R. G., and Connelly, D. T.. *Europace* 2002 :113-9

Ventricular pacing or dual-chamber pacing for sinus-node dysfunction. Lamas, G. A., Lee, K. L., Sweeney, M. O., Silverman, R., Leon, A., Yee, R., Marinchak, R. A., Flaker, G., Schron, E., Orav, E. J., Hellkamp, A. S., Greer, S., McAnulty, J., Ellenbogen, K., Ehlert, F., Freedman, R. A., Estes, N. A. 3rd, Greenspon, A., and Goldman, L.. *N Engl J Med* 2002 :1854-62

Biventricular pacing in patients with ICD: how many patients are possible candidates?. Werling, C., Weisse, U., Siemon, G., Kiessling, A. H., Rameken, M., Schwacke, H., Saggau, W., Senges, J., and Seidl, K.. *Thorac Cardiovasc Surg* 2002 :67-70

Frontiers in congestive heart failure: initial experience with an implantable cardioverter-defibrillator incorporating cardiac resynchronization therapy. Tepper, D.. *Congest Heart Fail* 2002 :91

Left ventricular dyssynchrony assessed by gated SPECT phase analysis is an independent predictor of death in patients with advanced coronary artery disease and reduced left ventricular function not undergoing cardiac resynchronization therapy. Uebles, C., Hellweger, S., Laubender, R. P., Becker, A., Sohn, H.-Y., Lehner, S., Haug, A., Bartenstein, P., Cumming, P., Van Kriekinge, S. D., Slomka, P. J., and Hacker, M.. *Eur. J. Nucl. Med. Mol. Imaging* 2012 :1561-1569

Infection after implantation of pulsatile mechanical circulatory support devices. Holman, W. L., Kirklin, J. K., Naftel, D. C., Kormos, R. L., Desvign-Nickens, P., Camacho, M. T., and Ascheim, D. D.. *J. Thorac. Cardiovasc. Surg.* 2010 :1632-1636.e2

Clinical Characteristics and Long-term Prognosis in Patients with Chronic Heart Failure and Reduced Ejection Fraction in China. Liu X., Yu H., Pei J., Chu J., Pu J., and Zhang S.. *Heart Lung Circul.* 2014 :

Heart rate turbulence predicts ICD-resistant mortality in ischaemic heart disease. Marynissen T., Flore V.,

Heidbuchel H., Nuyens D., Ector J., and Willems R..
Europace 2014 :1069-1077

Follow-up of implantable cardioverter-defibrillator therapy: comparison of coronary artery disease and dilated cardiomyopathy. Verhagen, M. P., van Boven, N., Ruiter, J. H., Kimman, G. J., Tahapary, G. J., and Umans, V. A..
Neth Heart J 2014 :431-7

Patients with long-term permanent pacemakers have a high prevalence of left ventricular dysfunction. Gierula, J., Cubbon, R. M., Jamil, H. A., Byrom, R. J., Waldron, Z. L., Pavitt, S., Kearney, M. T., and Witte, K. K.. J Cardiovasc Med (Hagerstown) 2014 :

Association between prophylactic implantable cardioverter-defibrillators and survival in patients with left ventricular ejection fraction between 30% and 35%. Al-Khatib, S. M., Hellkamp, A. S., Fonarow, G. C., Mark, D. B., Curtis, L. H., Hernandez, A. F., Anstrom, K. J., Peterson, E. D., Sanders, G. D., Al-Khalidi, H. R., Hammill, B. G., Heidenreich, P. A., and Hammill, S. C.. JAMA 2014 :2209-15

Fragmentation of the Paced QRS Complex: A Marker of Antitachycardia Pacing Effectiveness Among ICD Patients. Jimenez-Candil, J., Morinigo, J. L., Hernandez, J., Martin, A., Duran, O., Carlos Rama, J., Ledesma, C., and Sanchez, P. L.. J Cardiovasc Electrophysiol 2014 :1100-8

Renal Dysfunction and Clinical Outcomes of Patients Undergoing ICD and CRTD Implantation: Data from the Israeli ICD Registry. Eisen, A., Suleiman, M., Strasberg, B., Sela, R., Rosenheck, S., Freedberg, N. A., Geist, M., Ben-Zvi, S., Goldenberg, I., Glikson, M., and Haim, M.. J Cardiovasc Electrophysiol 2014 :990-7

Use of the 6-min walk distance to identify variations in treatment benefits from implantable cardioverter-defibrillator and amiodarone: results from the SCD-HeFT (Sudden Cardiac Death in Heart Failure Trial). Fishbein, D. P., Hellkamp, A. S., Mark, D. B., Walsh, M. N., Poole, J. E., Anderson, J., Johnson, G., Lee, K. L., and Bardy, G. H.. J Am Coll Cardiol 2014 :2560-8

Cardiac contractility modulation: first experience in heart failure patients with reduced ejection fraction and permanent atrial fibrillation. Roger, S., Schneider, R., Rudic, B., Liebe, V., Stach, K., Schimpf, R., Borggrefe, M., and Kuschyk, J.. Europace 2014 :1205-9

Depression and outcome among veterans with implantable cardioverter defibrillators with or without cardiac resynchronization therapy capability. Shalaby, A. A., Brumberg, G. E., Pointer, L., Bekelman, D. B., Rumsfeld, J. S., Yang, Y., Pellegrini, C. N., Heidenreich, P. A., Keung, E., Massie, B. M., and Varosy, P. D.. Pacing Clin Electrophysiol 2014 :994-1001

No Original Data

Effectiveness of implantable cardioverter defibrillators for primary prevention of sudden cardiac death in subgroups a

systematic review. Earley, A., Persson, R., Garlitski, A. C., Balk, E. M., and Uhlig, K.. Ann Intern Med 2014 :111-21

Biventricular pacing for adults with AV block and heart failure. . BMJ 2013 :f2719

A novel algorithm for individualized cardiac resynchronization therapy: rationale and design of the adaptive cardiac resynchronization therapy trial. Krum, H., Lemke, B., Birnie, D., Lee, K. L., Aonuma, K., Starling, R. C., Gasparini, M., Gorcsan, J., Rogers, T., Sambelashvili, A., Kalmes, A., and Martin, D.. Am Heart J 2012 :747-752.e1

Preventive cardiac resynchronisation therapy. Klein, H. U.. Heart 2012 :508-15

Device therapy: Indications for ICD-CRT in mildly symptomatic heart failure. Holzmeister, J. and Abraham, W. T.. Nat Rev Cardiol 2010 :7-8

Cardiac resynchronization therapy and reduced risk of death and nonfatal heart failure events. St John Sutton, M.. Curr Heart Fail Rep 2009 :211-2

MADIT-CRT (Multicenter Automatic Defibrillator Implantation Trial-Cardiac Resynchronization Therapy): cardiac resynchronization therapy towards early management of heart failure. Breithardt, G.. Eur Heart J 2009 :2551-3

Is echocardiographic assessment of dyssynchrony useful to select candidates for cardiac resynchronization therapy? Echocardiography is not useful before cardiac resynchronization therapy if QRS duration is available. Prinzen, F. W. and Auricchio, A.. Circ Cardiovasc Imaging 2008 :70-7; discussion 78

Usefulness of pulmonary artery pressure by echocardiography to predict outcome in patients receiving cardiac resynchronization therapy heart failure. Shalaby, A., Voigt, A., El-Saed, A., and Saba, S.. Am J Cardiol 2008 :238-41

What can happen during coronary sinus lead implantation: dislocation, perforation and other catastrophes. Nagele, H., Behrens, S., and Azizi, M.. Herzschrittmacherther Elektrophysiol 2007 :243-9

Predictors of response to cardiac resynchronization therapy (PROSPECT)--study design. Yu, C. M., Abraham, W. T., Bax, J., Chung, E., Fedewa, M., Ghio, S., Leclercq, C., Leon, A. R., Merlino, J., Nihoyannopoulos, P., Notabartolo, D., Sun, J. P., and Tavazzi, L.. Am Heart J 2005 :600-5

MADIT-II: clinical implications. Moss, A. J., Daubert, J., and Zareba, W.. Card Electrophysiol Rev 2002 :463-5

Frontiers in congestive heart failure: Ventricular contraction abnormalities in dilated cardiomyopathy: effect of biventricular pacing to correct interventricular dyssynchrony. Tepper, D.. Congest Heart Fail 2000 :224

A double jolt for heart failure. . Harv Heart Lett 2002 :5-6

Management of cardiac device-related infections: A review of protocol-driven care. Rodriguez, Y., Garisto, J., and Carrillo, R. G.. Int. J. Cardiol. 2013 :55-60

Effect of cardiac resynchronization therapy and implantable cardioverter defibrillator on quality of life in patients with heart failure: A meta-analysis. Chen, S., Yin, Y., and Krucoff, M. W.. *Europace* 2012 :1602-1607

Meta-analysis of randomized controlled trials comparing isolated left ventricular and biventricular pacing in patients with chronic heart failure. Liang, Y., Pan, W., Su, Y., and Ge, J.. *Am. J. Cardiol.* 2011 :1160-1165

Heart failure: Cardiac device therapy in elderly patients insights from 'real world' practice. King, A.. *Nat. Rev. Cardiol.* 2010 :357

Resynchronization therapy in patients with narrow QRS (RethinQ). . *ACC Cardiosource Rev. J.* 2007 :30

NYHA functional class IV patients: Cardiac Resynchronization therapy with defibrillator back up. Fusco, A.. *Mediterr. J. Pacing Electrophysiol.* 2007 :106-108

Does cardiac resynchronization therapy reduce the incidence of atrial fibrillation, and does atrial fibrillation compromise the cardiac resynchronization therapy effect?. Saxon, L. A.. *Heart Rhythm* 2007 :S31-S33

Expansion of ICD indications: Resynchronization therapy and the ICD. Auricchio, A. and Klein, H. U.. *Card. Electrophysiol. Rev.* 2001 :35-40

Cardiac resynchronization: Materials, technique and results. The InSync Italian Registry. Ricci, R., Ansalone, G., Toscano, S., Pignalberi, C., Lunati, M., Gasparini, M., Padeletti, L., Disertori, M., Ravazzi, P. A., and Santini, M.. *Eur. Heart J. Suppl.* 2000 :J6-J15

Superresponse to cardiac resynchronization therapy. Steffel, J. and Ruschitzka, F.. *Circulation* 2014 :87-90

Not in English

Biventricular pacing--early experience. Pires, R., Elvas, L., Monteiro, P., Cristovao, J., Antunes, A., Ventura, M., Costa, M., Ermida, P., and Providencia, L. A.. *Rev Port Cardiol* 2001 :1235-9

Mechanical dyssynchrony is similar in different patterns of left bundle-branch block: A dissincronia mecanica e semelhante em diferentes padroes do bloqueio de ramo esquerdo. Barretto, R. B. M., Piegas, L. S., Assef, J. E., Melo Neto, J. F., Resende, T. U., Moreira, D. A., Lebihan, D. C., Franca, F. F., Meneghelo, R. S., and Sousa, A. G. M. R.. *Arq. Bras. Cardiol.* 2013 :449-455

No full report

Cardiac resynchronization therapy and reduced risk of death and nonfatal heart failure events. St John Sutton, M.. *Curr Heart Fail Rep* 2009 :211-2

Comparison of acute changes in left ventricular volume, systolic and diastolic functions, and intraventricular synchronicity after biventricular and right ventricular

pacing for heart failure. Yu, C. M., Lin, H., Fung, W. H., Zhang, Q., Kong, S. L., and Sanderson, J. E.. *Am Heart J* 2003 :E18

Frontiers in congestive heart failure: Ventricular contraction abnormalities in dilated cardiomyopathy: effect of biventricular pacing to correct interventricular dyssynchrony. Tepper, D.. *Congest Heart Fail* 2000 :224

Frontiers in congestive heart failure: initial experience with an implantable cardioverter-defibrillator incorporating cardiac resynchronization therapy. Tepper, D.. *Congest Heart Fail* 2002 :91

Optimization of cardiac resynchronization therapy in non-responders. Sepsi, M., Krivan, L., Koza K, M., Sebo, M., Poloczek, M., Jarkovsky, J., Rybka, L., Kubkova, L., Vlasinova, J., and Spinar, J.. *Cor Vasa* 2013 :E293-E300

Comparison of the Effects of Cardiac Resynchronization Therapy in Patients With Class II vs Class III and IV Heart Failure (From the InSync/InSync ICD Italian Registry). Harris, S., Tepper, D., and Ip, R.. *Congestive Heart Fail.* 2013 :

Not relevant to Key Questions

Predictors and Outcomes of 'Super-Response' to Cardiac Resynchronization Therapy. Killu, A. M., Grupper, A., Friedman, P. A., Powell, B. D., Asirvatham, S. J., Espinosa, R. E., Luria, D., Rozen, G., Buber, Y., Lee, Y. H., Webster, T., Brooke, K. L., Hodge, D. O., Wiste, H. J., Glikson, M., and Cha, Y. M.. *J Card Fail* 2014 :

Cardiac Resynchronization Therapy in Patients With Atrial Fibrillation: The CERTIFY Study (Cardiac Resynchronization Therapy in Atrial Fibrillation Patients Multinational Registry). Gasparini, M., Leclercq, C., Lunati, M., Landolina, M., Auricchio, A., Santini, M., Boriani, G., Lamp, B., Proclemer, A., Curnis, A., Klersy, C., and Leyva, F.. *JACC Heart Fail* 2013 :500-7

Evaluation of Global Longitudinal Strain of Left Ventricle and Regional Longitudinal Strain in the Region of Left Ventricular Leads Predicts the Response to Cardiac Resynchronization Therapy in Patients with Ischemic Heart Failure. Ma, C. Y., Liu, S., Yang, J., Tang, L., Zhang, L. M., Li, N., and Yu, B.. *Cell Biochem Biophys* 2014 :

Sites of latest mechanical activation as assessed by SPECT myocardial perfusion imaging in ischemic and dilated cardiomyopathy patients with LBBB. Lin, X., Xu, H., Zhao, X., and Chen, J.. *Eur J Nucl Med Mol Imaging* 2014 :

Septal flash predicts cardiac resynchronization therapy response in patients with permanent atrial fibrillation. Gabrielli, L., Marincheva, G., Bijmens, B., Doltra, A., Tolosana, J. M., Borrás, R., Castel, M. A., Berrueto, A., Brugada, J., Mont, L., and Sitges, M.. *Europace* 2014 :

Left Ventricular Lead Position and Outcomes in the Resynchronization-Defibrillation for Ambulatory Heart

Failure Trial (RAFT). Wilton, S. B., Exner, D. V., Healey, J. S., Birnie, D., Arnold, M. O., Sapp, J. L., Thibault, B., Simpson, C. S., Tung, S., Crystal, E., Sivakumaran, S., Khaykin, Y., Yetisir, E., Wells, G., and Tang, A. S.. *Can J Cardiol* 2013 :

Sex differences in implantable cardioverter-defibrillator implantation indications and outcomes: lessons from the Nationwide Israeli-ICD Registry. Amit, G., Suleiman, M., Konstantino, Y., Luria, D., Kazatsker, M., Chetboun, I., Haim, M., Gavrielov-Yusim, N., Goldenberg, I., and Glikson, M.. *Europace* 2014 :

Outcomes after atrioventricular node ablation and biventricular pacing in patients with refractory atrial fibrillation and heart failure: a comparison between non-ischaemic and ischaemic cardiomyopathy. Sohinki, D., Ho, J., Srinivasan, N., Collins, L. J., and Obel, O. A.. *Europace* 2014 :

Physical activity measured with implanted devices predicts patient outcome in chronic heart failure. Conraads, V. M., Spruit, M. A., Braunschweig, F., Cowie, M. R., Tavazzi, L., Borggrefe, M., Hill, M. R., Jacobs, S., Gerritse, B., and van Veldhuisen, D. J.. *Circ Heart Fail* 2014 :279-87

Relationship between Two-Dimensional Speckle-Tracking Septal Strain and Response to Cardiac Resynchronization Therapy in Patients with Left Ventricular Dysfunction and Left Bundle Branch Block: A Prospective Pilot Study. Marechaux, S., Guiot, A., Castel, A. L., Guyomar, Y., Semichon, M., Delelis, F., Heuls, S., Ennezat, P. V., Graux, P., and Tribouilloy, C.. *J Am Soc Echocardiogr* 2014 :

Impact of Diabetes Mellitus on the Clinical Response to Cardiac Resynchronization Therapy in Elderly People. Sardu, C., Marfella, R., and Santulli, G.. *J Cardiovasc Transl Res* 2014 :

Implantable device diagnostics on day of discharge identify heart failure patients at increased risk for early readmission for heart failure. Small, R. S., Whellan, D. J., Boyle, A., Sarkar, S., Koehler, J., Warman, E. N., and Abraham, W. T.. *Eur J Heart Fail* 2013 :

Echocardiography-guided left ventricular lead placement for cardiac resynchronization therapy in ischemic vs nonischemic cardiomyopathy patients. Daya, H. A., Alam, M. B., Adelstein, E., Schwartzman, D., Jain, S., Marek, J., Gorcsan, J., and Saba, S.. *Heart Rhythm* 2014 :614-9

Effect of cardiac resynchronization therapy on the sequence of mechanical activation assessed by two-dimensional radial strain imaging. Auger, D., Hoke, U., Thijssen, J., Abate, E., Yiu, K. H., Ewe, S. H., Witkowski, T. G., Leong, D. P., Holman, E. R., Ajmone Marsan, N., Schali, M. J., Bax, J. J., and Delgado, V.. *Am J Cardiol* 2014 :982-7

Preserved contractile reserve in a dobutamine test for the prediction of a response to resynchronisation therapy in ischaemic and non-ischaemic cardiomyopathy - A multicenter ViaCRT study. Mizia-Stec, K., Wita, K., Mizia, M., Szwed, H., Nowalany-Kozielecka, E., Chrzanowski, L., Lobo-Grudzien, K., Gackowski, A., Gilewski, W.,

Chmiel, A., Sicari, R., and Plonska-Gosciniak, E.. *Int J Cardiol* 2014 :476-7

Circulating Endothelial Progenitor Cells as a Predictor of Response to Cardiac Resynchronization Therapy: The Missing Piece of the Puzzle?. Antonio, N., Soares, A., Carvalho, T., Fernandes, R., Paiva, A., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., Providencia, L. A., Fontes Ribeiro, C., and Mariano Pego, G.. *Pacing Clin Electrophysiol* 2014 :

Discrepancy between Electrical and Mechanical Dyssynchrony in Patients with Heart Failure and an Electrical Disturbance. Fujiwara, R., Yoshida, A., Fukuzawa, K., Takei, A., Kiuchi, K., Itoh, M., Imamura, K., Suzuki, A., Nakanishi, T., Yamashita, S., Matsumoto, A., Tanaka, H., and Hirata, K. I.. *Pacing Clin Electrophysiol* 2013 :

The Effect of Weight Loss on Clinical Outcomes in Patients Implanted With a Cardiac Resynchronization Therapy Device-A MADIT-CRT Substudy. Aktas, M. K., Zareba, W., Huang, D. T., McNitt, S., Polonsky, S., Chen, L., Stockburger, M., Merkely, B., Moss, A. J., and Kutyla, V.. *J Card Fail* 2014 :183-9

Left atrial volume and the benefit of cardiac resynchronization therapy in the MADIT-CRT trial. Kuperstein, R., Goldenberg, I., Moss, A. J., Solomon, S., Bourgoun, M., Shah, A., McNitt, S., Zareba, W., and Klempfner, R.. *Circ Heart Fail* 2014 :154-60

Clinical Benefit of Cardiac Resynchronization Therapy With a Defibrillator in Patients With an Ejection Fraction >35% Estimated by Cardiac Magnetic Resonance. Fabregat-Andres, O., Garcia-Gonzalez, P., Valle-Munoz, A., Estornell-Erill, J., Perez-Bosca, L., Palanca-Gil, V., Paya-Serrano, R., Quesada-Dorador, A., Morell, S., and Ridocci-Soriano, F.. *Rev Esp Cardiol* 2014 :107-113

Long-term outcome of 'super-responder' patients to cardiac resynchronization therapy. Zecchin, M., Proclemer, A., Magnani, S., Vitali-Serdoz, L., Facchin, D., Muser, D., Nordio, A., Barbati, G., Puggia, I., Sinagra, G., and Proclemer, A.. *Europace* 2014 :363-71

Changes in renal function over time in patients with cardiac resynchronisation therapy. Schaer, B. A., Hitz, L., Sticherling, C., Kuhne, M., Dickenmann, M., Jordaens, M., Osswald, L., and Theuns, S.. *Swiss Med Wkly* 2013 :w13863

Cardiac perforation from implantable cardioverter-defibrillator lead placement: insights from the national cardiovascular data registry. Hsu, J. C., Varosy, P. D., Bao, H., Dewland, T. A., Curtis, J. P., and Marcus, G. M.. *Circ Cardiovasc Qual Outcomes* 2013 :582-90

Impact of atrial fibrillation on early complications and one year-survival after cardioverter defibrillator implantation: results from the German DEVICE registry. Kobe, J., Wasmer, K., Andresen, D., Kleemann, T., Spitzer, S. G., Jehle, J., Brachmann, J., Stellbrink, C., Hochadel, M., Senges, J., Klein, H. U., and Eckardt, L.. *Int J Cardiol* 2013 :4184-90

- Relationship of electro-mechanical remodeling to survival rates after cardiac resynchronization therapy. Kiani, J., Agarwal, S. K., Kamireddy, S., Adelstein, E., and Saba, S.. *Tex Heart Inst J* 2013 :268-73
- Cystatin C as a predictor of mortality and cardiovascular morbidity after cardiac resynchronization therapy. Yamamoto, T., Shimano, M., Inden, Y., Miyata, S., Inoue, Y., Yoshida, N., Tsuji, Y., Hirai, M., and Murohara, T.. *Circ J* 2013 :2751-6
- Neutrophil-to-lymphocyte ratio predicts response to cardiac resynchronization therapy. Agacdiken, A., Celikyurt, U., Sahin, T., Karauzum, K., Vural, A., and Ural, D.. *Med Sci Monit* 2013 :373-7
- Cardiac resynchronization therapy: do patient selection and implant practice vary depending on the volume a center handles?. Hernandez Madrid, A., Matia Frances, R., Moro, C., and Zamorano, J.. *Pacing Clin Electrophysiol* 2013 :863-71
- A pilot study evaluating daily physical activity before and after cardiac resynchronization therapy. Sherry, D., Knight, B. P., Casey, C., Larson, J., Hacker, E. D., Quinn, L. T., Wang, E., and Collins, E. G.. *Biol Res Nurs* 2014 :31-7
- Effect of metoprolol versus carvedilol on outcomes in MADIT-CRT (multicenter automatic defibrillator implantation trial with cardiac resynchronization therapy). Ruwald, M. H., Ruwald, A. C., Jons, C., Alexis, J., McNitt, S., Zareba, W., and Moss, A. J.. *J Am Coll Cardiol* 2013 :1518-26
- Many response criteria are poor predictors of outcomes after cardiac resynchronization therapy: validation using data from the randomized trial. Boidol, J., Sredniawa, B., Kowalski, O., Szulik, M., Mazurek, M., Sokal, A., Pruszkowska-Skrzep, P., Kukulski, T., Kalarus, Z., and Lenarczyk, R.. *Europace* 2013 :835-44
- Acute effects of withdrawal of cardiac resynchronization therapy on left and right ventricular function, dyssynchrony, and contractile function in patients with New York Heart Association functional class I/II heart failure: MADIT-CRT. Knappe, D., Pouleur, A. C., Shah, A. M., Bourgoun, M., Brown, M. W., Foster, E., Pfeffer, M. A., Moss, A. J., and Solomon, S. D.. *J Card Fail* 2013 :149-55
- Radial strain delay based on segmental timing and strain amplitude predicts left ventricular reverse remodeling and survival after cardiac resynchronization therapy. Kydd, A. C., Khan, F. Z., O'Halloran, D., Pugh, P. J., Virdee, M. S., and Dutka, D. P.. *Circ Cardiovasc Imaging* 2013 :177-84
- Resolution of left bundle branch block-induced cardiomyopathy by cardiac resynchronization therapy. Vaillant, C., Martins, R. P., Donal, E., Leclercq, C., Thebault, C., Behar, N., Mabo, P., and Daubert, J. C.. *J Am Coll Cardiol* 2013 :1089-95
- Echocardiographic changes after cardiac resynchronisation therapy. Praus, R., Haman, L., Tauchman, M., Pudil, R., Blaha, V., and Parizek, P.. *Kardiologia Pol* 2012 :1250-7
- QRS axis and the benefit of cardiac resynchronization therapy in patients with mildly symptomatic heart failure enrolled in MADIT-CRT. Brenyo, A., Rao, M., Barsheshet, A., Cannom, D., Quesada, A., McNitt, S., Huang, D. T., Moss, A. J., and Zareba, W.. *J Cardiovasc Electrophysiol* 2013 :442-8
- Predictive factors and clinical effect of optimized cardiac resynchronization therapy. Xu, G. J., Gan, T. Y., Tang, B. P., Ma, Y. T., Zhang, Y., Li, J. X., Zhang, Y. Y., Wang, J., Tang, Q., Wang, C. M., Li, Y. D., and Zhang, J. H.. *Exp Ther Med* 2013 :355-361
- Effects of smoking in patients treated with cardiac resynchronization therapy. Perrotta, L., Xhaferi, B., Chiostri, M., Pieragnoli, P., Ricciardi, G., Di Biase, L., Natale, A., Ricceri, I., Biria, M., Lakkireddy, D., Valleggi, A., Emdin, M., Michelotti, F., Mascioli, G., Pandozi, A., Santini, M., and Padeletti, L.. *Intern Emerg Med* 2014 :311-8
- Influence of diabetes on left ventricular systolic and diastolic function and on long-term outcome after cardiac resynchronization therapy. Hoke, U., Thijssen, J., van Bommel, R. J., van Erven, L., van der Velde, E. T., Holman, E. R., Schali, M. J., Bax, J. J., Delgado, V., and Marsan, N. A.. *Diabetes Care* 2013 :985-91
- Incremental value of inefficient deformation indices for predicting response to cardiac resynchronization therapy. Chan, Y. H., Wu, L. S., Kuo, C. T., Wang, C. L., Yeh, Y. H., Ho, W. J., and Hsu, L. A.. *J Am Soc Echocardiogr* 2013 :307-15
- Prediction of long-term outcome of cardiac resynchronization therapy by acute pressure-volume loop measurements. de Roest, G. J., Allaart, C. P., Kleijn, S. A., Delnoy, P. P., Wu, L., Hendriks, M. L., Bronzwaer, J. G., van Rossum, A. C., and de Cock, C. C.. *Eur J Heart Fail* 2013 :299-307
- Improvement of left ventricular function under cardiac resynchronization therapy goes along with a reduced incidence of ventricular arrhythmia. Eickholt, C., Siekiera, M., Kirmanoglou, K., Rodenbeck, A., Heussen, N., Schauerte, P., Lichtenberg, A., Balzer, J., Rassaf, T., Perings, S., Kelm, M., Shin, D. I., and Meyer, C.. *PLoS One* 2012 :e48926
- Do baseline diastolic echocardiographic parameters predict outcome after resynchronization therapy? Results from the PROSPECT trial. Sullivan, R. M., Murillo, J., Gerritse, B., Chung, E., Orlov, M. V., Stegmann, B., Fedewa, M., Peterson, B. J., Sun, J. P., and Olshansky, B.. *Pacing Clin Electrophysiol* 2013 :214-20
- Comparison of three-dimensional echocardiographic software packages for assessment of left ventricular mechanical dyssynchrony and prediction of response to cardiac resynchronization therapy. Aly, M. F., Kleijn, S. A., de Boer, K., Abd El-Hady, Y. A., Sorour, K. A., Kandil, H. I., van Rossum, A. C., and Kamp, O.. *Eur Heart J Cardiovasc Imaging* 2013 :700-10
- Tpeak - Tend and Tpeak - Tend /QT ratio as markers of ventricular arrhythmia risk in cardiac resynchronization

- therapy patients. Barbhaiya, C., Po, J. R., Hanon, S., and Schweitzer, P.. *Pacing Clin Electrophysiol* 2013 :103-8
- Number of leads with fragmented QRS predicts response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Al, N., Kozdag, G., Vural, A., and Ural, D.. *Clin Cardiol* 2013 :36-9
- Adjustments of heart failure medication after implantation of a cardiac resynchronization therapy defibrillator. Hitz, L., Kuhne, M. S., Sticherling, C., Osswald, S., and Schaer, B. A.. *Minerva Med* 2012 :361-7
- Acute and mid-term outcomes of transvenous implant of a new left ventricular quadripolar lead versus bipolar leads for cardiac resynchronization therapy: results from a single-center prospective database. Arias, M. A., Pachon, M., Puchol, A., Jimenez-Lopez, J., and Rodriguez-Padial, L.. *Cardiol J* 2012 :470-8
- A reduction in total isovolumic time with cardiac resynchronisation therapy is a predictor of clinical outcomes. Guha, K., Mantziari, L., Sharma, R., McDonagh, T. A., Gibson, D., and Duncan, A. M.. *Int J Cardiol* 2013 :382-7
- Development of a method to risk stratify patients with heart failure for 30-day readmission using implantable device diagnostics. Whellan, D. J., Sarkar, S., Koehler, J., Small, R. S., Boyle, A., Warman, E. N., and Abraham, W. T.. *Am J Cardiol* 2013 :79-84
- High sensitivity C-reactive protein predicts nonresponders and cardiac deaths in severe heart failure patients after CRT implantation. Kamioka, M., Suzuki, H., Yamada, S., Kamiyama, Y., Saitoh, S., and Takeishi, Y.. *Int Heart J* 2012 :306-12
- Left ventricular midwall fibrosis as a predictor of mortality and morbidity after cardiac resynchronization therapy in patients with nonischemic cardiomyopathy. Leyva, F., Taylor, R. J., Foley, P. W., Umar, F., Mulligan, L. J., Patel, K., Stegemann, B., Haddad, T., Smith, R. E., and Prasad, S. K.. *J Am Coll Cardiol* 2012 :1659-67
- Hyponatremia as a predictor for worsening heart failure in patients receiving cardiac resynchronization therapy. Arao, K., Fujiwara, T., Sakakura, K., Wada, H., Sugawara, Y., Suga, C., Ako, J., Ishikawa, S. E., and Momomura, S.. *Circ J* 2013 :116-22
- Baseline vectorcardiography as a predictor of invasively determined acute hemodynamic response to cardiac resynchronization therapy. Schau, T., Koglek, W., Brandl, J., Seifert, M., Meyhofer, J., Neuss, M., Grimm, G., Bitschnau, R., and Butter, C.. *Clin Res Cardiol* 2013 :129-38
- Effects of biventricular pacing on right ventricular function assessed by standard echocardiography. Kusiak, A., Wilinski, J., Wojciechowska, W., Jastrzebski, M., Sondej, T., Bacior, B., Kloch-Badelek, M., and Czarnecka, D.. *Kardiologia Pol* 2012 :883-8
- Utility of combined assessment of baseline dyssynchrony and its acute improvement to predict long-term outcomes after cardiac resynchronization therapy. Imanishi, J., Tanaka, H., Matsumoto, K., Tatsumi, K., Miyoshi, T., Hiraishi, M., Kaneko, A., Ryo, K., Fukuda, Y., Yoshida, A., Yokoyama, M., Kawai, H., and Hirata, K.. *Am J Cardiol* 2012 :1814-9
- Electrical delay in apically positioned left ventricular leads and clinical outcome after cardiac resynchronization therapy. Kandala, J., Upadhyay, G. A., Altman, R. K., Bose, A., Heist, E. K., Mela, T., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2013 :182-7
- Effects of tricuspid valve regurgitation on clinical and echocardiographic outcome in patients with cardiac resynchronization therapy. Abu Sham'a, R., Buber, J., Grupper, A., Nof, E., Kuperstein, R., Luria, D., Feinberg, M. S., Eldar, M., and Glikson, M.. *Europace* 2013 :266-72
- Relationship between fragmented QRS and response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Al, N., Vural, A., and Ural, D.. *J Interv Card Electrophysiol* 2012 :337-42; discussion 342
- Improvement in coronary blood flow velocity with acute biventricular pacing is predominantly due to an increase in a diastolic backward-travelling decompression (suction) wave. Kyriacou, A., Whinnett, Z. I., Sen, S., Pabari, P. A., Wright, I., Cornelussen, R., Lefroy, D., Davies, D. W., Peters, N. S., Kanagaratnam, P., Mayet, J., Hughes, A. D., Francis, D. P., and Davies, J. E.. *Circulation* 2012 :1334-44
- The ECG in cardiac resynchronization therapy: influence of left and right ventricular preactivation and relation to acute response. Bogaard, M. D., Hesselink, T., Meine, M., Loh, P., Hauer, R. N., Cramer, M. J., Doevendans, P. A., and Tuinenburg, A. E.. *J Cardiovasc Electrophysiol* 2012 :1237-45
- Adaptive servo ventilation improves Cheyne-Stokes respiration, cardiac function, and prognosis in chronic heart failure patients with cardiac resynchronization therapy. Miyata, M., Yoshihisa, A., Suzuki, S., Yamada, S., Kamioka, M., Kamiyama, Y., Yamaki, T., Sugimoto, K., Kunii, H., Nakazato, K., Suzuki, H., Saitoh, S., and Takeishi, Y.. *J Cardiol* 2012 :222-7
- The prevalence of methicillin resistant organisms among pacemaker and defibrillator implant recipients. Rodriguez, D. J., Afzal, A., Evonich, R., and Haines, D. E.. *Am J Cardiovasc Dis* 2012 :116-22
- Changes in global longitudinal strain during rest and exercise in patients treated with cardiac resynchronization therapy. Valzania, C., Gadler, F., Boriani, G., and Eriksson, M. J.. *Clin Physiol Funct Imaging* 2012 :310-6
- Clinical efficacy of cardiac resynchronization therapy with an implantable defibrillator in a Japanese population: results of the MIRACLE-ICD outcome measured in Japanese indication (MOMIJI) study. Momomura, S., Tsutsui, H., Sugawara, Y., Ito, M., Mitsuhashi, T., Fukamizu, S., Noro, M., Matsumoto, N., Tejima, T., and Sugi, K.. *Circ J* 2012 :1911-9
- A strategy to achieve CRT response in permanent atrial fibrillation without obligatory atrioventricular node

- ablation. Himmel, F., Reppel, M., Mortensen, K., Schunkert, H., and Bode, F.. *Pacing Clin Electrophysiol* 2012 :943-7
- Effect of cardiac resynchronization therapy on left atrial reverse remodeling: role of echocardiographic AV delay optimization. Malagoli, A., Rossi, L., Franchi, F., Piepoli, M. F., Malavasi, V., Casali, E., Modena, M. G., and Villani, G. Q.. *Int J Cardiol* 2013 :1456-60
- Cardiac resynchronization therapy modulation of exercise left ventricular function and pulmonary O₂ uptake in heart failure. Tomczak, C. R., Paterson, I., Haykowsky, M. J., Lawrance, R., Martellotto, A., Pantano, A., Gulamhusein, S., and Haennel, R. G.. *Am J Physiol Heart Circ Physiol* 2012 :H2635-45
- Performance of the Seattle Heart Failure Model in implantable defibrillator patients treated with cardiac resynchronization therapy. Smith, T., Levy, W. C., Schaer, B. A., Balk, A. H., Sticherling, C., Jordaens, L., and Theuns, D. A.. *Am J Cardiol* 2012 :398-402
- The effect of left ventricular (LV) remodeling on ventricular arrhythmia in cardiac resynchronization therapy (CRT-D) patients (antiarrhythmic effect of CRT). Shahrzad, S., Soleiman, N. K., Taban, S., Alizadeh, A., Aslani, A., Tavooosi, A., and Emkanjoo, Z.. *Pacing Clin Electrophysiol* 2012 :592-7
- Effect of cardiac resynchronization therapy on beat-to-beat T-wave amplitude variability. Zizek, D., Cvijic, M., Tasic, J., Jan, M., Frljak, S., and Zupan, I.. *Europace* 2012 :1646-52
- Response to the Center for Medicare & Medicaid Services coverage with evidence development request for primary prevention implantable cardioverter-defibrillators: data from the OMNI study. Sweeney, M. O., Sakaguchi, S., Simons, G., Machado, C., Connett, J. E., and Yang, F.. *Heart Rhythm* 2012 :1058-66
- Appropriate therapies predict long-term mortality in primary and secondary prevention of sudden cardiac death. Stabile, G., D'Agostino, C., Gallo, P., Marrazzo, N., Iuliano, A., De Simone, A., Turco, P., Palella, M., Donnici, G., Ciardiello, C., Napolitano, G., and Solimene, F.. *J Cardiovasc Med (Hagerstown)* 2013 :110-3
- New equation for prediction of reverse remodeling after cardiac resynchronization therapy. Hotta, V. T., Martinelli Filho, M., Mathias, W. Jr, and Vieira, M. L.. *Echocardiography* 2012 :678-87
- Comparison of left ventricular reverse remodeling induced by cardiac contractility modulation and cardiac resynchronization therapy in heart failure patients with different QRS durations. Zhang, Q., Chan, Y. S., Liang, Y. J., Fang, F., Lam, Y. Y., Chan, C. P., Lee, A. P., Chan, K. C., Wu, E. B., and Yu, C. M.. *Int J Cardiol* 2013 :889-93
- Cardiac resynchronization therapy in the real world: comparison with the COMPANION study. Bank, A. J., Burns, K. V., Gage, R. M., Vatterott, D. B., Adler, S. W., Sajady, M., Rohde, D., Parah, J. S., Anand, I., Yong, P., Seth, M., and Kubo, S. H.. *J Card Fail* 2012 :153-8
- Risk stratification of ischaemic patients with implantable cardioverter defibrillators by C-reactive protein and a multi-markers strategy: results of the CAMI-GUIDE study. Biasucci, L. M., Bellocci, F., Landolina, M., Rordorf, R., Vado, A., Menardi, E., Giubilato, G., Orazi, S., Sassari, M., Castro, A., Massa, R., Kheir, A., Zaccone, G., Klersy, C., Accardi, F., and Crea, F.. *Eur Heart J* 2012 :1344-50
- Influence of myocardial viability on responsiveness to cardiac resynchronization in ischemic dilated cardiomyopathy: a prospective observational cohort study. Pugliese, M., Minardi, G., Vitali, A., Natale, E., De Girolamo, P., Zampi, G., Leggio, M., Chiarelli, A., Pappalardo, A., Avella, A., Laurenzi, F., and Fera, M. S.. *Anadolu Kardiyol Derg* 2012 :132-41
- Acute and chronic response to CRT in narrow QRS patients. Donahue, T., Niazi, I., Leon, A., Stucky, M., and Herrmann, K.. *J Cardiovasc Transl Res* 2012 :232-41
- Effect of cardiac resynchronization therapy on cardiotrophin-1 circulating levels in patients with heart failure. Limongelli, G., Roselli, T., Pacileo, G., Calabro, P., Maddaloni, V., Masarone, D., Riegler, L., Gravino, R., Scarafile, R., Salerno, G., Miele, T., D'Andrea, A., Santangelo, L., Romano, M., Di Salvo, G., Russo, M. G., and Calabro, R.. *Intern Emerg Med* 2014 :43-50
- Reverse left ventricular remodeling is more likely in non ischemic cardiomyopathy patients upgraded to biventricular stimulation after chronic right ventricular pacing. Morales, M. A., Startari, U., Rossi, G., Panchetti, L., Rossi, A., and Piacenti, M.. *Cardiovasc Ultrasound* 2011 :41
- Greater response to cardiac resynchronization therapy in patients with true complete left bundle branch block: a PREDICT substudy. Perrin, M. J., Green, M. S., Redpath, C. J., Nery, P. B., Keren, A., Beanlands, R. S., and Birnie, D. H.. *Europace* 2012 :690-5
- Geographic variation in implantable cardioverter-defibrillator use and heart failure survival. Epstein, A. J., Polsky, D., Yang, F., Yang, L., and Groeneveld, P. W.. *Med Care* 2012 :10-7
- Impact of chronic atrial fibrillation in patients with severe heart failure and indication for CRT: data of two registries with 711 patients (1999-2006 and 2007-6/2008). Luedorff, G., Grove, R., Kowalski, M., Wolff, E., Thale, J., and Kranig, W.. *Herzschrittmacherther Elektrophysiol* 2011 :226-32
- Impact of mitral regurgitation on the outcome of patients treated with CRT-D: data from the InSync ICD Italian Registry. Boriani, G., Gasparini, M., Landolina, M., Lunati, M., Biffi, M., Santini, M., Padeletti, L., Molon, G., Botto, G., de Santo, T., and Valsecchi, S.. *Pacing Clin Electrophysiol* 2012 :146-54
- Baseline aortic pre-ejection interval predicts reverse remodeling and clinical improvement after cardiac resynchronization therapy. Aksoy, H., Okutucu, S., Aytemir, K., Kaya, E. B., Evranos, B., Kabakci, G., Tokgozoglu, L., Ozkutlu, H., and Oto, A.. *Cardiol J* 2011 :639-47

Association of galectin-3 and fibrosis markers with long-term cardiovascular outcomes in patients with heart failure, left ventricular dysfunction, and dyssynchrony: insights from the CARE-HF (Cardiac Resynchronization in Heart Failure) trial. Lopez-Andres, N., Rossignol, P., Iraqi, W., Fay, R., Nuee, J., Ghio, S., Cleland, J. G., Zannad, F., and Lacolley, P.. *Eur J Heart Fail* 2012 :74-81

Prospective evaluation of electrocardiographic parameters in cardiac resynchronization therapy: detecting nonresponders by left ventricular pacing. Kobe, J., Decherer, D. G., Rath, B., Reinke, F., Monnig, G., Wasmer, K., and Eckardt, L.. *Heart Rhythm* 2012 :499-504

Impact of mitral regurgitation on reverse remodeling and outcome in patients undergoing cardiac resynchronization therapy. Verhaert, D., Popovic, Z. B., De, S., Puntawangkoon, C., Wolski, K., Wilkoff, B. L., Starling, R. C., Tang, W. H., Thomas, J. D., Griffin, B. P., and Grimm, R. A.. *Circ Cardiovasc Imaging* 2012 :21-6

Right ventricular dysfunction is a predictor of non-response and clinical outcome following cardiac resynchronization therapy. Alpendurada, F., Guha, K., Sharma, R., Ismail, T. F., Clifford, A., Banya, W., Mohiaddin, R. H., Pennell, D. J., Cowie, M. R., McDonagh, T., and Prasad, S. K.. *J Cardiovasc Magn Reson* 2011 :68

Additive value of severe diastolic dysfunction and contractile reserve in the identification of responders to cardiac resynchronization therapy. Ciampi, Q., Pratali, L., Citro, R., Villari, B., Picano, E., and Sicari, R.. *Eur J Heart Fail* 2011 :1323-30

Cardiac resynchronization in combination with beta blocker treatment in advanced chronic heart failure (CARIBE-HF): the results of the CARIBE-HF study. Grosu, A., Senni, M., Iacovoni, A., Gori, M., Cantu, F., Bisetti, S., De Santo, T., De Luca, A., and Gavazzi, A.. *Acta Cardiol* 2011 :573-80

Echocardiography-based qualification and response assessment to cardiac resynchronization therapy in patients with chronic heart failure. The matrix metalloproteinase-9 substudy. Szulik, M., Stabryla-Deska, J., Boidol, J., Lenarczyk, R., Kalarus, Z., and Kukulski, T.. *Kardiologia Pol* 2011 :1043-51

Presence of extensive LV remodeling limits the benefits of CRT in patients with intraventricular dyssynchrony. Carluccio, E., Biagioli, P., Alunni, G., Murrone, A., Pantano, P., Biscottini, E., Zuchi, C., Zingarini, G., Cavallini, C., and Ambrosio, G.. *JACC Cardiovasc Imaging* 2011 :1067-76

Long-term follow-up of cardiac resynchronization therapy: mechanical resynchronization and reverse left ventricular remodeling are predictive for long-term transplant-free survival. Faber, L., Vlachojannis, M., Oldenburg, O., Hering, D., Bogunovic, N., Horstkotte, D., and Lamp, B.. *Int J Cardiovasc Imaging* 2012 :1341-50

Ventricular tachycardia or ventricular fibrillation occurs less often in patients with left bundle branch block and combined resynchronization and defibrillators than in

patients with narrow QRS and conventional defibrillators. Blaschke, F., Knaus, T., Celebi, O., Krebs, A., Nitardy, A., Habedank, D., Dietz, R., and Stockburger, M.. *Europace* 2012 :224-9

Strong coherence between heart rate variability and intracardiac repolarization lability during biventricular pacing is associated with reverse electrical remodeling of the native conduction and improved outcome. Tereshchenko, L. G., Henrikson, C. A., and Berger, R. D.. *J Electrocardiol* 2011 :713-7

Absence of left ventricular apical rocking and atrial-ventricular dyssynchrony predicts non-response to cardiac resynchronization therapy. Tournoux, F., Singh, J. P., Chan, R. C., Chen-Tournoux, A., McCarty, D., Manzke, R., Ruskin, J. N., Semigran, M., Heist, E. K., Moore, S., Picard, M. H., and Weyman, A. E.. *Eur Heart J Cardiovasc Imaging* 2012 :86-94

Long term effects of cardiac resynchronization therapy in non-ambulatory NYHA IV heart failure patients. Theodorakis, G., Katsikis, A., Livanis, E., Kostopoulou, A., Adamopoulos, S., Tsiapras, D., and Voudris, V.. *Pacing Clin Electrophysiol* 2011 :1553-60

Relationship between left ventricular dyssynchrony and reverse remodeling after cardiac resynchronization therapy. Celikyurt, U., Vural, A., Sahin, T., Kilic, T., Agacdiken, A., and Ural, D.. *Clin Cardiol* 2011 :645-8

QRS duration and QTc interval are predictors of risk for ventricular arrhythmias during cardiac resynchronization therapy. Prochnau, D., Kuehnert, H., Figulla, H. R., and Surber, R.. *Acta Cardiol* 2011 :415-20

Predictors of response to cardiac resynchronization therapy in patients with a non-left bundle branch block morphology. Rickard, J., Bassiouny, M., Cronin, E. M., Martin, D. O., Varma, N., Niebauer, M. J., Tchou, P. J., Tang, W. H., and Wilkoff, B. L.. *Am J Cardiol* 2011 :1576-80

Effect of cardiac resynchronization therapy on thyroid function. Celikyurt, U., Agacdiken, A., Geyik, B., Kozdag, G., Vural, A., and Ural, D.. *Clin Cardiol* 2011 :703-5

The effect of cardiac resynchronization therapy on left ventricular diastolic function assessed with speckle-tracking echocardiography. Shanks, M., Antoni, M. L., Hoke, U., Bertini, M., Ng, A. C., Auger, D., Marsan, N. A., van Erven, L., Holman, E. R., Schalij, M. J., Bax, J. J., and Delgado, V.. *Eur J Heart Fail* 2011 :1133-9

Effective prediction of response to cardiac resynchronization therapy using a novel program of gated myocardial perfusion single photon emission computed tomography. Nakamura, K., Takami, M., Shimabukuro, M., Maesato, A., Chinen, I., Ishigaki, S., Higa, S., Keida, T., and Masuzaki, H.. *Europace* 2011 :1731-7

Relation between left ventricular morphology and reduction in functional mitral regurgitation by cardiac resynchronization therapy in patients with idiopathic dilated cardiomyopathy. Matsumoto, K., Tanaka, H.,

Okajima, K., Hayashi, T., Kajiya, T., Kawai, H., and Hirata, K.. *Am J Cardiol* 2011 :1327-34

Adverse effect of right ventricular pacing prevented by biventricular pacing during long-term follow-up: a randomized comparison. Albertsen, A. E., Mortensen, P. T., Jensen, H. K., Poulsen, S. H., Egeblad, H., and Nielsen, J. C.. *Eur J Echocardiogr* 2011 :767-72

Multicentre study using strain delay index for predicting response to cardiac resynchronization therapy (MUSIC study). Lim, P., Donal, E., Lafitte, S., Derumeaux, G., Habib, G., Reant, P., Thivolet, S., Lellouche, N., Grimm, R. A., and Gueret, P.. *Eur J Heart Fail* 2011 :984-91

Evaluation of baseline contractile reserve vs dyssynchrony as a predictor of functional improvement and long term outcome after resynchronization pacing therapy: a radionuclide stress study. Verna, E., Ghiringhelli, S., Scotti, S., and Caravati, F.. *J Nucl Cardiol* 2012 :53-62

Right ventricular lead positioning does not influence the benefits of cardiac resynchronization therapy in patients with heart failure and atrial fibrillation. Ronn, F., Kesek, M., Karp, K., Henein, M., and Jensen, S. M.. *Europace* 2011 :1747-52

Effect of carvedilol versus metoprolol CR/XL on mortality in patients with heart failure treated with cardiac resynchronization therapy: a COX multivariate regression analysis. Shen, X., Nair, C. K., Aronow, W. S., Hee, T., and Esterbrooks, D. J.. *Am J Ther* 2013 :247-53

Prognostic value of cardiac troponin T in patients with moderate to severe heart failure scheduled for cardiac resynchronization therapy. Aarones, M., Gullestad, L., Aakhus, S., Ueland, T., Skaardal, R., Aass, H., Wergeland, R., Smith, H. J., Aukrust, P., and Kongsgaard, E.. *Am Heart J* 2011 :1031-7

Benefits of cardiac resynchronization therapy in "very dilated cardiomyopathy". Lousinha, A., Oliveira, M. M., Feliciano, J., Galrinho, A., Branco, L. M., Cunha, P. S., Hamad, H., Ramos, R., Abreu, J., Leal, A., Santos, S., Soares, R., da Silva, M. N., and Ferreira, R. C.. *Rev Port Cardiol* 2011 :283-94

Effect of cardiac resynchronization therapy on libido and erectile dysfunction. Vural, A., Agacdiken, A., Celikyurt, U., Culha, M., Kahraman, G., Kozdag, G., and Ural, D.. *Clin Cardiol* 2011 :437-41

Relationship between improvement in left ventricular dyssynchrony and contractile function and clinical outcome with cardiac resynchronization therapy: the MADIT-CRT trial. Pouleur, A. C., Knappe, D., Shah, A. M., Uno, H., Bourgoun, M., Foster, E., McNitt, S., Hall, W. J., Zareba, W., Goldenberg, I., Moss, A. J., Pfeffer, M. A., and Solomon, S. D.. *Eur Heart J* 2011 :1720-9

Prognostic significance of atrial arrhythmias in a primary prevention ICD population. van Gelder, I. C., Phan, H. M., Wilkoff, B. L., Brown, M. L., Rogers, T., Peterson, B. J., and Birgersdotter-Green, U. M.. *Pacing Clin Electrophysiol* 2011 :1070-9

Electrical remodelling in cardiac resynchronization therapy: decrease in intrinsic QRS duration. Mischke, K., Knackstedt, C., Fache, K., Reith, S., Rana, O., Saygili, E., Gemein, C., Becker, M., Marx, N., and Schauerte, P.. *Acta Cardiol* 2011 :175-80

Peak longitudinal strain delay is superior to TDI in the selection of patients for resynchronisation therapy. Scheffer, M. G., van Dessel, P. F., van Gelder, B. M., Sutherland, G. R., and van Hemel, N. M.. *Neth Heart J* 2010 :574-82

Incidence and clinical relevance of uncontrolled ventricular rate during atrial fibrillation in heart failure patients treated with cardiac resynchronization therapy. Boriani, G., Gasparini, M., Landolina, M., Lunati, M., Proclemer, A., Lonardi, G., Iacopino, S., Rahue, W., Biffi, M., DiStefano, P., Grammatico, A., and Santini, M.. *Eur J Heart Fail* 2011 :868-76

Anodal stimulation: an underrecognized cause of nonresponders to cardiac resynchronization therapy. Dendy, K. F., Powell, B. D., Cha, Y. M., Espinosa, R. E., Friedman, P. A., Rea, R. F., Hayes, D. L., Redfield, M. M., and Asirvatham, S. J.. *Indian Pacing Electrophysiol J* 2011 :64-72

Usefulness of low-dose dobutamine echocardiography to predict response and outcome in patients undergoing cardiac resynchronization therapy. Altman, R. K., McCarty, D., Chen-Tournoux, A. A., Tournoux, F. B., Riedl, L., Orencole, M., Park, M. Y., Picard, M. H., and Singh, J. P.. *Am J Cardiol* 2011 :252-7

Additive value of right ventricular dyssynchrony indexes in predicting the success of cardiac resynchronization therapy: a speckle-tracking imaging study. Vitarelli, A., Franciosa, P., Nguyen, B. L., Capotosto, L., Ciccaglioni, A., Conde, Y., Iorio, G., De Curtis, G., Caranci, F., Vitarelli, M., Lucchetti, P., Dettori, O., and De Cicco, V.. *J Card Fail* 2011 :392-402

QRS fragmentation is not associated with poor response to cardiac resynchronization therapy. Rickard, J., Zardkoohi, O., Popovic, Z., Verhaert, D., Sraow, D., Baranowski, B., Martin, D. O., Grimm, R. A., Chung, M. K., Tchou, P., Lindsay, B. A., and Wilkoff, B. L.. *Ann Noninvasive Electrocardiol* 2011 :165-71

Dependency of cardiac resynchronization therapy on myocardial viability at the LV lead position. Becker, M., Zwicker, C., Kaminski, M., Napp, A., Altiok, E., Ocklenburg, C., Friedman, Z., Adam, D., Schauerte, P., Marx, N., and Hoffmann, R.. *JACC Cardiovasc Imaging* 2011 :366-74

Quantification of mechanical ventricular dyssynchrony: direct comparison of velocity-encoded and cine magnetic resonance imaging. Muellerleile, K., Baholli, L., Groth, M., Koopmann, K., Barmeyer, A., Gosau, N., Ventura, R., Rostock, T., Koester, R., Adam, G., Willems, S., and Lund, G.. *Rofe* 2011 :554-60

Elevated B-type natriuretic peptide is associated with increased in-hospital mortality or cardiac arrest in patients undergoing implantable cardioverter-defibrillator

implantation. Wei, S., Loyo-Berrios, N. I., Haigney, M. C., Cheng, H., Pinnow, E. E., Mitchell, K. R., Beachy, J. H., Woodward, A. M., Wang, Y., Curtis, J. P., and Marinac-Dabic, D.. *Circ Cardiovasc Qual Outcomes* 2011 :346-54

Relationship between mechanical and electrical remodelling in patients with cardiac resynchronization implanted defibrillators. Lellouche, N., De Diego, C., Boyle, N. G., Wiener, I., Akopyan, G., Child, J. S., and Shivkumar, K.. *Europace* 2011 :1180-7

Long-term response of the left ventricle to cardiac resynchronization therapy: insights from standard and strain echocardiography. Kalogeropoulos, A., Savoye, L. P., Georgiopoulos, V., Raj, L., Lloyd, M. S., Chiladakis, J., Lerakis, S., Alexopoulos, D., and Butler, J.. *Congest Heart Fail* 2011 :71-9

Cardiac resynchronization therapy reduces the risk of cardiac events in patients with diabetes enrolled in the multicenter automatic defibrillator implantation trial with cardiac resynchronization therapy (MADIT-CRT). Martin, D. T., McNitt, S., Nesto, R. W., Rutter, M. K., and Moss, A. J.. *Circ Heart Fail* 2011 :332-8

Predicting hyperresponse among pacemaker-dependent nonischemic cardiomyopathy patients upgraded to cardiac resynchronization. Adelstein, E., Schwartzman, D., Gorcsan, J. 3rd, and Saba, S.. *J Cardiovasc Electrophysiol* 2011 :905-11

Male gender and chronic obstructive pulmonary disease predict a poor clinical response in patients undergoing cardiac resynchronization therapy. Kirubakaran, S., Ladwiniec, A., Arujuna, A., Ginks, M., McPhail, M., Bostock, J., Carr-White, G., and Rinaldi, C. A.. *Int J Clin Pract* 2011 :281-8

Peak longitudinal strain delay is superior to TDI in the selection of patients for resynchronization therapy. Scheffer, M. G., van Dessel, P. F., van Gelder, B. M., Sutherland, G. R., and van Hemel, N. M.. *Neth Heart J* 2010 :574-82

The QRS narrowing index predicts reverse left ventricular remodeling following cardiac resynchronization therapy. Rickard, J., Popovic, Z., Verhaert, D., Sraow, D., Baranowski, B., Martin, D. O., Lindsay, B. D., Varma, N., Tchou, P., Grimm, R. A., Wilkoff, B. L., and Chung, M. K.. *Pacing Clin Electrophysiol* 2011 :604-11

Influence of aetiology on long-term effects of resynchronization on cardiac structure and function in patients treated with beta-blockers. Zaca, V., Baiocchi, C., Gaddi, R., Gentilini, R., Lunghetti, S., Padeletti, M., Pagliaro, A., Furiuzzi, F., Mondillo, S., and Favilli, R.. *J Cardiovasc Med (Hagerstown)* 2011 :227-33

Device-detected atrial tachyarrhythmias predict adverse outcome in real-world patients with implantable biventricular defibrillators. Santini, M., Gasparini, M., Landolina, M., Lunati, M., Proclemer, A., Padeletti, L., Catanzariti, D., Molon, G., Botto, G. L., La Rocca, L., Grammatico, A., and Boriani, G.. *J Am Coll Cardiol* 2011 :167-72

The impact of cardiac resynchronization therapy on the incidence of ventricular arrhythmias in mild heart failure. Gold, M. R., Linde, C., Abraham, W. T., Gardiwal, A., and Daubert, J. C.. *Heart Rhythm* 2011 :679-84

Effects of cardiac resynchronisation therapy on dilated cardiomyopathy with isolated ventricular non-compaction. Bertini, M., Ziacchi, M., Biffi, M., Biagini, E., Rocchi, G., Martignani, C., Ferlito, M., Pasquale, F., Cervi, E., Branzi, A., Rapezzi, C., and Boriani, G.. *Heart* 2011 :295-300

Symptom improvement after upgrade from right ventricular apical to biventricular pacing: Role of right and left ventricular volumes assessed with single-photon emission computed tomographic equilibrium radionuclide angiocardiology. Clements, I. P., Christenson, S., Hodge, D. O., Mullan, B. P., Redfield, M. M., and Hayes, D. L.. *J Nucl Cardiol* 2011 :43-51

Inotropic contractile reserve and response to cardiac resynchronization therapy in patients with markedly remodeled left ventricle. Chaudhry, F. A., Shah, A., Bangalore, S., DeRose, J., and Steinberg, J. S.. *J Am Soc Echocardiogr* 2011 :91-7

Effect of implantable cardioverter-defibrillator on left ventricular ejection fraction in patients with idiopathic dilated cardiomyopathy. Schaer, B., Theuns, D. A., Sticherling, C., Szili-Torok, T., Osswald, S., and Jordaens, L.. *Am J Cardiol* 2010 :1640-5

Antiarrhythmic effect of reverse electrical remodeling associated with cardiac resynchronization therapy. Tereshchenko, L. G., Henrikson, C. A., Stempniewicz, P., Han, L., and Berger, R. D.. *Pacing Clin Electrophysiol* 2011 :357-64

Cardiac resynchronization therapy in asymptomatic or mildly symptomatic heart failure patients in relation to etiology: results from the REVERSE (REsynchronization reVERses Remodeling in Systolic Left vEntricular Dysfunction) study. Linde, C., Abraham, W. T., Gold, M. R., and Daubert, C.. *J Am Coll Cardiol* 2010 :1826-31

Renal function and mortality following cardiac resynchronization therapy. Lin, G., Gersh, B. J., Greene, E. L., Redfield, M. M., Hayes, D. L., and Brady, P. A.. *Eur Heart J* 2011 :184-90

Left ventricular reverse remodelling, long-term clinical outcome, and mode of death after cardiac resynchronization therapy. Foley, P. W., Chalil, S., Khadjooi, K., Irwin, N., Smith, R. E., and Leyva, F.. *Eur J Heart Fail* 2011 :43-51

Relationship of echocardiographic dyssynchrony to long-term survival after cardiac resynchronization therapy. Gorcsan, J. 3rd, Oyenu, O., Habib, P. J., Tanaka, H., Adelstein, E. C., Hara, H., McNamara, D. M., and Saba, S.. *Circulation* 2010 :1910-8

Is "hyper response" to cardiac resynchronization therapy in patients with nonischemic cardiomyopathy a recovery, a remission, or a control? Castellant, P., Orhan, E., Bertault-Valls, V., Fatemi, M., Etienne, Y., and Blanc, J. J.. *Ann Noninvasive Electrocardiol* 2010 :321-7

- Improvement in right ventricular systolic function after cardiac resynchronization therapy correlates with left ventricular reverse remodeling. Aksoy, H., Okutucu, S., Aytemir, K., Kaya, E. B., Tulumen, E., Evranos, B., Fatihoglu, S. G., Kabakci, G., Tokgozoglu, L., Ozkutlu, H., and Oto, A.. *Pacing Clin Electrophysiol* 2011 :200-7
- Intramural dyssynchrony and response to cardiac resynchronization therapy in patients with and without previous right ventricular pacing. Bank, A. J., Kaufman, C. L., Burns, K. V., Parah, J. S., Johnson, L., Kelly, A. S., Shroff, S. G., and Kaiser, D. R.. *Eur J Heart Fail* 2010 :1317-24
- Effect of cardiac resynchronization therapy on subendo- and subepicardial left ventricular twist mechanics and relation to favorable outcome. Bertini, M., Delgado, V., Nucifora, G., Marsan, N. A., Ng, A. C., Shanks, M., Van Bommel, R. J., Borleffs, C. J., Ewe, S. H., Boriani, G., Biffi, M., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2010 :682-7
- Dyssynchrony indices to predict response to cardiac resynchronization therapy: a comprehensive prospective single-center study. Miyazaki, C., Redfield, M. M., Powell, B. D., Lin, G. M., Herges, R. M., Hodge, D. O., Olson, L. J., Hayes, D. L., Espinosa, R. E., Rea, R. F., Bruce, C. J., Nelson, S. M., Miller, F. A., and Oh, J. K.. *Circ Heart Fail* 2010 :565-73
- Predictive factors of difficult implantation procedure in cardiac resynchronization therapy. Bisch, L., Da Costa, A., Dauphinot, V., Romeyer-Bouchard, C., Khris, L., M'baye, A., and Isaaz, K.. *Europace* 2010 :1141-8
- Beta-blocker utilization and outcomes in patients receiving cardiac resynchronization therapy. Voigt, A., Shalaby, A., Adelstein, E., and Saba, S.. *Clin Cardiol* 2010 :E1-5
- Survival in New York Heart Association class IV heart failure patients treated with cardiac resynchronization therapy compared with patients on optimal pharmacological treatment. Castel, M. A., Magnani, S., Mont, L., Roig, E., Tamborero, D., Mendez-Zurita, F., Femenia, J. F., Tolosana, J. M., Perez-Villa, F., and Brugada, J.. *Europace* 2010 :1136-40
- Usefulness of left ventricle dyssynchrony assessment before cardiac resynchronization implantation. Lipoldova, J., Ozabalova, E., Meluzin, J., Novak, M., and Vitovec, J.. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2010 :39-46
- Ventilatory response and peak circulatory power: new functional markers of response after cardiac resynchronization therapy. Jaussaud, J., Blanc, P., Derval, N., Bordachar, P., Courregelongue, M., Roudaut, R., and Douard, H.. *Arch Cardiovasc Dis* 2010 :184-91
- Identification and characterization of super-responders after cardiac resynchronization therapy. Reant, P., Zaroui, A., Donal, E., Mignot, A., Bordachar, P., Deplagne, A., Solnon, A., Ritter, P., Daubert, J. C., Clementy, J., Leclercq, C., Roudaut, R., Habib, G., and Lafitte, S.. *Am J Cardiol* 2010 :1327-35
- Upgrading to resynchronization therapy after chronic right ventricular pacing improves left ventricular remodelling. Frohlich, G., Steffel, J., Hurlimann, D., Enseleit, F., Luscher, T. F., Ruschitzka, F., Abraham, W. T., and Holzmeister, J.. *Eur Heart J* 2010 :1477-85
- A left hemiblock improves cardiac resynchronization therapy outcomes in patients with a right bundle branch block. Chandra, R., Zolty, R., and Palma, E.. *Clin Cardiol* 2010 :89-93
- Decreased likelihood of response to cardiac resynchronization in patients with severe heart failure. Vidal, B., Delgado, V., Mont, L., Poyatos, S., Silva, E., Angeles Castel, M., Tolosana, J. M., Berruezo, A., Brugada, J., and Sitges, M.. *Eur J Heart Fail* 2010 :283-7
- Prediction of appropriate defibrillator therapy in heart failure patients treated with cardiac resynchronization therapy. Soliman, O. I., Theuns, D. A., van Dalen, B. M., Vletter, W. B., Nemes, A., Jordaens, L. J., Balk, A. H., Ten Cate, F. J., and Geleijnse, M. L.. *Am J Cardiol* 2010 :105-11
- Analysis of ventricular activation using surface electrocardiography to predict left ventricular reverse volumetric remodeling during cardiac resynchronization therapy. Sweeney, M. O., van Bommel, R. J., Schalij, M. J., Borleffs, C. J., Hellkamp, A. S., and Bax, J. J.. *Circulation* 2010 :626-34
- Beneficial effects of biventricular pacing in chronically right ventricular paced patients with mild cardiomyopathy. van Geldorp, I. E., Vernooy, K., Delhaas, T., Prins, M. H., Crijns, H. J., Prinzen, F. W., and Dijkman, B.. *Europace* 2010 :223-9
- Right ventricular systolic function and cardiac resynchronization therapy. Burri, H., Domenichini, G., Sunthorn, H., Fleury, E., Stettler, C., Foulkes, I., and Shah, D.. *Europace* 2010 :389-94
- Incidence of appropriate cardioverter-defibrillator shocks and mortality in patients with heart failure treated with combined cardiac resynchronization plus implantable cardioverter-defibrillator therapy versus implantable cardioverter-defibrillator therapy. Desai, H., Aronow, W. S., Ahn, C., Tsai, F. S., Lai, H. M., Gandhi, K., Amin, H., Frishman, W. H., Kalapatapu, K., Cohen, M., and Sorbera, C.. *J Cardiovasc Pharmacol Ther* 2010 :37-40
- Effects of cardiac resynchronization therapy on systemic inflammation and neurohormonal pathways in heart failure. Tarquini, R., Guerra, C. T., Porciani, M. C., Michelucci, A., Padeletti, M., Ricciardi, G., Chiostri, M., Jelic, S., and Padeletti, L.. *Cardiol J* 2009 :545-52
- Persistence of secondary mitral regurgitation and response to cardiac resynchronization therapy. Cabrera-Bueno, F., Molina-Mora, M. J., Alzueta, J., Pena-Hernandez, J., Jimenez-Navarro, M., Fernandez-Pastor, J., Barrera, A., and de Teresa, E.. *Eur J Echocardiogr* 2010 :131-7
- Value of right ventricular-left ventricular interlead electrical delay to predict reverse remodelling in cardiac resynchronization therapy: the INTER-V pilot study.

Sassone, B., Gabrieli, L., Sacca, S., Boggian, G., Fusco, A., Pratola, C., Bacchi-Reggiani, M. L., Padeletti, L., and Barold, S. S.. *Europace* 2010 :78-83

Combined resynchronization therapy and automatic defibrillator in advanced non-ischaemic heart failure: the importance of QRS width. Cabrera-Bueno, F., Fernandez-Pastor, J., Molina-Mora, M. J., Alzueta, J., Pena-Hernandez, J. L., Barrera, A., and de Teresa-Galvan, E.. *Europace* 2010 :92-5

Trial-generated profiles for implantation of electrical devices in outpatients with heart failure: real-world prevalence and 1-year outcome. Boriani, G., Rapezzi, C., Diemberger, I., Gonzini, L., Gorini, M., Lucci, D., Sinagra, G., Cooke, R. M., Di Pasquale, G., Tavazzi, L., and Maggioni, A. P.. *J Eval Clin Pract* 2010 :82-91

Limited response to cardiac resynchronization therapy in patients with concomitant right ventricular dysfunction. Tabereaux, P. B., Doppalapudi, H., Kay, G. N., McElderry, H. T., Plumb, V. J., and Epstein, A. E.. *J Cardiovasc Electrophysiol* 2010 :431-5

Cardiac resynchronization therapy in patients with right ventricular pacing-induced cardiomyopathy. Nazeri, A., Massumi, A., Rasekh, A., Saeed, M., Frank, C., and Razavi, M.. *Pacing Clin Electrophysiol* 2010 :37-40

The European cardiac resynchronization therapy survey. Dickstein, K., Bogale, N., Priori, S., Auricchio, A., Cleland, J. G., Gitt, A., Limbourg, T., Linde, C., van Veldhuisen, D. J., and Brugada, J.. *Eur Heart J* 2009 :2450-60

Echocardiography and risk prediction in advanced heart failure: incremental value over clinical markers. Agha, S. A., Kalogeropoulos, A. P., Shih, J., Georgiopoulou, V. V., Giamouzis, G., Anarado, P., Mangalat, D., Hussain, I., Book, W., Laskar, S., Smith, A. L., Martin, R., and Butler, J.. *J Card Fail* 2009 :586-92

Usefulness of NT-pro BNP monitoring to identify echocardiographic responders following cardiac resynchronization therapy. Magne, J., Dubois, M., Champagne, J., Dumesnil, J. G., Pibarot, P., Philippon, F., O'Hara, G., and Senechal, M.. *Cardiovasc Ultrasound* 2009 :39

Growth differentiation factor-15 predicts mortality and morbidity after cardiac resynchronization therapy. Foley, P. W., Stegmann, B., Ng, K., Ramachandran, S., Proudler, A., Frenneaux, M. P., Ng, L. L., and Leyva, F.. *Eur Heart J* 2009 :2749-57

Long-term clinical outcome and left ventricular lead position in cardiac resynchronization therapy. Kronborg, M. B., Albertsen, A. E., Nielsen, J. C., and Mortensen, P. T.. *Europace* 2009 :1177-82

Relevance of echocardiographic evaluation of right ventricular function in patients undergoing cardiac resynchronization therapy. Scuteri, L., Rordorf, R., Marsan, N. A., Landolina, M., Magrini, G., Klersy, C., Frattini, F., Petracci, B., Vicentini, A., Campana, C., Tavazzi, L., and Ghio, S.. *Pacing Clin Electrophysiol* 2009 :1040-9

Right ventricular myocardial function in patients with either idiopathic or ischemic dilated cardiomyopathy without clinical sign of right heart failure: effects of cardiac resynchronization therapy. D'Andrea, A., Salerno, G., Scarafie, R., Riegler, L., Gravino, R., Castaldo, F., Cocchia, R., Limongelli, G., Romano, M., Calabro, P., Nigro, G., Cuomo, S., Bossone, E., Caso, P., and Calabro, R.. *Pacing Clin Electrophysiol* 2009 :1017-29

Atrial fibrillation is under-recognized in chronic heart failure: insights from a heart failure cohort treated with cardiac resynchronization therapy. Caldwell, J. C., Contractor, H., Petkar, S., Ali, R., Clarke, B., Garratt, C. J., Neyses, L., and Mamas, M. A.. *Europace* 2009 :1295-300

Assessment of intraventricular mechanical dyssynchrony and prediction of response to cardiac resynchronization therapy: comparison between tissue Doppler imaging and real-time three-dimensional echocardiography. Kleijn, S. A., van Dijk, J., de Cock, C. C., Allaart, C. P., van Rossum, A. C., and Kamp, O.. *J Am Soc Echocardiogr* 2009 :1047-54

Longitudinal two-dimensional strain rate imaging: a potential approach to predict the response to cardiac resynchronization therapy. Shi, H., Shu, X., Wang, F., Cui, J., Chen, H., Sun, B., and Liu, S.. *Int J Cardiovasc Imaging* 2009 :677-87

Statins reduce appropriate cardioverter-defibrillator shocks and mortality in patients with heart failure and combined cardiac resynchronization and implantable cardioverter-defibrillator therapy. Desai, H., Aronow, W. S., Tsai, F. S., Ahn, C., Lai, H. M., Amin, H., Gandhi, K., Frishman, W. H., Cohen, M., and Sorbera, C.. *J Cardiovasc Pharmacol Ther* 2009 :176-9

Development and validation of a clinical index to predict survival after cardiac resynchronisation therapy. Leyva, F., Foley, P. W., Stegmann, B., Ward, J. A., Ng, L. L., Frenneaux, M. P., Regoli, F., Smith, R. E., and Auricchio, A.. *Heart* 2009 :1619-25

Long-term clinical response of cardiac resynchronization after chronic right ventricular pacing. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Elvan, A., Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am J Cardiol* 2009 :116-21

Improvement of P wave dispersion after cardiac resynchronization therapy for heart failure. Ding, L., Hua, W., Zhang, S., Chu, J., Chen, K., Wang, F., and Chen, X.. *J Electrocardiol* 2009 :334-8

Changes in global left ventricular function by multidirectional strain assessment in heart failure patients undergoing cardiac resynchronization therapy. Delgado, V., Ypenburg, C., Zhang, Q., Mollema, S. A., Fung, J. W., Schalij, M. J., Yu, C. M., and Bax, J. J.. *J Am Soc Echocardiogr* 2009 :688-94

Results of the Prospective Minnesota Study of ECHO/TDI in Cardiac Resynchronization Therapy (PROMISE-CRT) study. Bank, A. J., Kaufman, C. L., Kelly, A. S., Burns, K. V., Adler, S. W., Rector, T. S., Goldsmith, S. R., Olivari,

M. T., Tang, C., Nelson, L., and Metzger, A.. *J Card Fail* 2009 :401-9

Usefulness of left ventricular systolic dyssynchrony by real-time three-dimensional echocardiography to predict long-term response to cardiac resynchronization therapy. Soliman, O. I., Geleijnse, M. L., Theuns, D. A., van Dalen, B. M., Vletter, W. B., Jordaens, L. J., Metawei, A. K., Al-Amin, A. M., and ten Cate, F. J.. *Am J Cardiol* 2009 :1586-91

Atrioventricular node ablation is not a prerequisite for cardiac resynchronization therapy in patients with chronic atrial fibrillation. Schutte, F., Ludorff, G., Grove, R., Kranig, W., and Thale, J.. *Cardiol J* 2009 :246-9

Correlation of electrical and mechanical reverse remodeling after cardiac resynchronization therapy. Kamireddy, S., Agarwal, S. K., Adelstein, E., Jain, S., and Saba, S.. *Ann Noninvasive Electrocardiol* 2009 :153-7

Effect of long-term resynchronization therapy on left ventricular remodeling in pacemaker patients upgraded to biventricular devices. Vatankulu, M. A., Goktekin, O., Kaya, M. G., Ayhan, S., Kucukdurmaz, Z., Sutton, R., and Henein, M.. *Am J Cardiol* 2009 :1280-4

Effect of cardiac resynchronization therapy on the incidence of electrical storm. Nordbeck, P., Seidl, B., Fey, B., Bauer, W. R., and Ritter, O.. *Int J Cardiol* 2010 :330-6

Decrease of plasma N-terminal pro beta-type natriuretic peptide as a predictor of clinical improvement after cardiac resynchronization therapy for heart failure. Ding, L. G., Hua, W., Zhang, S., Chu, J. M., Chen, K. P., Wang, Y., Wang, F. Z., and Chen, X.. *Chin Med J (Engl)* 2009 :617-21

Long-term effects of upgrading from right ventricular pacing to cardiac resynchronization therapy in patients with heart failure. Foley, P. W., Muhyaldeen, S. A., Chalil, S., Smith, R. E., Sanderson, J. E., and Leyva, F.. *Europace* 2009 :495-501

Influence of left ventricular lead location on outcomes in the COMPANION study. Saxon, L. A., Olshansky, B., Volosin, K., Steinberg, J. S., Lee, B. K., Tomassoni, G., Guarnieri, T., Rao, A., Yong, P., Galle, E., Leigh, J., Ecklund, F., and Bristow, M. R.. *J Cardiovasc Electrophysiol* 2009 :764-8

Comparison of myocardial deformation and velocity dyssynchrony for identification of responders to cardiac resynchronization therapy. Mele, D., Toselli, T., Capasso, F., Stabile, G., Piacenti, M., Piepoli, M., Giatti, S., Klersy, C., Sallusti, L., and Ferrari, R.. *Eur J Heart Fail* 2009 :391-9

Clinical importance of new-onset atrial fibrillation after cardiac resynchronization therapy. Borleffs, C. J., Ypenburg, C., van Bommel, R. J., Delgado, V., van Erven, L., Schalij, M. J., and Bax, J. J.. *Heart Rhythm* 2009 :305-10

Effects of cardiac resynchronization therapy in patients unselected for mechanical dyssynchrony. Foley, P. W.,

Chalil, S., Khadjooi, K., Jordan, P., Smith, R. E., Frenneaux, M. P., and Leyva, F.. *Int J Cardiol* 2010 :51-6

Patients with non-ischaemic dilated cardiomyopathy and hyper-responders to cardiac resynchronization therapy: characteristics and long-term evolution. Castellant, P., Fatemi, M., Orhan, E., Etienne, Y., and Blanc, J. J.. *Europace* 2009 :350-5

Identification of 'super-responders' to cardiac resynchronization therapy: the importance of symptom duration and left ventricular geometry. Antonio, N., Teixeira, R., Coelho, L., Lourenco, C., Monteiro, P., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., and Providencia, L. A.. *Europace* 2009 :343-9

Gender differences in procedure-related adverse events in patients receiving implantable cardioverter-defibrillator therapy. Peterson, P. N., Daugherty, S. L., Wang, Y., Vidaillet, H. J., Heidenreich, P. A., Curtis, J. P., and Masoudi, F. A.. *Circulation* 2009 :1078-84

Importance of heart rate during exercise for response to cardiac resynchronization therapy. Maass, A. H., Buck, S., Nieuwland, W., Bruggemann, J., van Veldhuisen, D. J., and Van Gelder, I. C.. *J Cardiovasc Electrophysiol* 2009 :773-80

Long-term prognosis after cardiac resynchronization therapy is related to the extent of left ventricular reverse remodeling at midterm follow-up. Ypenburg, C., van Bommel, R. J., Borleffs, C. J., Bleeker, G. B., Boersma, E., Schalij, M. J., and Bax, J. J.. *J Am Coll Cardiol* 2009 :483-90

Cardiac resynchronization therapy: long-term alternative to cardiac transplantation?. Hansky, B., Vogt, J., Zittermann, A., Guldner, H., Heintze, J., Schulz, U., Horstkotte, D., Tenderich, G., and Korfer, R.. *Ann Thorac Surg* 2009 :432-8

Effects of global longitudinal strain and total scar burden on response to cardiac resynchronization therapy in patients with ischaemic dilated cardiomyopathy. D'Andrea, A., Caso, P., Scarafie, R., Riegler, L., Salerno, G., Castaldo, F., Gravino, R., Cocchia, R., Del Viscovo, L., Limongelli, G., Di Salvo, G., Ascione, L., Iengo, R., Cuomo, S., Santangelo, L., and Calabro, R.. *Eur J Heart Fail* 2009 :58-67

Alleviation of pulmonary hypertension by cardiac resynchronization therapy is associated with improvement in central sleep apnea. Yiu, K. H., Lee, K. L., Lau, C. P., Siu, C. W., Miu, K. M., Lam, B., Lam, J., Ip, M. S., and Tse, H. F.. *Pacing Clin Electrophysiol* 2008 :1522-7

Electrical storm in patients with biventricular implantable cardioverter defibrillator: incidence, predictors, and prognostic implications. Gasparini, M., Lunati, M., Landolina, M., Santini, M., Padeletti, L., Perego, G., Vincenti, A., Curnis, A., Carboni, A., Denaro, A., Spotti, A., Grammatico, A., Regoli, F., and Boriani, G.. *Am Heart J* 2008 :847-54

Cardiac resynchronization therapy may improve symptoms of congestive heart failure in patients without electrical or

mechanical dyssynchrony. Nazeri, A., Massumi, A., Rasekh, A., Saeed, M., Frank, C., Wilson, J. M., Lopez, J. A., and Razavi, M.. *Europace* 2009 :86-8

Implementation of seven echocardiographic parameters of myocardial asynchrony to improve the long-term response rate of cardiac resynchronization therapy (CRT). Knebel, F., Schattke, S., Bondke, H., Richter, C., Melzer, C., Dreger, H., Grohmann, A., Baumann, G., and Borges, A. C.. *Cardiovasc Ultrasound* 2008 :58

Optimal left ventricular lead position predicts reverse remodeling and survival after cardiac resynchronization therapy. Ypenburg, C., van Bommel, R. J., Delgado, V., Mollema, S. A., Bleeker, G. B., Boersma, E., Schalij, M. J., and Bax, J. J.. *J Am Coll Cardiol* 2008 :1402-9

Predictors of mortality from pump failure and sudden cardiac death in patients with systolic heart failure and left ventricular dyssynchrony: results of the CARE-HF trial. Uretsky, B. F., Thygesen, K., Daubert, J. C., Erdmann, E., Freemantle, N., Gras, D., Kappenberger, L., Tavazzi, L., and Cleland, J. G.. *J Card Fail* 2008 :670-5

Primary failure of cardiac resynchronization therapy: what are the causes and is it worth considering a second attempt? A single-centre experience. Fatemi, M., Etienne, Y., Castellant, P., and Blanc, J. J.. *Europace* 2008 :1308-12

Diaphragmatic myopotential oversensing in pacemaker-dependent patients with CRT-D devices. Santos, K. R., Adragao, P., Cavaco, D., Morgado, F. B., Candeias, R., Lima, S., and Silva, J. A.. *Europace* 2008 :1381-6

Over-time mitral regurgitation changes following cardiac resynchronization therapy. Kelarijani, R. B., Dadjoo, Y., Chalian, H., Naserbakht, M., Kabir, K., and Saleh, D. K.. *Adv Med Sci* 2008 :94-8

Prognostic value of electrocardiographic measurements before and after cardiac resynchronization device implantation in patients with heart failure due to ischemic or nonischemic cardiomyopathy. Iler, M. A., Hu, T., Ayyagari, S., Callahan, T. D. 4th, Civello, K. C., Thal, S. G., Wilkoff, B. L., and Chung, M. K.. *Am J Cardiol* 2008 :359-63

Left ventricular function and visual phase analysis with equilibrium radionuclide angiography in patients with biventricular device. Muxi, A., Paredes, P., Mont, L., Setoain, F. J., Duch, J., Fuertes, S., Ortin, J., Diaz-Infante, E., and Pons, F.. *Eur J Nucl Med Mol Imaging* 2008 :912-21

Chronic cardiac resynchronization therapy reverses cardiac remodelling and improves invasive haemodynamics of patients with severe heart failure on optimal medical treatment. Inage, T., Yoshida, T., Hiraki, T., Ohe, M., Takeuchi, T., Nagamoto, Y., Fukuda, Y., Gondo, T., and Imaizumi, T.. *Europace* 2008 :379-83

Left ventricular apical wall motion abnormality is associated with lack of response to cardiac resynchronization therapy in patients with ischemic cardiomyopathy. Buch, E., Lellouche, N., De Diego, C.,

Vaseghi, M., Cesario, D. A., Fujimura, O., Wiener, I., Child, J. S., Boyle, N. G., and Shivkumar, K.. *Heart Rhythm* 2007 :1300-5

Reduced atrial tachyarrhythmia susceptibility after upgrade of conventional implanted pulse generator to cardiac resynchronization therapy in patients with heart failure. Yannopoulos, D., Lurie, K. G., Sakaguchi, S., Milstein, S., Ermis, C., VanHeel, L., and Benditt, D. G.. *J Am Coll Cardiol* 2007 :1246-51

Comparison of the effects of cardiac resynchronization therapy in patients with class II versus class III and IV heart failure (from the InSync/InSync ICD Italian Registry). Landolina, M., Lunati, M., Gasparini, M., Santini, M., Padeletti, L., Achilli, A., Bianchi, S., Laurenzi, F., Curnis, A., Vincenti, A., Valsecchi, S., and Denaro, A.. *Am J Cardiol* 2007 :1007-12

Effect of cardiac resynchronisation therapy on occurrence of ventricular arrhythmia in patients with implantable cardioverter defibrillators undergoing upgrade to cardiac resynchronisation therapy devices. Lin, G., Rea, R. F., Hammill, S. C., Hayes, D. L., and Brady, P. A.. *Heart* 2008 :186-90

Response to cardiac resynchronization therapy predicts survival in heart failure: a single-center experience. Cha, Y. M., Rea, R. F., Wang, M., Shen, W. K., Asirvatham, S. J., Friedman, P. A., Munger, T. M., Espinosa, R. E., Hodge, D. O., Hayes, D. L., and Redfield, M. M.. *J Cardiovasc Electrophysiol* 2007 :1015-9

Feasibility, safety, and mid-term efficacy of cardiac resynchronization therapy in patients with severe heart failure and ventricular conduction delay: Chulalongkorn experience. Sunsaneewitayakul, B., Sitthisook, S., Sangwatanaroj, S., Prechawat, S., and Songmuang, S. B.. *J Med Assoc Thai* 2007 :1458-66

The BRIGHT study: bifocal right ventricular resynchronization therapy: a randomized study. Res, J. C., Bokern, M. J., de Cock, C. C., van Loenhout, T., Bronzwaer, P. N., and Spierenburg, H. A.. *Europace* 2007 :857-61

Brain natriuretic peptide--a reliable parameter for the effectiveness of cardiac resynchronization therapy after coronary artery bypass grafting. Raab, S., Oertel, F., Weimann, T., Danov, V., and Beyer, M.. *Interact Cardiovasc Thorac Surg* 2006 :439-43

Volume overload modulates effects of cardiac resynchronization therapy independently of myocardial reperfusion: results of the RESYNC study. Gimelli, A., Stanislaw, M., Valle, G., Frumento, P., Zanco, P., Ometto, R., Inglese, E., Martino, G., Startari, U., Bertelli, P., and Marzullo, P.. *J Cardiovasc Med (Hagerstown)* 2007 :575-81

Twenty-millisecond interventricular difference as assessed by body surface potential mapping identifies patients with clinical improvement after implantation of cardiac resynchronization device. Samesima, N., Douglas, R., Tobias, N., Pedrosa, A., Martinelli Filho, M., Ramires, J.

A., and Pastore, C. A.. *Anadolu Kardiyol Derg* 2007 :213-5

Value of baseline left lateral wall postsystolic displacement assessed by M-mode to predict reverse remodeling by cardiac resynchronization therapy. Sassone, B., Capecechi, A., Boggian, G., Gabrieli, L., Sacca, S., Vandelli, R., Petracci, E., and Mele, D.. *Am J Cardiol* 2007 :470-5

Can LV dyssynchrony as assessed with phase analysis on gated myocardial perfusion SPECT predict response to CRT?. Henneman, M. M., Chen, J., Dibbets-Schneider, P., Stokkel, M. P., Bleeker, G. B., Ypenburg, C., van der Wall, E. E., Schalij, M. J., Garcia, E. V., and Bax, J. J.. *J Nucl Med* 2007 :1104-11

Comparison of usefulness of cardiac resynchronization therapy in patients with atrial fibrillation and heart failure versus patients with sinus rhythm and heart failure. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Elvan, A., Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am J Cardiol* 2007 :1252-7

Relation of inflammatory status to major adverse cardiac events and reverse remodeling in patients undergoing cardiac resynchronization therapy. Michelucci, A., Ricciardi, G., Sofi, F., Gori, A. M., Pirolo, F., Pieragnoli, P., Giaccardi, M., Colella, A., Porciani, M. C., Di Biase, L., Padeletti, L., Abbate, R., and Gensini, G. F.. *J Card Fail* 2007 :207-10

Hemodynamic changes during cardiac resynchronization therapy. Nagele, H., Azizi, M., and Castel, M. A.. *Clin Cardiol* 2007 :141-3

Four-year efficacy of cardiac resynchronization therapy on exercise tolerance and disease progression: the importance of performing atrioventricular junction ablation in patients with atrial fibrillation. Gasparini, M., Auricchio, A., Regoli, F., Fantoni, C., Kawabata, M., Galimberti, P., Pini, D., Ceriotti, C., Gronda, E., Klersy, C., Fratini, S., and Klein, H. H.. *J Am Coll Cardiol* 2006 :734-43

Sympathetic control after cardiac resynchronization therapy: responders versus nonresponders. Najem, B., Unger, P., Preumont, N., Jansens, J. L., Houssiere, A., Pathak, A., Xhaet, O., Gabriel, L., Friart, A., De Roy, L., Vandenbossche, J. L., and van de Borne, P.. *Am J Physiol Heart Circ Physiol* 2006 :H2647-52

Cardiac resynchronization therapy in patients with systolic left ventricular dysfunction and symptoms of mild heart failure secondary to ischemic or nonischemic cardiomyopathy. Bleeker, G. B., Schalij, M. J., Holman, E. R., Steendijk, P., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2006 :230-5

Usefulness of a novel "response score" to predict hemodynamic and clinical outcome from cardiac resynchronization therapy. Heist, E. K., Taub, C., Fan, D., Arzola-Castaner, D., Alabiad, C. R., Reddy, V. Y., Mansour, M., Mela, T., Picard, M. H., Ruskin, J. N., and Singh, J. P.. *Am J Cardiol* 2006 :1732-6

Differential change in left ventricular mass and regional wall thickness after cardiac resynchronization therapy for

heart failure. Zhang, Q., Fung, J. W., Auricchio, A., Chan, J. Y., Kum, L. C., Wu, L. W., and Yu, C. M.. *Eur Heart J* 2006 :1423-30

Relation of response to cardiac resynchronization therapy to left ventricular reverse remodeling. Vidal, B., Sitges, M., Marigliano, A., Diaz-Infante, E., Azqueta, M., Tamborero, D., Macias, A., Roig, E., Brugada, J., Pare, C., and Mont, L.. *Am J Cardiol* 2006 :876-81

Clinical versus echocardiographic parameters to assess response to cardiac resynchronization therapy. Bleeker, G. B., Bax, J. J., Fung, J. W., van der Wall, E. E., Zhang, Q., Schalij, M. J., Chan, J. Y., and Yu, C. M.. *Am J Cardiol* 2006 :260-3

The incremental benefit of rate-adaptive pacing on exercise performance during cardiac resynchronization therapy. Tse, H. F., Siu, C. W., Lee, K. L., Fan, K., Chan, H. W., Tang, M. O., Tsang, V., Lee, S. W., and Lau, C. P.. *J Am Coll Cardiol* 2005 :2292-7

Improvements in left ventricular diastolic function after cardiac resynchronization therapy are coupled to response in systolic performance. Waggoner, A. D., Faddis, M. N., Gleva, M. J., de las Fuentes, L., and Davila-Roman, V. G.. *J Am Coll Cardiol* 2005 :2244-9

Contractile response and mitral regurgitation after temporary interruption of long-term cardiac resynchronization therapy. Brandt, R. R., Reiner, C., Arnold, R., Sperzel, J., Pitschner, H. F., and Hamm, C. W.. *Eur Heart J* 2006 :187-92

Effect of cardiac resynchronization therapy on the incidence of ventricular arrhythmias in patients with an implantable cardioverter-defibrillator. Arya, A., Haghighi, M., Dehghani, M. R., Alasti, M., Alizadeh, H., Kazemi, B., and Sadr-Ameli, M. A.. *Heart Rhythm* 2005 :1094-8

Optimizing sequential biventricular pacing using radionuclide ventriculography. Burri, H., Sunthorn, H., Somsen, A., Zaza, S., Fleury, E., Shah, D., and Righetti, A.. *Heart Rhythm* 2005 :960-5

Cardiac resynchronisation therapy in chronic atrial fibrillation: impact on left atrial size and reversal to sinus rhythm. Kies, P., Leclercq, C., Bleeker, G. B., Crocq, C., Molhoek, S. G., Poulain, C., van Erven, L., Bootsma, M., Zeppenfeld, K., van der Wall, E. E., Daubert, J. C., Schalij, M. J., and Bax, J. J.. *Heart* 2006 :490-4

Effects of cardiac resynchronization therapy on incidence of atrial fibrillation in patients with poor left ventricular systolic function. Fung, J. W., Yu, C. M., Chan, J. Y., Chan, H. C., Yip, G. W., Zhang, Q., and Sanderson, J. E.. *Am J Cardiol* 2005 :728-31

Real-time three-dimensional echocardiography: a novel technique to quantify global left ventricular mechanical dyssynchrony. Kapetanakis, S., Kearney, M. T., Siva, A., Gall, N., Cooklin, M., and Monaghan, M. J.. *Circulation* 2005 :992-1000

A unique method by which to quantitate synchrony with equilibrium radionuclide angiography. O'Connell, J. W., Schreck, C., Moles, M., Badwar, N., DeMarco, T., Olgin,

J., Lee, B., Tseng, Z., Kumar, U., and Botvinick, E. H.. *J Nucl Cardiol* 2005 :441-50

Single-chamber versus dual-chamber pacing for high-grade atrioventricular block. Toff, W. D., Camm, A. J., and Skehan, J. D.. *N Engl J Med* 2005 :145-55

Left ventricular pacing in patients with heart failure: evaluation study with Fourier analysis of radionuclide ventriculography. Santomauro, M., Pace, L., Duilio, C., Ottaviano, L., Borrelli, A., Ferro, A., Monteforte, N., Cuocolo, A., Salvatore, M., and Chiariello, M.. *Ital Heart J* 2004 :906-11

Baseline characteristics of patients recruited into the CARE-HF study. Cleland, J. G., Daubert, J. C., Erdmann, E., Freemantle, N., Gras, D., Kappenberger, L., Klein, W., and Tavazzi, L.. *Eur J Heart Fail* 2005 :205-14

Echocardiographic parameters of ventricular dyssynchrony validation in patients with heart failure using sequential biventricular pacing. Bordachar, P., Lafitte, S., Reuter, S., Sanders, P., Jais, P., Haissaguerre, M., Roudaut, R., Garrigue, S., and Clementy, J.. *J Am Coll Cardiol* 2004 :2157-65

Impact of coronary sinus lead position on biventricular pacing: mortality and echocardiographic evaluation during long-term follow-up. Rossillo, A., Verma, A., Saad, E. B., Corrado, A., Gasparini, G., Marrouche, N. F., Golshayan, A. R., McCurdy, R., Bhargava, M., Khaykin, Y., Burkhardt, J. D., Martin, D. O., Wilkoff, B. L., Saliba, W. I., Schweikert, R. A., Raviele, A., and Natale, A.. *J Cardiovasc Electrophysiol* 2004 :1120-5

Cost-effectiveness of cardiac resynchronization therapy in patients with symptomatic heart failure. Nichol, G., Kaul, P., Huszti, E., and Bridges, J. F.. *Ann Intern Med* 2004 :343-51

Comparison of left ventricular-biventricular pacing on ventricular synchrony, mitral regurgitation, and global left ventricular function in patients with severe chronic heart failure. Vinereanu, D., Bleasdale, R., Turner, M., Frenneaux, M. P., and Fraser, A. G.. *Am J Cardiol* 2004 :519-21

Assessment of upgrading to biventricular pacing in patients with right ventricular pacing and congestive heart failure after atrioventricular junctional ablation for chronic atrial fibrillation. Valls-Bertault, V., Fatemi, M., Gilard, M., Pennec, P. Y., Etienne, Y., and Blanc, J. J.. *Europace* 2004 :438-43

Effect of left ventricular remodeling after cardiac resynchronization therapy on frequency of ventricular arrhythmias. Kies, P., Bax, J. J., Molhoek, S. G., Bleeker, G. B., Zeppenfeld, K., Bootsma, M., St John Sutton, M., van Erven, L., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2004 :130-2

Systolic and diastolic regional myocardial motion of pacing-induced versus idiopathic left bundle branch block with and without left ventricular dysfunction. Kang, S. J., Song, J. K., Yang, H. S., Song, J. M., Kang, D. H., Rhee,

K. S., Nam, G. B., Choi, K. J., Kim, J. J., and Kim, Y. H.. *Am J Cardiol* 2004 :1243-6

Performance of left ventricular versus biventricular pacing in chronic heart failure assessed by stress echocardiography. Riedlbauchova, L., Fridl, P., Kautzner, J., and Peichl, P.. *Pacing Clin Electrophysiol* 2004 :626-31

Myocardial perfusion reserve and oxidative metabolism contribute to exercise capacity in patients with dilated cardiomyopathy. Stolen, K. Q., Kemppainen, J., Kalliokoski, K. K., Hallsten, K., Luotolahti, M., Karanko, H., Lehtikainen, P., Viljanen, T., Salo, T., Airaksinen, K. E., Nuutila, P., and Knuuti, J.. *J Card Fail* 2004 :132-40

The effects of cardiac resynchronization therapy on left ventricular function, myocardial energetics, and metabolic reserve in patients with dilated cardiomyopathy and heart failure. Sundell, J., Engblom, E., Koistinen, J., Ylitalo, A., Naum, A., Stolen, K. Q., Kalliokoski, R., Nekolla, S. G., Airaksinen, K. E., Bax, J. J., and Knuuti, J.. *J Am Coll Cardiol* 2004 :1027-33

Effect of cardiac resynchronization therapy on left atrial reverse remodeling and spontaneous echo contrast. Vural, A., Agacdiken, A., Ural, D., Sahin, T., Kozdag, G., Kahraman, G., Ural, E., Akbas, H., Suzer, K., and Komsuoglu, B.. *Tohoku J Exp Med* 2004 :143-53

Improvement of left ventricular wall synchronization with multisite ventricular pacing in heart failure: a prospective study using Doppler tissue imaging. Lafitte, S., Garrigue, S., Perron, J. M., Bordachar, P., Reuter, S., Jais, P., Haissaguerre, M., Clementy, J., and Roudaut, R.. *Eur J Heart Fail* 2004 :203-12

Tissue Doppler echocardiography for evaluation of patients with ventricular resynchronization therapy. Santos, J. F., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Soares, L. N., and Ines, L.. *Rev Port Cardiol* 2003 :1363-71

Effects of cardiac resynchronization therapy on right ventricular function--evaluation with tissue Doppler echocardiography. Santos, J. F., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Soares, L. N., and Ines, L.. *Rev Port Cardiol* 2003 :1347-55

Cardiac resynchronization therapy improves heart rate variability in patients with symptomatic heart failure. Adamson, P. B., Kleckner, K. J., VanHout, W. L., Srinivasan, S., and Abraham, W. T.. *Circulation* 2003 :266-9

Effects of cardiac resynchronization therapy on heart rate variability in patients with chronic systolic heart failure and intraventricular conduction delay. Alonso, C., Ritter, P., Leclercq, C., Mabo, P., Bailleul, C., and Daubert, J. C.. *Am J Cardiol* 2003 :1144-7

Comparison between biventricular pacing and single site pacing in patients with poor ventricular function: a hemodynamic study. Varma, C., O'Callaghan, P., Rowland, E., Mahon, N. G., McKenna, W., Camm, A. J., and Brecker, S. J.. *Pacing Clin Electrophysiol* 2003 :551-8

- Biventricular pacing via a persistent left superior vena cava: report of four cases. Gasparini, M., Mantica, M., Galimberti, P., Coltorti, F., Simonini, S., Ceriotti, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :192-6
- Relief of drug refractory angina by biventricular pacing in heart failure. Gasparini, M., Mantica, M., Galimberti, P., Ceriotti, C., Simonini, S., Mangiavacchi, M., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :181-4
- How many patients with dilated cardiomyopathy may potentially benefit from cardiac resynchronization therapy?. Grimm, W., Sharkova, J., Funck, R., and Maisch, B.. *Pacing Clin Electrophysiol* 2003 :155-7
- Regional myocardial perfusion during chronic biventricular pacing and after acute change of the pacing mode in patients with congestive heart failure and bundle branch block treated with an atrioventricular sequential biventricular pacemaker. Nielsen, J. C., Bottcher, M., Jensen, H. K., Nielsen, T. T., Pedersen, A. K., and Mortensen, P. T.. *Eur J Heart Fail* 2003 :179-86
- Effect of biventricular pacing on heart rate variability in patients with chronic heart failure. Livanis, E. G., Flevari, P., Theodorakis, G. N., Kolokathis, F., Leftheriotis, D., and Kremastinos, D. T.. *Eur J Heart Fail* 2003 :175-8
- Acute effects of cardiac resynchronization therapy on functional mitral regurgitation in advanced systolic heart failure. Breithardt, O. A., Sinha, A. M., Schwammenthal, E., Bidaoui, N., Markus, K. U., Franke, A., and Stellbrink, C.. *J Am Coll Cardiol* 2003 :765-70
- Echocardiographic atrioventricular interval optimization in patients with dual-chamber pacemakers and symptomatic left ventricular systolic dysfunction. Gilligan, D. M., Sargent, D., Ponnathpur, V., Dan, D., Zakaib, J. S., and Ellenbogen, K. A.. *Am J Cardiol* 2003 :629-31
- Biventricular pacing for congestive heart failure: early experience in surgical epicardial versus coronary sinus lead placement. Izutani, H., Quan, K. J., Biblo, L. A., and Gill, I. S.. *Heart Surg Forum* 2002 :E1-6; discussion E1-6
- Sequential versus simultaneous biventricular resynchronization for severe heart failure: evaluation by tissue Doppler imaging. Sogaard, P., Egeblad, H., Pedersen, A. K., Kim, W. Y., Kristensen, B. O., Hansen, P. S., and Mortensen, P. T.. *Circulation* 2002 :2078-84
- Early and late QRS morphology and width in biventricular pacing: relationship to lead site and electrical remodeling. Ricci, R., Pignalberi, C., Ansalone, G., Jannone, E., Vaccaro, M. V., Denaro, A., Cavaglia, S., and Santini, M.. *J Interv Card Electrophysiol* 2002 :279-85
- Echocardiographic quantification of left ventricular asynchrony predicts an acute hemodynamic benefit of cardiac resynchronization therapy. Breithardt, O. A., Stellbrink, C., Kramer, A. P., Sinha, A. M., Franke, A., Salo, R., Schiffgens, B., Huvelle, E., and Auricchio, A.. *J Am Coll Cardiol* 2002 :536-45
- Interatrial septum pacing avoids the adverse effect of interatrial delay in biventricular pacing: an echo-Doppler evaluation. Porciani, M. C., Sabini, A., Colella, A., Michelucci, A., Musilli, N., Pieragnoli, P., and Padeletti, L.. *Europace* 2002 :317-24
- Quantitation of basal dyssynchrony and acute resynchronization from left or biventricular pacing by novel echo-contrast variability imaging. Kawaguchi, M., Murabayashi, T., Fetics, B. J., Nelson, G. S., Samejima, H., Nevo, E., and Kass, D. A.. *J Am Coll Cardiol* 2002 :2052-8
- Effects of resynchronization therapy on sympathetic activity in patients with depressed ejection fraction and intraventricular conduction delay due to ischemic or idiopathic dilated cardiomyopathy. Hamdan, M. H., Barbera, S., Kowal, R. C., Page, R. L., Ramaswamy, K., Joglar, J. A., Karimkhani, V., and Smith, M. L.. *Am J Cardiol* 2002 :1047-51
- Biventricular pacing in patients with ICD: how many patients are possible candidates?. Werling, C., Weisse, U., Siemon, G., Kiessling, A. H., Rameken, M., Schwacke, H., Saggau, W., Senges, J., and Seidl, K.. *Thorac Cardiovasc Surg* 2002 :67-70
- Effects of long-term biventricular stimulation for resynchronization on echocardiographic measures of remodeling. Saxon, L. A., De Marco, T., Schafer, J., Chatterjee, K., Kumar, U. N., and Foster, E.. *Circulation* 2002 :1304-10
- Doppler myocardial imaging to evaluate the effectiveness of pacing sites in patients receiving biventricular pacing. Ansalone, G., Giannantoni, P., Ricci, R., Trambaiolo, P., Fedele, F., and Santini, M.. *J Am Coll Cardiol* 2002 :489-99
- The effect of variation in the interval between right and left ventricular activation on paced QRS duration. O'Cochlain, B., Delurgio, D., Leon, A., and Langberg, J.. *Pacing Clin Electrophysiol* 2001 :1780-2
- Comparison of characteristics in responders versus nonresponders with biventricular pacing for drug-resistant congestive heart failure. Reuter, S., Garrigue, S., Barold, S. S., Jais, P., Hocini, M., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2002 :346-50
- Exercise performance following cardiac resynchronization therapy in patients with heart failure and ventricular conduction delay. Auricchio, A., Kloss, M., Trautmann, S. I., Rodner, S., and Klein, H.. *Am J Cardiol* 2002 :198-203
- Acute effects of cardiac resynchronization therapy on left ventricular Doppler indices in patients with congestive heart failure. Breithardt, O. A., Stellbrink, C., Franke, A., Balta, O., Diem, B. H., Bakker, P., Sack, S., Auricchio, A., Pochet, T., and Salo, R.. *Am Heart J* 2002 :34-44
- Effect of resynchronization therapy stimulation site on the systolic function of heart failure patients. Butter, C., Auricchio, A., Stellbrink, C., Fleck, E., Ding, J., Yu, Y., Huvelle, E., and Spinelli, J.. *Circulation* 2001 :3026-9
- Usefulness of biventricular pacing in patients with congestive heart failure and right bundle branch block. Garrigue, S., Reuter, S., Labeque, J. N., Jais, P., Hocini,

M., Shah, D. C., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2001 :1436-41, A8

Impact of acute biventricular pacing on left ventricular performance and volumes in patients with severe heart failure. A tissue doppler and three-dimensional echocardiographic study. Sogaard, P., Kim, W. Y., Jensen, H. K., Mortensen, P., Pedersen, A. K., Kristensen, B. O., and Egeblad, H.. *Cardiology* 2001 :173-82

Should stimulation therapy for congestive heart failure be combined with defibrillation backup?. Gaita, F., Bocchiardo, M., Porciani, M. C., Vivalda, L., Colella, A., Di Donna, P., Caponi, D., Bruzzzone, M., and Padeletti, L.. *Am J Cardiol* 2000 :165K-158K

The potential usage of dual chamber pacing in patients with implantable cardioverter defibrillators. Best, P. J., Hayes, D. L., and Stanton, M. S.. *Pacing Clin Electrophysiol* 99 :79-85

Dynamic relationship of left-ventricular dyssynchrony and contractile reserve in patients undergoing cardiac resynchronization therapy. Stankovic, I., Aaronson, M., Smith, H.-J., Voros, G., Kongsgaard, E., Neskovic, A. N., Willems, R., Aakhus, S., and Voigt, J.-U.. *Eur. Heart J.* 2014 :48-55a

Mechanical dyssynchrony is similar in different patterns of left bundle-branch block: A dissincronia mecanica e semelhante em diferentes padroes do bloqueio de ramo esquerdo. Barretto, R. B. M., Piegas, L. S., Assef, J. E., Melo Neto, J. F., Resende, T. U., Moreira, D. A., Lebiham, D. C., Franca, F. F., Meneghelo, R. S., and Sousa, A. G. M. R.. *Arq. Bras. Cardiol.* 2013 :449-455

Reliability of implantable cardioverter defibrillator home monitoring in forecasting the need for regular office visits, and patient perspective: Japanese HOME-ICD study. Watanabe, E., Kasai, A., Fujii, E., Yamashiro, K., and Brugada, P.. *Circ. J.* 2013 :2704-2711

Acute effects of multisite left ventricular pacing on mechanical dyssynchrony in patients receiving cardiac resynchronization therapy. Rinaldi, C. A., Kranig, W., Leclercq, C., Kacet, S., Betts, T., Bordachar, P., Gutleben, K.-J., Shetty, A., Keel, A., Ryu, K., Farazi, T. G., Simon, M., and Naqvi, T. Z.. *J. Card. Fail.* 2013 :731-738

Validity of cardiac implantable electronic devices in assessing daily physical activity. Pressler, A., Danner, M., Esefeld, K., Haller, B., Scherr, J., Schomig, A., Halle, M., and Kolb, C.. *Int. J. Cardiol.* 2013 :1127-1130

The effects of cardiac resynchronization treatment on autonomic functions aside from functional status in heart failure: Kardiyak resenkronizasyon tedavisinin otonom sistem uzerine fonksiyonel kapasite otesinde etkileri. Arslan, U., Balci, M. M., Kocaoglu, I., Cimen, T., Kalayci, S., and Temizhan, A.. *Anadolu Kardiyoloji Derg.* 2013 :439-445

Optimization of cardiac resynchronization therapy in non-responders. Sepsi, M., Krivan, L., Koza K, M., Sebo, M., Poloczek, M., Jarkovsky, J., Rybka, L., Kubkova, L., Vlasinova, J., and Spinar, J.. *Cor Vasa* 2013 :E293-E300

Management of cardiac device-related infections: A review of protocol-driven care. Rodriguez, Y., Garisto, J., and Carrillo, R. G.. *Int. J. Cardiol.* 2013 :55-60

CRT-D therapy in patients with decompensated NYHA class-four CHF. Zaeem, F., Giedriemienė, D., Coleman, C., Crespo, E., Radojevic, J., Zweibel, S., Kluger, J., and Clyne, C. A.. *Cardiol. Res. Pract.* 2012 :

Septal deformation patterns delineate mechanical dyssynchrony and regional differences in contractility analysis of patient data using a computer model. Leenders, G. E., Lumens, J., Cramer, M. J., De Boeck, B. W. L., Doevendans, P. A., Delhaas, T., and Prinzen, F. W.. *Circ. Heart Fail.* 2012 :87-96

Cardiac resynchronization therapy in patients with and without atrial fibrillation. Wo, H.-T., Chang, P.-C., Chen, T.-H., and Wang, C.-C.. *Acta Cardiol. Sin.* 2011 :46-51

Tricuspid annular plane systolic excursion evaluation improves selection of cardiac resynchronization therapy patients. Cappelli, F., Porciani, M. C., Ricceri, I., Perrotta, L., Ricciardi, G., Pieragnoli, P., Paladini, G., Michelucci, A., and Padeletti, L.. *Clin. Cardiol.* 2010 :578-582

Prevalence and inter-relationship of different Doppler measures of dyssynchrony in patients with heart failure and prolonged QRS: A report from CARE-HF. Edner, M., Kim, Y., Hansen, K. N., Nissen, H., Espersen, G., La Rosee, K., Maru, F., Freemantle, N., Cleland, J., and Sogaard, P.. *Cardiovasc. Ultrasound* 2009 :

Comparison of Benefits and Mortality in Cardiac Resynchronization Therapy in Patients With Atrial Fibrillation Versus Patients in Sinus Rhythm (Results of the Spanish Atrial Fibrillation and Resynchronization [SPARE] Study). Tolosana, J. M., Hernandez Madrid, A., Brugada, J., Sitges, M., Garcia Bolao, I., Fernandez Lozano, I., Martinez Ferrer, J., Quesada, A., Macias, A., Marin, W., Escudier, J. M., Gomez, A. A., Gimenez Alcala, M., Tamborero, D., Berrueto, A., and Mont, L.. *Am. J. Cardiol.* 2008 :444-449

Resynchronization therapy in patients with narrow QRS (RethinQ). . *ACC Cardiosource Rev. J.* 2007 :30

Efficacy of CRT on exercise tolerance and disease progression: The importance of AV junction ablation in patients with atrial fibrillation. Gasparini, M. and Block, P. C.. *ACC Cardiosource Rev. J.* 2006 :39-42

Predicting mortality and rehospitalization in heart failure patients with Home Monitoring - The Home CARE pilot study. Ellery, S., Pakrashi, T., Paul, V., and Sack, S.. *Clin. Res. Cardiol.* 2006 :III/29-III/35

Cardiac resynchronization therapy with sequential biventricular pacing: Impact of echocardiography guided VV delay optimization on acute results: Terapeutica de resincronizacao cardiaca com pacing biventricular sequencial: Importancia da optimizacao do intervalo VV por ecocardiografia na resposta aguda a terapeutica. Parreira, L., Ferreira Santos, J., Madeira, J., Mendes, L., Seixo, F., Caetano, F., Lopes, C., Venancio, J., Mateus, A.,

- Lopes Ines, J., and Mendes, M.. *Rev. Port. Cardiol.* 2005 :1355-1365
- The Bad Oeynhausen experience. Vogt, J., Lamp, B., Hansky, B., Heintze, J., Faber, L., Guldner, H., Korfer, R., and Horstkotte, D.. *Eur. Heart J. Suppl.* 2004 :D122-D127
- Standard haemodynamic measurements. Vogt, J., Heintze, J., Lamp, B., Hansky, B., and Horstkotte, D.. *Eur. Heart J. Suppl.* 2004 :D29-D34
- Cardiac resynchronization in severe heart failure and left bundle branch block: A single centre experience. Ammann, P., Kiencke, S., Schaer, B., Cron, T. A., Sticherling, C., Haldi, C., Linka, A., Buser, P., Pfisterer, M., and Osswald, S.. *Swiss Med. Wkly* 2004 :277-282
- Mortality of patients with implanted cardioverter/defibrillators in relation to episodes of atrial fibrillation. Deneke, T., Lawo, T., Gerritse, B., and Lemke, B.. *Europace* 2004 :151-158
- Expansion of ICD indications: Resynchronization therapy and the ICD. Auricchio, A. and Klein, H. U.. *Card. Electrophysiol. Rev.* 2001 :35-40
- A pilot experience with permanent biventricular pacing to treat advanced heart failure. Leclercq, C., Cazeau, S., Ritter, P., Alonso, C., Gras, D., Mabo, P., Lazarus, A., and Daubert, J. C.. *Am. Heart J.* 2000 :862-870
- A U-shaped type II contraction pattern in patients with strict left bundle branch block predicts super-response to cardiac resynchronization therapy. Jackson T., Sohal M., Chen Z., Child N., Sammut E., Behar J., Claridge S., Carr-White G., Razavi R., and Rinaldi C.A.. *Heart Rhythm* 2014 :
- Cardiac implantable electronic device removal in patients with left ventricular assist device associated infections. Krishnamoorthy A., Pokorney S.D., Lewis R.K., Daubert J.P., Greenfield R.A., Hegland D.D., Milano C.A., Rogers J.G., Schroder J.N., Patel C.B., and Piccini J.P.. *J. Cardiovasc. Electrophysiol.* 2014 :
- Relationship between two-dimensional speckle-tracking septal strain and response to cardiac resynchronization therapy in patients with left ventricular dysfunction and left bundle branch block: A prospective pilot study. Marechaux S., Guiot A., Castel A.L., Guyomar Y., Semichon M., Delelis F., Heuls S., Ennezat P.-V., Graux P., and Tribouilloy C.. *J. Am. Soc. Echocardiogr.* 2014 :501-511
- Dynamic relationship of left-ventricular dyssynchrony and contractile reserve in patients undergoing cardiac resynchronization therapy. Stankovic I., Aaronson M., Smith H.-J., Voros G., Kongsgaard E., Neskovic A.N., Willems R., Aakhus S., and Voigt J.-U.. *Eur. Heart J.* 2014 :48-55a
- Development and optimization of SPECT gated blood pool cluster analysis for the prediction of CRT outcome. Lalonde M., Wells R.G., Birnie D., Ruddy T.D., and Wassenaar R.. *Med. Phys.* 2014 :
- Appropriate duration of driving restrictions after inappropriate therapy from implantable cardiac shock devices - Interim analysis of the Nippon Storm Study. Noda T., Kurita T., Nitta T., Abe H., Watanabe S., Furushima H., Matsumoto N., Toyoshima T., Shimizu A., Mitamura H., Ohe T., and Aizawa Y.. *Circ. J.* 2014 :1989-1991
- Hemodynamic effects after six-month CRT and after acute discontinuation evaluated by RHC. Wojciechowska C., Tomasik A., Gala A., Kubiak G., Krzemieszewska K., Kawecki D., Nowalany-Kozielska E., and Jachec W.. *Exp. Clin. Cardiol.* 2014 :3932-3952
- Quality of Life in Cardiac Resynchronization Recipients: Association with Response and Impact on Outcome. Lenarczyk, R., Jedrzejczyk-Patej, E., Mazurek, M., Szulik, M., Kowalski, O., Pruszkowska, P., Sokal, A., Sredniawa, B., Boidol, J., Kowalczyk, J., Podolecki, T., Mencil, G., and Kalarus, Z.. *Pacing Clin Electrophysiol* 2014 :
- Left ventricular electrical activation during right ventricular pacing in heart failure patients with LBBB: Visualization by electrocardiographic imaging and implications for cardiac resynchronization therapy. Varma, N.. *J Electrocardiol* 2014 :
- Outcome of super-responders to cardiac resynchronization therapy defined by endpoint-derived parameters of left ventricular remodeling: a two-center retrospective study. Hurlimann, D., Schmidt, S., Seifert, B., Saguner, A. M., Hindricks, G., Luscher, T. F., Ruschitzka, F., and Steffel, J.. *Clin Res Cardiol* 2014 :
- T-Wave Area Predicts Response to Cardiac Resynchronization Therapy in Patients with Left Bundle Branch Block. Engels, E. B., Vegh, E. M., VAN Deursen, C. J., Vernoooy, K., Singh, J. P., and Prinzen, F. W.. *J Cardiovasc Electrophysiol* 2014 :
- Clinical Effectiveness of Cardiac Resynchronization Therapy vs Medical Therapy Alone Among Patients With Heart Failure: An Analysis of the ICD and ADHERE National Registries. Khazanie, P., Hammill, B. G., Qualls, L. G., Fonarow, G. C., Hammill, S. C., Heidenreich, P. A., Al-Khatib, S. M., Piccini, J. P., Masoudi, F. A., Peterson, P. N., Curtis, J. P., Hernandez, A. F., and Curtis, L. H.. *Circ Heart Fail* 2014 :
- Identification of Genetic Markers for Treatment Success in Heart Failure Patients: Insight from Cardiac Resynchronization Therapy. Schmitz, B., DeMaria, R., Gatsios, D., Chrysanthakopoulou, T., Landolina, M., Gasparini, M., Campolo, J., Parolini, M., Sanzo, A., Galimberti, P., Bianchi, M., Lenders, M., Brand, E., Parodi, O., Lunati, M., and Brand, S. M.. *Circ Cardiovasc Genet* 2014 :
- Relationship between pre-implant ejection fraction and outcome after cardiac resynchronization therapy in symptomatic patients. Schuchert, A., Muto, C., Maounis, T., Ella, R. O., Polauck, A., and Padeletti, L.. *Acta Cardiol* 2014 :424-32
- Follow-up of implantable cardioverter-defibrillator therapy: comparison of coronary artery disease and dilated cardiomyopathy. Verhagen, M. P., van Boven, N., Ruiter, J. H., Kimman, G. J., Tahapary, G. J., and Umans, V. A.. *Neth Heart J* 2014 :431-7

Gender, underutilization of cardiac resynchronization therapy, and prognostic impact of QRS prolongation and left bundle branch block in heart failure. Linde, C., Stahlberg, M., Benson, L., Braunschweig, F., Edner, M., Dahlstrom, U., Alehagen, U., and Lund, L. H.. *Europace* 2014 :

The association between biventricular pacing and cardiac resynchronization therapy-defibrillator efficacy when compared with implantable cardioverter defibrillator on outcomes and reverse remodelling. Ruwald, A. C., Kutyla, V., Ruwald, M. H., Solomon, S., Daubert, J. P., Jons, C., Brenyo, A., McNitt, S., Do, D., Tanabe, K., Al-Ahmad, A., Wang, P., Moss, A. J., and Zareba, W.. *Eur Heart J* 2014 :

A prospective evaluation of cardiovascular magnetic resonance measures of dyssynchrony in the prediction of response to cardiac resynchronization therapy. Sohal, M., Duckett, S. G., Zhuang, X., Shi, W., Ginks, M., Shetty, A., Sammut, E., Kozerke, S., Niederer, S., Smith, N., Ourselin, S., Rinaldi, C., Rueckert, D., Carr-White, G., and Razavi, R.. *J Cardiovasc Magn Reson* 2014 :58

Coronary sinus biomarker sampling compared to peripheral venous blood for predicting outcomes in patients with severe heart failure undergoing cardiac resynchronization therapy: The BIOCRT study. Truong, Q. A., Januzzi, J. L., Szymonifka, J., Thai, W. E., Wai, B., Lavender, Z., Sharma, U., Sandoval, R. M., Grunau, Z. S., Basnet, S., Babatunde, A., Ajijola, O. A., Min, J. K., and Singh, J. P.. *Heart Rhythm* 2014 :

Transient variations of transthoracic impedance as a predictor of heart failure and death in patients with implanted defibrillators. Mitrani, R. D., Sager, S. J., Moscucci, M., Cogan, J., and Myerburg, R. J.. *Int J Cardiol* 2014 :473-7

PR interval identifies clinical response in patients with non-left bundle branch block: a Multicenter Automatic Defibrillator Implantation Trial-Cardiac Resynchronization Therapy substudy. Kutyla, V., Stockburger, M., Daubert, J. P., Holmqvist, F., Olshansky, B., Schuger, C., Klein, H., Goldenberg, I., Brenyo, A., McNitt, S., Merkely, B., Zareba, W., and Moss, A. J.. *Circ Arrhythm Electrophysiol* 2014 :645-51

Long-term performance of modern coronary sinus leads in cardiac resynchronization therapy. Steffel, J., Hurlimann, A., Starck, C., Krasniqi, N., Schmidt, S., Luscher, T. F., Duru, F., Ruschitzka, F., Holzmeister, J., and Hurlimann, D.. *Indian Pacing Electrophysiol J* 2014 :112-20

Impact of Pacing Site on QRS Duration and Its Relationship to Hemodynamic Response in Cardiac Resynchronization Therapy for Congestive Heart Failure. Derval, N., Bordachar, P., Lim, H. S., Sacher, F., Ploux, S., Laborde, J., Steendijk, P., Deplagne, A., Ritter, P., Garrigue, S., Denis, A., Hocini, M., Haissaguerre, M., Clementy, J., and Jais, P.. *J Cardiovasc Electrophysiol* 2014 :1012-20

The Impact of Nonsustained Ventricular Tachycardia on Reverse Remodeling, Heart Failure, and Treated Ventricular Tachyarrhythmias in MADIT-CRT. Mittal, S.,

Aktas, M. K., Moss, A. J., McNitt, S., Kutyla, V., Steinberg, J. S., and Zareba, W.. *J Cardiovasc Electrophysiol* 2014 :1082-7

Usefulness of hyponatremia as a predictor for adverse events in patients with heart failure receiving cardiac resynchronization therapy. Sharma, A. K., Vegh, E. M., Kandala, J., Orencole, M., Januszkiewicz, L., Bose, A., Miller, A., Parks, K. A., Heist, E. K., and Singh, J. P.. *Am J Cardiol* 2014 :83-7

The epidemic of inadequate biventricular pacing in patients with persistent or permanent atrial fibrillation and its association with mortality. Ousdigian, K. T., Borek, P. P., Koehler, J. L., Heywood, J. T., Ziegler, P. D., and Wilkoff, B. L.. *Circ Arrhythm Electrophysiol* 2014 :370-6

Influence of healthy candidate bias in assessing clinical effectiveness for implantable cardioverter-defibrillators: cohort study of older patients with heart failure. Setoguchi, S., Warner Stevenson, L., Stewart, G. C., Bhatt, D. L., Epstein, A. E., Desai, M., Williams, L. A., and Chen, C. Y.. *BMJ* 2014 :g2866

Adverse Effects of First-Degree AV-Block in Patients with Sinus Node Dysfunction: Data from the Mode Selection Trial. Holmqvist, F., Hellkamp, A. S., Lee, K. L., Lamas, G. A., and Daubert, J. P.. *Pacing Clin Electrophysiol* 2014 :1111-9

Prevalence of guideline-directed medical therapy among patients receiving cardiac resynchronization therapy defibrillator implantation in the National Cardiovascular Data Registry during the years 2006 to 2008. Schneider, P. M., Pellegrini, C. N., Wang, Y., Fein, A. S., Reynolds, M. R., Curtis, J. P., Masoudi, F. A., and Varosy, P. D.. *Am J Cardiol* 2014 :2052-6

Combined score using clinical, electrocardiographic, and echocardiographic parameters to predict left ventricular remodeling in patients having had cardiac resynchronization therapy six months earlier. Brunet-Bernard, A., Marechaux, S., Fauchier, L., Guiot, A., Fournet, M., Reynaud, A., Schnell, F., Leclercq, C., Mabo, P., and Donal, E.. *Am J Cardiol* 2014 :2045-51

Elevated pulmonary artery pressure predicts poor outcome after cardiac resynchronization therapy. Wang, J., Su, Y., Bai, J., Wang, W., Qin, S., and Ge, J.. *J Interv Card Electrophysiol* 2014 :171-8

Systolic heart failure and cardiac resynchronization therapy: a focus on diastole. Facchini, E., Varalda, M., Sartori, C., Burkhoff, D., and Marino, P. N.. *Int J Cardiovasc Imaging* 2014 :897-905

Probability and magnitude of response to cardiac resynchronization therapy according to QRS duration and gender in nonischemic cardiomyopathy and LBBB. Varma, N., Manne, M., Nguyen, D., He, J., Niebauer, M., and Tchou, P.. *Heart Rhythm* 2014 :1139-47

Association between brain natriuretic peptide, markers of inflammation and the objective and subjective response to cardiac resynchronization therapy. Brouwers, C., Versteeg, H., Meine, M., Heijnen, C. J., Kavelaars, A. M., Pedersen,

S. S., and Mommersteeg, P. M.. *Brain Behav Immun* 2014 :211-8

Metabolomic does not predict response to cardiac resynchronization therapy in patients with heart failure. Padeletti, L., Modesti, P. A., Carlei, S., Checchi, L., Ricciardi, G., Pieragnolia, P., Sacchi, S., Padeletti, M., Alterini, B., Pantaleo, P., Hu, X., Tenori, L., and Luchinat, C.. *J Cardiovasc Med (Hagerstown)* 2014 :295-300

Comparison of the relation between left ventricular anatomy and QRS duration in patients with cardiomyopathy with versus without left bundle branch block. Chan, D. D., Wu, K. C., Loring, Z., Galeotti, L., Gerstenblith, G., Tomaselli, G., Weiss, R. G., Wagner, G. S., and Strauss, D. G.. *Am J Cardiol* 2014 :1717-22

Patient-assessed short-term positive response to cardiac resynchronization therapy is an independent predictor of long-term mortality. Reitan, C., Bakos, Z., Platonov, P. G., Hoijer, C. J., Brandt, J., Wang, L., and Borgquist, R.. *Europace* 2014 :

Determination of the longest inpatient left ventricular electrical delay may predict acute hemodynamic improvement in patients after cardiac resynchronization therapy. Zanon, F., Baracca, E., Pastore, G., Fraccaro, C., Roncon, L., Aggio, S., Noventa, F., Mazza, A., and Prinzen, F.. *Circ Arrhythm Electrophysiol* 2014 :377-83

Outcomes in pacemaker-dependent patients upgraded from conventional pacemakers to cardiac resynchronization therapy-defibrillators. Adelstein, E., Schwartzman, D., Bazaz, R., Jain, S., Gorcsan, J. 3rd, and Saba, S.. *Heart Rhythm* 2014 :1008-14

Device-measured physical activity versus six-minute walk test as a predictor of reverse remodeling and outcome after cardiac resynchronization therapy for heart failure. Vegh, E. M., Kandala, J., Orencole, M., Upadhyay, G. A., Sharma, A., Miller, A., Merkely, B., Parks, K. A., and Singh, J. P.. *Am J Cardiol* 2014 :1523-8

Effect of echocardiography-guided left ventricular lead placement for cardiac resynchronization therapy on mortality and risk of defibrillator therapy for ventricular arrhythmias in heart failure patients (from the Speckle Tracking Assisted Resynchronization Therapy for Electrode Region. Adelstein, E., Alam, M. B., Schwartzman, D., Jain, S., Marek, J., Gorcsan, J., and Saba, S.. *Am J Cardiol* 2014 :1518-22

Impact of mechanical activation, scar, and electrical timing on cardiac resynchronization therapy response and clinical outcomes. Bilchick, K. C., Kuruvilla, S., Hamirani, Y. S., Ramachandran, R., Clarke, S. A., Parker, K. M., Stukenborg, G. J., Mason, P., Ferguson, J. D., Moorman, J. R., Malhotra, R., Mangrum, J. M., Darby, A. E., Dimarco, J., Holmes, J. W., Salerno, M., Kramer, C. M., and Epstein, F. H.. *J Am Coll Cardiol* 2014 :1657-66

Septal flash predicts cardiac resynchronization therapy response in patients with permanent atrial fibrillation. Gabrielli, L., Marincheva, G., Bijmens, B., Doltra, A., Tolosana, J. M., Borrás, R., Castel, M. A., Berrueto, A.,

Brugada, J., Mont, L., and Sitges, M.. *Europace* 2014 :1342-9

Cardiac resynchronization therapy restored ventricular septal myocardial perfusion and enhanced ventricular remodeling in patients with nonischemic cardiomyopathy presenting with left bundle branch block. Ogano, M., Iwasaki, Y. K., Tanabe, J., Takagi, H., Umemoto, T., Hayashi, M., Miyauchi, Y., and Shimizu, W.. *Heart Rhythm* 2014 :836-41

Depression and outcome among veterans with implantable cardioverter defibrillators with or without cardiac resynchronization therapy capability. Shalaby, A. A., Brumberg, G. E., Pointer, L., Bekelman, D. B., Rumsfeld, J. S., Yang, Y., Pellegrini, C. N., Heidenreich, P. A., Keung, E., Massie, B. M., and Varosy, P. D.. *Pacing Clin Electrophysiol* 2014 :994-1001

Smoking is associated with an increased risk of first and recurrent ventricular tachyarrhythmias in ischemic and nonischemic patients with mild heart failure: a MADIT-CRT substudy. Plank, B., Kutyla, V., Moss, A. J., Huang, D. T., Ruwald, A. C., McNitt, S., Polonsky, B., Zareba, W., Goldenberg, I., and Aktas, M. K.. *Heart Rhythm* 2014 :822-7

Incremental value of larger interventricular conduction time in improving cardiac resynchronization therapy outcome in patients with different QRS duration. D'Onofrio, A., Botto, G., Mantica, M., LA Rosa, C., Occhetta, E., Verlato, R., Molon, G., Ammendola, E., Villani, G. Q., Bongioni, M. G., Bianchi, V., Gelmini, G. P., Valsecchi, S., and Ciardiello, C.. *J Cardiovasc Electrophysiol* 2014 :500-6

Survival in octogenarians undergoing cardiac resynchronization therapy compared to the general population. Rickard, J., Cheng, A., Spragg, D., Green, A., Leff, B., Tang, W., Cantillon, D., Baranowski, B., Wilkoff, B. L., and Tchou, P.. *Pacing Clin Electrophysiol* 2014 :740-4

Not left ventricular lead position, but the extent of immediate asynchrony reduction predicts long-term response to cardiac resynchronization therapy. Poller, W. C., Dreger, H., Schwerg, M., Bondke, H., and Melzer, C.. *Clin Res Cardiol* 2014 :457-66

Long-term prognostic impact of therapeutic strategies in patients with idiopathic dilated cardiomyopathy: changing mortality over the last 30 years. Merlo, M., Pivetta, A., Pinamonti, B., Stolfo, D., Zecchin, M., Barbati, G., Di Lenarda, A., and Sinagra, G.. *Eur J Heart Fail* 2014 :317-24

Effect of cardiac resynchronization therapy on the sequence of mechanical activation assessed by two-dimensional radial strain imaging. Auger, D., Hoke, U., Thijssen, J., Abate, E., Yiu, K. H., Ewe, S. H., Witkowski, T. G., Leong, D. P., Holman, E. R., Ajmone Marsan, N., Schalij, M. J., Bax, J. J., and Delgado, V.. *Am J Cardiol* 2014 :982-7

Left ventricular ejection fraction overcrossing 35% after one year of cardiac resynchronization therapy predicts long term survival and freedom from sudden cardiac death:

single center observational experience. Frigerio, M., Lunati, M., Pasqualucci, D., Vargiu, S., Foti, G., Pedretti, S., Vittori, C., Cattafi, G., Magenta, G., Campo, C., Bisetti, S., and Mercuro, G.. *Int J Cardiol* 2014 :64-71

Circulating endothelial progenitor cells as a predictor of response to cardiac resynchronization therapy: the missing piece of the puzzle?. Antonio, N., Soares, A., Carvalheiro, T., Fernandes, R., Paiva, A., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., Providencia, L. A., Ribeiro, C. F., and Pego, G. M.. *Pacing Clin Electrophysiol* 2014 :731-9

The effect of weight loss on clinical outcomes in patients implanted with a cardiac resynchronization therapy device-A MADIT-CRT substudy. Aktas, M. K., Zareba, W., Huang, D. T., McNitt, S., Polonsky, S., Chen, L., Stockburger, M., Merkely, B., Moss, A. J., and Kutyla, V.. *J Card Fail* 2014 :183-9

Impact of myocardial viability and left ventricular lead location on clinical outcome in cardiac resynchronization therapy recipients with ischemic cardiomyopathy. Bose, A., Kandala, J., Upadhyay, G. A., Riedl, L., Ahmado, I., Padmanabhan, R., Gewirtz, H., Mulligan, L. J., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2014 :507-13

Cardiac implantable electronic device infections: incidence, risk factors, and the effect of the AegisRx antibacterial envelope. Mittal, S., Shaw, R. E., Michel, K., Palekar, R., Arshad, A., Musat, D., Preminger, M., Sichrovsky, T., and Steinberg, J. S.. *Heart Rhythm* 2014 :595-601

Remote past left ventricular function before chronic right ventricular pacing predicts responses to cardiac resynchronization therapy upgrade. Chang, P. C., Wo, H. T., Chen, T. H., Wu, D., Lin, F. C., and Wang, C. C.. *Pacing Clin Electrophysiol* 2014 :454-63

Prevalence of ventricular arrhythmias in patients with cardiac resynchronization therapy without back-up ICD: a single-center experience. Bortnik, M., Degiovanni, A., Dell'era, G., Cavallino, C., Occhetta, E., and Marino, P.. *J Cardiovasc Med (Hagerstown)* 2014 :301-6

Depression, psychological distress, and quality of life in patients with cardioverter defibrillator with or without cardiac resynchronization therapy. Knackstedt, C., Arndt, M., Mischke, K., Marx, N., Nieman, F., Kunert, H. J., Schauerte, P., and Norra, C.. *Heart Vessels* 2014 :364-74

Effects of smoking in patients treated with cardiac resynchronization therapy. Perrotta, L., Xhaferi, B., Chiostrì, M., Pieragnoli, P., Ricciardi, G., Di Biase, L., Natale, A., Ricceri, I., Biria, M., Lakkireddy, D., Valleggi, A., Emdin, M., Michelotti, F., Mascioli, G., Pandozi, A., Santini, M., and Padeletti, L.. *Intern Emerg Med* 2014 :311-8

Usefulness of echocardiographically guided left ventricular lead placement for cardiac resynchronization therapy in patients with intermediate QRS width and non-left bundle branch block morphology. Marek, J. J., Saba, S., Onishi, T., Ryo, K., Schwartzman, D., Adelstein, E. C., and Gorcsan, I. I. J.. *American journal of cardiology* 2014 :107-16

Prognosis and response to therapy of first inpatient and outpatient heart failure event in a heart failure clinical trial: MADIT-CRT. Skali, H., Dwyer, E. M., Goldstein, R., Haigney, M., Krone, R., Kukin, M., Lichstein, E., McNitt, S., Moss, A. J., Pfeffer, M. A., and Solomon, S. D.. *European journal of heart failure* 2014 :560-5

Single case study

Pacemaker-related reversible right heart failure. Shah, B. N., Bethell, H. W., and Senior, R.. *Postgrad Med J* 2013 :486-7

Electrical storm after cardiac resynchronization therapy suppressed by triple-site biventricular pacing and atrioventricular nodal ablation. Itoh, M., Yoshida, A., Takei, A., and Hirata, K.. *Heart Rhythm* 2012 :2059-62

Effect of cardiac resynchronization therapy in isolated ventricular noncompaction in adults: follow-up of four cases. Oginosawa, Y., Nogami, A., Soejima, K., Aonuma, K., Kubota, S., Sato, T., Sugiyasu, A., Yoshida, K., Kowase, S., Sakamaki, M., Kurosaki, K., and Kato, K.. *J Cardiovasc Electrophysiol* 2008 :935-8

Cardiac resynchronization therapy in hemodynamically unstable heart failure patients. Rao, B. H., Kalavakolanu, S., Chandrasekar, K., Sastry, B. K., and Narasimhan, C.. *Indian Heart J* 2007 :185-7

Optimization of atrioventricular and interventricular delay with acoustic cardiography in biventricular pacing. Toggweiler, S., Zuber, M., and Erne, P.. *Congest Heart Fail* 2006 :37-40

Loss of left bundle branch block following biventricular pacing therapy for heart failure: evidence for electrical remodeling?. Dizon, J., Horn, E., Neglia, J., Medina, N., and Garan, H.. *J Interv Card Electrophysiol* 2004 :47-50

Pacemaker syndrome associated with a biventricular pacing system. Akiyama, M., Kaneko, Y., Taniguchi, Y., and Kurabayashi, M.. *J Cardiovasc Electrophysiol* 2002 :1061-2

Acute effects of resynchronisation treatment on functional mitral regurgitation in dilated cardiomyopathy. Breithardt, O. A., Kuhl, H. P., and Stellbrink, C.. *Heart* 2002 :440

Resynchronization therapy in dilated cardiomyopathy: confirmation of hemodynamic improvement with real-time three-dimensional echocardiography. Chamoun, A. J., Lenihan, D. J., McCulloch, M., Ahmad, M., and Sheahan, R. G.. *Circulation* 2001 :E98-8

Intra-atrial thrombosis and pulmonary embolism complicating pacemaker leads for cardiac resynchronization therapy. Sbragia, P., Nait-Saidi, L., Alexandre Trigano, J., Saadjian, A., Barnay, P., and Levy, S.. *J. Intervent. Card. Electrophysiol.* 2003 :25-27

Superresponse to cardiac resynchronization therapy. Steffel, J. and Ruschitzka, F.. *Circulation* 2014 :87-90

Addresses only effectiveness; not an RCT

The effect of concomitant cardiac resynchronization therapy on quality of life in patients with heart failure undergoing cardiac surgery. Thoren, E., Kesek, M., and Jideus, L.. *Open Cardiovasc Med J* 2014 :18-22

Predictors and Outcomes of 'Super-Response' to Cardiac Resynchronization Therapy. Killu, A. M., Grupper, A., Friedman, P. A., Powell, B. D., Asirvatham, S. J., Espinosa, R. E., Luria, D., Rozen, G., Buber, Y., Lee, Y. H., Webster, T., Brooke, K. L., Hodge, D. O., Wiste, H. J., Glikson, M., and Cha, Y. M.. *J Card Fail* 2014 :

Outcomes after atrioventricular node ablation and biventricular pacing in patients with refractory atrial fibrillation and heart failure: a comparison between non-ischaemic and ischaemic cardiomyopathy. Sohinki, D., Ho, J., Srinivasan, N., Collins, L. J., and Obel, O. A.. *Europace* 2014 :

Impact of Diabetes Mellitus on the Clinical Response to Cardiac Resynchronization Therapy in Elderly People. Sardu, C., Marfella, R., and Santulli, G.. *J Cardiovasc Transl Res* 2014 :

Survival in Octogenarians Undergoing Cardiac Resynchronization Therapy Compared to the General Population. Rickard, J., Cheng, A., Spragg, D., Green, A., Leff, B., Tang, W., Cantillon, D., Baranowski, B., Wilkoff, B. L., and Tchou, P.. *Pacing Clin Electrophysiol* 2014 :

Cardiac Resynchronization Therapy Plus Coupled Pacing Improves Acutely Myocardial Function in Heart Failure Patients. Bremont, C., Lim, P., Elbaz, N., Damy, T., Gueret, P., Dubois-Rande, J. L., Wallick, D. W., and Lellouche, N.. *Pacing Clin Electrophysiol* 2014 :

The Registry Evaluating Functional Outcomes of Resynchronization Management (REFORM): quality of life and psychological functioning in patients receiving cardiac resynchronization therapy. Ford, J., Sears, S., Ramza, B., Reynolds, D. W., Nguyen, P., Fedewa, M., House, J., Kennedy, P., Thompson, R., and Murray, C.. *J Cardiovasc Electrophysiol* 2014 :43-51

Depression, psychological distress, and quality of life in patients with cardioverter defibrillator with or without cardiac resynchronization therapy. Knackstedt, C., Arndt, M., Mischke, K., Marx, N., Nieman, F., Kunert, H. J., Schauerte, P., and Norra, C.. *Heart Vessels* 2013 :

Cardiac resynchronization therapy in patients with chronic heart failure is associated with anti-inflammatory and anti-remodeling effects. Stanciu, A. E., Vatesescu, R. G., Stanciu, M. M., Iorgulescu, C., Vasile, A. I., and Dorobantu, M.. *Clin Biochem* 2013 :230-4

Improvement of left ventricular function under cardiac resynchronization therapy goes along with a reduced incidence of ventricular arrhythmia. Eickholt, C., Siekiera, M., Kirmanoglou, K., Rodenbeck, A., Heussen, N., Schauerte, P., Lichtenberg, A., Balzer, J., Rassaf, T.,

Perings, S., Kelm, M., Shin, D. I., and Meyer, C.. *PLoS One* 2012 :e48926

Incremental Reduction in Risk of Death Associated With Use of Guideline-Recommended Therapies in Patients With Heart Failure: A Nested Case-Control Analysis of IMPROVE HF. Fonarow, G. C., Albert, N. M., Curtis, A. B., Gheorghiade, M., Liu, Y., Mehra, M. R., O'Connor, C. M., Reynolds, D., Walsh, M. N., and Yancy, C. W.. *J Am Heart Assoc* 2012 :16-26

Comparison of three-dimensional echocardiographic software packages for assessment of left ventricular mechanical dyssynchrony and prediction of response to cardiac resynchronization therapy. Aly, M. F., Kleijn, S. A., de Boer, K., Abd El-Hady, Y. A., Sorour, K. A., Kandil, H. I., van Rossum, A. C., and Kamp, O.. *Eur Heart J Cardiovasc Imaging* 2013 :700-10

Number of leads with fragmented QRS predicts response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Al, N., Kozdag, G., Vural, A., and Ural, D.. *Clin Cardiol* 2013 :36-9

A reduction in total isovolumic time with cardiac resynchronisation therapy is a predictor of clinical outcomes. Guha, K., Mantziari, L., Sharma, R., McDonagh, T. A., Gibson, D., and Duncan, A. M.. *Int J Cardiol* 2013 :382-7

Time from emerging heart failure symptoms to cardiac resynchronisation therapy: impact on clinical response. Verbrugge, F. H., Dupont, M., Vercammen, J., Jacobs, L., Verhaert, D., Vandervoort, P., Tang, W. H., and Mullens, W.. *Heart* 2013 :314-9

High sensitivity C-reactive protein predicts nonresponders and cardiac deaths in severe heart failure patients after CRT implantation. Kamioka, M., Suzuki, H., Yamada, S., Kamiyama, Y., Saitoh, S., and Takeishi, Y.. *Int Heart J* 2012 :306-12

Hyponatremia as a predictor for worsening heart failure in patients receiving cardiac resynchronization therapy. Arao, K., Fujiwara, T., Sakakura, K., Wada, H., Sugawara, Y., Suga, C., Ako, J., Ishikawa, S. E., and Momomura, S.. *Circ J* 2013 :116-22

Effects of biventricular pacing on right ventricular function assessed by standard echocardiography. Kusiak, A., Wilinski, J., Wojciechowska, W., Jastrzebski, M., Sondej, T., Bacior, B., Kloch-Badelek, M., and Czarnecka, D.. *Kardiologia Pol* 2012 :883-8

Electrical delay in apically positioned left ventricular leads and clinical outcome after cardiac resynchronization therapy. Kandala, J., Upadhyay, G. A., Altman, R. K., Bose, A., Heist, E. K., Mela, T., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2013 :182-7

Effects of tricuspid valve regurgitation on clinical and echocardiographic outcome in patients with cardiac resynchronization therapy. Abu Sham'a, R., Buber, J., Grupper, A., Nof, E., Kuperstein, R., Luria, D., Feinberg, M. S., Eldar, M., and Glikson, M.. *Europace* 2013 :266-72

- Characteristics of responders to cardiac resynchronization therapy: the impact of echocardiographic left ventricular volume. Park, M. Y., Altman, R. K., Orencole, M., Kumar, P., Parks, K. A., Heist, K. E., Singh, J. P., and Picard, M. H.. *Clin Cardiol* 2012 :777-80
- Intrathoracic impedance changes reflect reverse left ventricular remodeling in response to cardiac resynchronization therapy in chronic heart failure patients. Kaneshiro, T., Suzuki, H., Yamada, S., Kamiyama, Y., Saitoh, S., and Takeishi, Y.. *Int Heart J* 2012 :249-52
- Cardiac resynchronization therapy in clinical responders: right ventricular echocardiographic changes at mid-term follow-up. Praus, R., Hama, L., Tauchman, M., Blaha, V., and Parizek, P.. *Acta Cardiol* 2012 :311-6
- Impact of renal insufficiency on long-term clinical outcome in patients with heart failure treated by cardiac resynchronization therapy. Hosoda, J., Ishikawa, T., Matsushita, K., Matsumoto, K., Kimura, Y., Miyamoto, M., Ogawa, H., Takamura, T., Sugano, T., Ishigami, T., Uchino, K., Kimura, K., and Umemura, S.. *J Cardiol* 2012 :301-5
- Impact of cardiac resynchronisation therapy on physical ability and quality of life in patients with chronic heart failure. Kloch Badelek, M., Kloczek, M., Czarnecka, D., Wojciechowska, W., Wilinski, J., and Kawecka Jaszcz, K.. *Kardiologia Pol* 2012 :581-8
- Association between red blood cell distribution width and response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Kozdag, G., Vural, A., and Ural, D.. *J Interv Card Electrophysiol* 2012 :215-8
- A strategy to achieve CRT response in permanent atrial fibrillation without obligatory atrioventricular node ablation. Himmel, F., Reppel, M., Mortensen, K., Schunkert, H., and Bode, F.. *Pacing Clin Electrophysiol* 2012 :943-7
- Usefulness of hemoglobin A(1c) to predict outcome after cardiac resynchronization therapy in patients with diabetes mellitus and heart failure. Shah, R. V., Altman, R. K., Park, M. Y., Zilinski, J., Leyton-Mange, J., Orencole, M., Picard, M. H., Barrett, C. D., Heist, E. K., Upadhyay, G., Das, R., Singh, J. P., and Das, S.. *Am J Cardiol* 2012 :683-8
- Independent predictors of mortality in patients with advanced heart failure treated by cardiac resynchronization therapy. Kreuz, J., Horlbeck, F., Linhart, M., Mellert, F., Fimmers, R., Schrickel, J., Nickenig, G., and Schwab, J. O.. *Europace* 2012 :1596-601
- Effect of cardiac resynchronization therapy on left atrial reverse remodeling: role of echocardiographic AV delay optimization. Malagoli, A., Rossi, L., Franchi, F., Piepoli, M. F., Malavasi, V., Casali, E., Modena, M. G., and Villani, G. Q.. *Int J Cardiol* 2013 :1456-60
- Septal rebound stretch is a strong predictor of outcome after cardiac resynchronization therapy. Leenders, G. E., De Boeck, B. W., Teske, A. J., Meine, M., Bogaard, M. D., Prinzen, F. W., Doevendans, P. A., and Cramer, M. J.. *J Card Fail* 2012 :404-12
- Comparison of cardiac resynchronization therapy outcomes in patients with New York Heart Association functional class I/II versus III/IV heart failure. Bank, A. J., Rischall, A., Gage, R. M., Burns, K. V., and Kubo, S. H.. *J Card Fail* 2012 :373-8
- Extraordinarily favorable left ventricular reverse remodeling through long-term cardiac resynchronization: super-response to cardiac resynchronization. Celebi, O., Knaus, T., Blaschke, F., Habedank, D., Dohner, W., Nitardy, A., and Stockburger, M.. *Pacing Clin Electrophysiol* 2012 :870-6
- Performance of the Seattle Heart Failure Model in implantable defibrillator patients treated with cardiac resynchronization therapy. Smith, T., Levy, W. C., Schaer, B. A., Balk, A. H., Sticherling, C., Jordaens, L., and Theuns, D. A.. *Am J Cardiol* 2012 :398-402
- Small left atrium and mild mitral regurgitation predict super-response to cardiac resynchronization therapy. Stefan, L., Sedlacek, K., Cerna, D., Kryze, L., Vancura, V., Marek, T., and Kautzner, J.. *Europace* 2012 :1608-14
- Effect of cardiac resynchronization therapy on beat-to-beat T-wave amplitude variability. Zizek, D., Cvijic, M., Tasic, J., Jan, M., Friljak, S., and Zupan, I.. *Europace* 2012 :1646-52
- Acute hemodynamic response to biventricular pacing in heart failure patients with narrow, moderately, and severely prolonged QRS duration. Ploux, S., Whinnett, Z., Lumens, J., Denis, A., Zemmoura, A., De Guillebon, M., Ramoul, K., Ritter, P., Jais, P., Clementy, J., Haissaguerre, M., and Bordachar, P.. *Heart Rhythm* 2012 :1247-50
- Comparison of left ventricular reverse remodeling induced by cardiac contractility modulation and cardiac resynchronization therapy in heart failure patients with different QRS durations. Zhang, Q., Chan, Y. S., Liang, Y. J., Fang, F., Lam, Y. Y., Chan, C. P., Lee, A. P., Chan, K. C., Wu, E. B., and Yu, C. M.. *Int J Cardiol* 2013 :889-93
- Cardiac resynchronization therapy in the real world: comparison with the COMPANION study. Bank, A. J., Burns, K. V., Gage, R. M., Vatterott, D. B., Adler, S. W., Sajady, M., Rohde, D., Parah, J. S., Anand, I., Yong, P., Seth, M., and Kubo, S. H.. *J Card Fail* 2012 :153-8
- Influence of myocardial viability on responsiveness to cardiac resynchronization in ischemic dilated cardiomyopathy: a prospective observational cohort study. Pugliese, M., Minardi, G., Vitali, A., Natale, E., De Girolamo, P., Zampi, G., Leggio, M., Chiarelli, A., Pappalardo, A., Avella, A., Laurenzi, F., and Fera, M. S.. *Anadolu Kardioloji Derg* 2012 :132-41
- Baseline aortic pre-ejection interval predicts reverse remodeling and clinical improvement after cardiac resynchronization therapy. Aksoy, H., Okutucu, S., Aytemir, K., Kaya, E. B., Evranos, B., Kabakci, G., Tokgozoglu, L., Ozkutlu, H., and Oto, A.. *Cardiol J* 2011 :639-47
- Application of the Seattle Heart Failure Model in patients on cardiac resynchronization therapy. Perrotta, L.,

- Ricciardi, G., Pieragnoli, P., Chiostrì, M., Pontecorboli, G., De Santo, T., Bellocchi, F., Vitulano, N., Emdin, M., Mascioli, G., Ricceri, I., Porciani, M. C., Michelucci, A., and Padeletti, L.. *Pacing Clin Electrophysiol* 2012 :88-94
- Additive value of severe diastolic dysfunction and contractile reserve in the identification of responders to cardiac resynchronization therapy. Ciampi, Q., Pratali, L., Citro, R., Villari, B., Picano, E., and Sicari, R.. *Eur J Heart Fail* 2011 :1323-30
- CArdiac resynchronization in combination with beta blocker treatment in advanced chronic heart failure (CARIBE-HF): the results of the CARIBE-HF study. Grosu, A., Senni, M., Iacovoni, A., Gori, M., Cantu, F., Bisetti, S., De Santo, T., De Luca, A., and Gavazzi, A.. *Acta Cardiol* 2011 :573-80
- Pre-implant right ventricular function might be an important predictor of the response to cardiac resynchronization therapy. Edner, M., Ring, M., and Henriksson, P.. *Cardiovasc Ultrasound* 2011 :28
- Echocardiography-based qualification and response assessment to cardiac resynchronisation therapy in patients with chronic heart failure. The matrix metalloproteinase-9 substudy. Szulik, M., Stabryla-Deska, J., Boidol, J., Lenarczyk, R., Kalarus, Z., and Kukulski, T.. *Kardiologia Pol* 2011 :1043-51
- Presence of extensive LV remodeling limits the benefits of CRT in patients with intraventricular dyssynchrony. Carluccio, E., Biagioli, P., Alunni, G., Murrone, A., Pantano, P., Biscottini, E., Zuchi, C., Zingarini, G., Cavallini, C., and Ambrosio, G.. *JACC Cardiovasc Imaging* 2011 :1067-76
- The impact of left ventricular size on response to cardiac resynchronization therapy. Rickard, J., Brennan, D. M., Martin, D. O., Hsieh, E., Tang, W. H., Lindsay, B. D., Starling, R. C., Wilkoff, B. L., and Grimm, R. A.. *Am Heart J* 2011 :646-53
- Ventricular tachycardia or ventricular fibrillation occurs less often in patients with left bundle branch block and combined resynchronization and defibrillators than in patients with narrow QRS and conventional defibrillators. Blaschke, F., Knaus, T., Celebi, O., Krebs, A., Nitardy, A., Habedank, D., Dietz, R., and Stockburger, M.. *Europace* 2012 :224-9
- Predictors of response to cardiac resynchronization therapy in patients with a non-left bundle branch block morphology. Rickard, J., Bassiouny, M., Cronin, E. M., Martin, D. O., Varma, N., Niebauer, M. J., Tchou, P. J., Tang, W. H., and Wilkoff, B. L.. *Am J Cardiol* 2011 :1576-80
- Effect of cardiac resynchronization on gradient reduction in patients with obstructive hypertrophic cardiomyopathy: preliminary study. Lenarczyk, R., Wozniak, A., Kowalski, O., Sokal, A., Pruszkowska-Skrzep, P., Sredniawa, B., Szulik, M., Zielinska, T., Kukulski, T., Stabryla, J., Mazurek, M., Bialkowski, J., and Kalarus, Z.. *Pacing Clin Electrophysiol* 2011 :1544-52
- Evaluation of baseline contractile reserve vs dyssynchrony as a predictor of functional improvement and long term outcome after resynchronization pacing therapy: a radionuclide stress study. Verna, E., Ghiringhelli, S., Scotti, S., and Caravati, F.. *J Nucl Cardiol* 2012 :53-62
- Comparison between 2D and 3D echocardiography in the evaluation of reverse remodeling after CRT. Hotta, V. T., Martinelli Filho, M., Mady, C., Mathias, W. Jr, and Vieira, M. L.. *Arq Bras Cardiol* 2011 :111-21
- Benefits of cardiac resynchronization therapy in "very dilated cardiomyopathy". Lousinha, A., Oliveira, M. M., Feliciano, J., Galrinho, A., Branco, L. M., Cunha, P. S., Hamad, H., Ramos, R., Abreu, J., Leal, A., Santos, S., Soares, R., da Silva, M. N., and Ferreira, R. C.. *Rev Port Cardiol* 2011 :283-94
- Comparison of long-term survival of men versus women with heart failure treated with cardiac resynchronization therapy. Mooyaart, E. A., Marsan, N. A., van Bommel, R. J., Thijssen, J., Borleffs, C. J., Delgado, V., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2011 :63-8
- Left ventricular lead position and nonspecific conduction delay are predictors of mortality in patients during cardiac resynchronization therapy. Prochnau, D., Kuehnert, H., Heinke, M., Figulla, H. R., and Surber, R.. *Can J Cardiol* 2011 :363-8
- Improvement effect on endothelial function in patients with congestive heart failure treated with cardiac resynchronization therapy. Enomoto, K., Yamabe, H., Toyama, K., Matsuzawa, Y., Yamamuro, M., Uemura, T., Morihisa, K., Iwashita, S., Kaikita, K., Sugiyama, S., and Ogawa, H.. *J Cardiol* 2011 :69-73
- Quantification of mechanical ventricular dyssynchrony: direct comparison of velocity-encoded and cine magnetic resonance imaging. Muellerleile, K., Baholli, L., Groth, M., Koopmann, K., Barmeyer, A., Gosau, N., Ventura, R., Rostock, T., Koester, R., Adam, G., Willems, S., and Lund, G.. *Rofo* 2011 :554-60
- Long-term response of the left ventricle to cardiac resynchronization therapy: insights from standard and strain echocardiography. Kalogeropoulos, A., Savoye, L. P., Georgiopoulou, V., Raj, L., Lloyd, M. S., Chiladakis, J., Lerakis, S., Alexopoulos, D., and Butler, J.. *Congest Heart Fail* 2011 :71-9
- Relationship between acute improvement in left ventricular function to 6-month outcomes after cardiac resynchronization therapy in patients with chronic heart failure. Pires, L. A., Ghio, S., Chung, E. S., Tavazzi, L., Abraham, W. T., and Gerritse, B.. *Congest Heart Fail* 2011 :65-70
- Clinical and classic echocardiographic features of patients with, and without, left ventricle reverse remodeling following the introduction of cardiac resynchronization therapy. Wilinski, J., Czarnecka, D., Wojciechowska, W., Kloch-Badelek, M., Jastrzebski, M., Baciór, B., Sondej, T., Kusak, P., Przybyla, A., and Kawecka-Jaszcz, K.. *Cardiol J* 2011 :157-64

Close connection between improvement in left ventricular function by cardiac resynchronization therapy and the incidence of arrhythmias in cardiac resynchronization therapy-defibrillator patients. Schaer, B. A., Osswald, S., Di Valentino, M., Soliman, O. I., Sticherling, C., ten Cate, F. J., Jordaens, L., and Theuns, D. A.. *Eur J Heart Fail* 2010 :1325-32

Isolated left ventricular pacing results in worse long-term clinical outcome when compared with biventricular pacing: a single-centre randomized study. Sedlacek, K., Burianova, L., Mlcochova, H., Peichl, P., Marek, T., and Kautzner, J.. *Europace* 2010 :1762-8

Right atrial size and deformation in patients with dilated cardiomyopathy undergoing cardiac resynchronization therapy. D'Andrea, A., Scarafio, R., Riegler, L., Salerno, G., Gravino, R., Cocchia, R., Castaldo, F., Allocca, F., Limongelli, G., Di Salvo, G., Cuomo, S., Pacileo, G., Caso, P., Russo, M. G., and Calabro, R.. *Eur J Heart Fail* 2009 :1169-77

Outcome after device implantation in chronic heart failure is dependent on concomitant medical treatment. Adlbrecht, C., Hulsmann, M., Gwechenberger, M., Strunk, G., Khazen, C., Wiesbauer, F., Elhenicky, M., Neuhold, S., Binder, T., Maurer, G., Lang, I. M., and Pacher, R.. *Eur J Clin Invest* 2009 :1073-81

Prediction of response to cardiac resynchronization therapy using simple electrocardiographic and echocardiographic tools. Bonakdar, H. R., Jorat, M. V., Fazelifar, A. F., Alizadeh, A., Givtaj, N., Sameie, N., Sadeghpour, A., and Haghighi, M.. *Europace* 2009 :1330-7

Different response rates to cardiac resynchronization therapy (CRT) according to the applied definition. Wilinski, J., Czarnecka, D., Wojciechowska, W., Kloch-Badelek, M., Jastrzebski, M., Baciorek, B., Kwiecien-Sobstel, A., and Kawecka-Jaszcz, K.. *Przegl Lek* 2009 :130-3

Right ventricular pump function after cardiac resynchronization therapy: a strain imaging study. Donal, E., Thibault, H., Bergerot, C., Leroux, P. Y., Cannesson, M., Thivolet, S., Barthelet, M., Rivard, L., Chevalier, P., Ovize, M., Daubert, J. C., Leclercq, C., Mabo, P., and Derumeaux, G.. *Arch Cardiovasc Dis* 2008 :475-84

Cardiac resynchronization therapy modifies the neurohormonal profile, hemodynamic and functional capacity in heart failure patients. Menardi, E., Vado, A., Rossetti, G., Racca, E., Conte, E., Deorsola, A., Bobbio, M., and Feola, M.. *Arch Med Res* 2008 :702-8

Diaphragmatic myopotential oversensing in pacemaker-dependent patients with CRT-D devices. Santos, K. R., Adragao, P., Cavaco, D., Morgado, F. B., Candeias, R., Lima, S., and Silva, J. A.. *Europace* 2008 :1381-6

Comparison of benefits and mortality in cardiac resynchronization therapy in patients with atrial fibrillation versus patients in sinus rhythm (Results of the Spanish Atrial Fibrillation and Resynchronization. Tolosana, J. M., Hernandez Madrid, A., Brugada, J., Sitges, M., Garcia Bolao, I., Fernandez Lozano, I., Martinez Ferrer, J., Quesada, A., Macias, A., Marin, W., Escudier, J. M.,

Gomez, A. A., Gimenez Alcala, M., Tamborero, D., Berrueto, A., and Mont, L.. *Am J Cardiol* 2008 :444-9

Predicting the long-term effects of cardiac resynchronization therapy on mortality from baseline variables and the early response a report from the CARE-HF (Cardiac Resynchronization in Heart Failure) Trial. Cleland, J., Freemantle, N., Ghio, S., Fruhwald, F., Shankar, A., Marijanowski, M., Verboven, Y., and Tavazzi, L.. *J Am Coll Cardiol* 2008 :438-45

The ischemic etiology of heart failure in diabetics limits reverse left ventricular remodeling after cardiac resynchronization therapy. Soliman, O. I., van Dalen, B. M., Theuns, D. A., ten Cate, F. J., Nemes, A., Jordaens, L. J., and Geleijnse, M. L.. *J Diabetes Complications* 2009 :365-70

Cardiac resynchronization therapy response is associated with shorter duration of atrial fibrillation. Lellouche, N., De Diego, C., Vaseghi, M., Buch, E., Cesario, D. A., Mahajan, A., Wiener, I., Fonarow, G. C., Boyle, N. G., and Shivkumar, K.. *Pacing Clin Electrophysiol* 2007 :1363-8

Effect of cardiac resynchronisation therapy on occurrence of ventricular arrhythmia in patients with implantable cardioverter defibrillators undergoing upgrade to cardiac resynchronisation therapy devices. Lin, G., Rea, R. F., Hammill, S. C., Hayes, D. L., and Brady, P. A.. *Heart* 2008 :186-90

Biventricular upgrading in patients with conventional pacing system and congestive heart failure: results and response predictors. Laurenzi, F., Achilli, A., Avella, A., Peraldo, C., Orazi, S., Perego, G. B., Cesario, A., Valsecchi, S., De Santo, T., Puglisi, A., and Tondo, C.. *Pacing Clin Electrophysiol* 2007 :1096-104

Response to cardiac resynchronization therapy predicts survival in heart failure: a single-center experience. Cha, Y. M., Rea, R. F., Wang, M., Shen, W. K., Asirvatham, S. J., Friedman, P. A., Munger, T. M., Espinosa, R. E., Hodge, D. O., Hayes, D. L., and Redfield, M. M.. *J Cardiovasc Electrophysiol* 2007 :1015-9

The impact of cardiac resynchronization therapy on obstructive sleep apnea in heart failure patients: a pilot study. Stanchina, M. L., Ellison, K., Malhotra, A., Anderson, M., Kirk, M., Benser, M. E., Tosi, C., Carlisle, C., Millman, R. P., and Buxton, A.. *Chest* 2007 :433-9

Cardiac resynchronization therapy in hemodynamically unstable heart failure patients. Rao, B. H., Kalavakolanu, S., Chandrasekar, K., Sastry, B. K., and Narasimhan, C.. *Indian Heart J* 2007 :185-7

Sustained benefit of cardiac resynchronization therapy. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Nicastia, D. M., Elvan, A., Misier, A. R., and Beukema, W.. *J Cardiovasc Electrophysiol* 2007 :298-302

Prediction of response to cardiac resynchronization therapy: the selection of candidates for CRT (SCART) study. Achilli, A., Peraldo, C., Sassara, M., Orazi, S., Bianchi, S., Laurenzi, F., Donati, R., Perego, G. B.,

Spampinato, A., Valsecchi, S., Denaro, A., and Puglisi, A.. *Pacing Clin Electrophysiol* 2006 :S11-9

Benefit of combined resynchronization and defibrillator therapy in heart failure patients with and without ventricular arrhythmias. Ypenburg, C., van Erven, L., Bleeker, G. B., Bax, J. J., Bootsma, M., Wijffels, M. C., van der Wall, E. E., and Schalij, M. J.. *J Am Coll Cardiol* 2006 :464-70

Urgent cardiac resynchronization therapy in patients with decompensated chronic heart failure receiving inotropic therapy. A case series. Konstantino, Y., Iakobishvili, Z., Arad, O., Ben-Gal, T., Kusniec, J., Mazur, A., Porter, A., Strasberg, B., Battler, A., and Hasdai, D.. *Cardiology* 2006 :59-62

Biventricular pacing for heart failure patients on inotropic support: a review of 38 consecutive cases. James, K. B., Militello, M., Barbara, G., and Wilkoff, B. L.. *Tex Heart Inst J* 2006 :19-22

Effects of cardiac resynchronization therapy on the mechanisms underlying functional mitral regurgitation in congestive heart failure. Porciani, M. C., Macioce, R., Demarchi, G., Chiostrì, M., Musilli, N., Cappelli, F., Lilli, A., Ricciardi, G., and Padeletti, L.. *Eur J Echocardiogr* 2006 :31-9

CRT improves the exercise capacity and functional reserve of the failing heart through enhancing the cardiac flow- and pressure-generating capacity. Schlosshan, D., Barker, D., Pepper, C., Williams, G., Morley, C., and Tan, L. B.. *Eur J Heart Fail* 2006 :515-21

Progression of heart failure in right univentricular pacing compared to biventricular pacing. Ritter, O., Koller, M. L., Fey, B., Seidel, B., Krein, A., Langenfeld, H., and Bauer, W. R.. *Int J Cardiol* 2006 :359-65

Cardiac resynchronization therapy improves heart rate profile and heart rate variability of patients with moderate to severe heart failure. Fantoni, C., Raffa, S., Regoli, F., Giraldi, F., La Rovere, M. T., Prentice, J., Pastori, F., Fratini, S., Salerno-Urriarte, J. A., Klein, H. U., and Auricchio, A.. *J Am Coll Cardiol* 2005 :1875-82

Effect of cardiac resynchronization therapy on sleep quality, quality of life, and symptomatic depression in patients with chronic heart failure and Cheyne-Stokes respiration. Skobel, E. C., Sinha, A. M., Norra, C., Randerath, W., Breithardt, O. A., Breuer, C., Hanrath, P., and Stellbrink, C.. *Sleep Breath* 2005 :159-66

Reverse ventricular remodeling and improved functional capacity after ventricular resynchronization in advanced heart failure. Malfatto, G., Facchini, M., Branzi, G., Brambilla, R., Fratianni, G., Tortorici, E., Balla, E., and Perego, G. B.. *Ital Heart J* 2005 :578-83

Sympathetic nerve activity after thoracoscopic cardiac resynchronization therapy in congestive heart failure. Najem, B., Preumont, N., Unger, P., Jansens, J. L., Houssiere, A., Ciarka, A., Stoupel, E., Degaute, J. P., and van de Borne, P.. *J Card Fail* 2005 :529-33

Cardiac resynchronization therapy in chronic atrial fibrillation: impact on left atrial size and reversal to sinus rhythm. Kies, P., Leclercq, C., Bleeker, G. B., Crocq, C., Molhoek, S. G., Poulain, C., van Erven, L., Bootsma, M., Zeppenfeld, K., van der Wall, E. E., Daubert, J. C., Schalij, M. J., and Bax, J. J.. *Heart* 2006 :490-4

Long-term follow-up of cardiac resynchronization therapy in patients with end-stage heart failure. Molhoek, S. G., Bax, J. J., Bleeker, G. B., Holman, E. R., Van Erven, L., Bootsma, M., Boersma, E., Steendijk, P., Van Der Wall, E. E., and Schalij, M. J.. *J Cardiovasc Electrophysiol* 2005 :701-7

Haemodynamic effects of dual-chamber pacing versus ventricular pacing during a walk test in patients with depressed or normal left ventricular function. Ferro, A., Duilio, C., Santomauro, M., Salvatore, M., and Cuocolo, A.. *Eur J Nucl Med Mol Imaging* 2005 :1075-80

Right atrial pacing impairs cardiac function during resynchronization therapy: acute effects of DDD pacing compared to VDD pacing. Bernheim, A., Ammann, P., Sticherling, C., Burger, P., Schaer, B., Brunner-La Rocca, H. P., Eckstein, J., Kiencke, S., Kaiser, C., Linka, A., Buser, P., Pfisterer, M., and Osswald, S.. *J Am Coll Cardiol* 2005 :1482-7

Long-term outcome of cardiac resynchronization therapy in patients with severe congestive heart failure. Davis, D. R., Krahn, A. D., Tang, A. S., Lemery, R., Green, M. S., Gollob, M., Yee, R., Skanes, A. C., Klein, G. J., and Birnie, D. H.. *Can J Cardiol* 2005 :413-7

Monitoring of physical activity and heart rate variability in patients with chronic heart failure using cardiac resynchronization devices. Braunschweig, F., Mortensen, P. T., Gras, D., Reiser, W., Lawo, T., Mansour, H., Sogaard, P., Stegemann, B., Bruns, H. J., and Linde, C.. *Am J Cardiol* 2005 :1104-7

Use of cardiac resynchronization therapy to optimize beta-blocker therapy in patients with heart failure and prolonged QRS duration. Aranda, J. M. Jr, Woo, G. W., Conti, J. B., Schofield, R. S., Conti, C. R., and Hill, J. A.. *Am J Cardiol* 2005 :889-91

Cardiac resynchronization therapy acutely improves diastolic function. Waggoner, A. D., Faddis, M. N., Gleva, M. J., De Las Fuentes, L., Osborn, J., Heuerman, S., and Davila-Roman, V. G.. *J Am Soc Echocardiogr* 2005 :216-20

Long-term follow-up of patients with refractory heart failure and myocardial ischemia treated with cardiac resynchronization therapy. De Cock, C. C., Van Campen, L. M., Jessurun, E. R., Allaart, C. A., Vos, D. S., and Visser, C. A.. *Pacing Clin Electrophysiol* 2005 :S8-S10

Marked improvement in left ventricular function and significant reverse left ventricular remodeling within 3 months of cardiac resynchronization therapy in patients with dilated cardiomyopathy. Funck, R. C., Koelsch, S., Waldhans, S., Prinz, H., Grimm, W., Moosdorf, R., and Maisch, B.. *Pacing Clin Electrophysiol* 2005 :S5-7

- Cardiac resynchronization therapy: effects on left and right ventricular ejection fraction during exercise. Boriani, G., Fallani, F., Martignani, C., Biffi, M., Saporito, D., Greco, C., Ziacchi, M., Levorato, M., Pontone, G., Valzania, C., Diemberger, I., Franchi, R., and Branzi, A.. *Pacing Clin Electrophysiol* 2005 :S11-4
- Comparison of response to cardiac resynchronization therapy in patients with sinus rhythm versus chronic atrial fibrillation. Molhoek, S. G., Bax, J. J., Bleeker, G. B., Boersma, E., van Erven, L., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2004 :1506-9
- Effect of cardiac resynchronization therapy on functional mitral regurgitation in heart failure. Lancellotti, P., Melon, P., Sakalihasan, N., Waleffe, A., Dubois, C., Bertholet, M., and Pierard, L. A.. *Am J Cardiol* 2004 :1462-5
- Outcome of right ventricular bifocal pacing in patients with permanent atrial fibrillation and severe dilated cardiomyopathy due to Chagas disease: three years of follow-up. da Silva Menezes, A.. *J Interv Card Electrophysiol* 2004 :193-8
- Reduction in hospitalization rates following cardiac resynchronisation therapy in cardiac failure: experience from a single centre. Dixon, L. J., Murtagh, J. G., Richardson, S. G., and Chew, E. W.. *Europace* 2004 :586-9
- Comparative effects of ventricular resynchronization therapy in heart failure patients with or without coronary artery disease. Leclercq, C., Gras, D., Tang, A., Alonso, C., Thomas-Revault d'Allones, F., and Mabo, P.. *Ann Cardiol Angeiol (Paris)* 2004 :171-6
- Cardiac resynchronization in severe heart failure and left bundle branch block: a single center experience. Ammann, P., Kiencke, S., Schaer, B., Cron, T. A., Sticherling, C., Haldi, C., Linka, A., Buser, P., Pfisterer, M., and Osswald, S.. *Swiss Med Wkly* 2004 :277-82
- Effects of cardiac resynchronization therapy on disease progression in patients with congestive heart failure. Bonanno, C., Ometto, R., Pasinato, S., Finocchi, G., La Vecchia, L., and Fontanelli, A.. *Ital Heart J* 2004 :364-70
- Effect of biventricular pacing therapy in patients with dilated cardiomyopathy with severe congestive heart failure. Takemoto, M., Sakamoto, M., Kawagoe, J., Goto, K., Baba, H., Noma, M., Origuchi, H., Yoshimura, H., Sese, A., and Yamamoto, H.. *Jpn J Thorac Cardiovasc Surg* 2004 :175-80
- Long-term effectiveness of cardiac resynchronization therapy in patients with refractory heart failure and "narrow" QRS. Achilli, A., Sassara, M., Ficili, S., Pontillo, D., Achilli, P., Alessi, C., De Spirito, S., Guerra, R., Patruno, N., and Serra, F.. *J Am Coll Cardiol* 2003 :2117-24
- Benefits of cardiac resynchronization therapy in outpatients with indicators for heart transplantation. Greenberg, J. M., Leon, A. R., Book, W. M., Hott, B. J., DeLurgio, D. B., Langberg, J. J., and Smith, A. L.. *J Heart Lung Transplant* 2003 :1134-40
- Functional and echocardiographic improvement following multisite biventricular pacing for congestive heart failure. Chan, K. L., Tang, A. S., Achilli, A., Sassara, M., Bocchiardo, M., Gaita, F., Cavaglia, S., Hilpisch, K., Hill, M. R., and Gras, D.. *Can J Cardiol* 2003 :387-90
- Effect of biventricular pacing on myocardial glucose metabolism in patients with heart failure using fluoro-18-deoxyglucose positron emission tomography. Ohkusu, Y., Takahashi, N., Ishikawa, T., Sumita, S., Kobayashi, T., Matsushita, K., Yamakawa, Y., Uchino, K., Kimura, K., Inoue, T., and Umemura, S.. *Pacing Clin Electrophysiol* 2003 :144-7
- Echocardiographic modeling of cardiac dyssynchrony before and during multisite stimulation: a prospective study. Cazeau, S., Bordachar, P., Jauvert, G., Lazarus, A., Alonso, C., Vandrell, M. C., Mugica, J., and Ritter, P.. *Pacing Clin Electrophysiol* 2003 :137-43
- Biventricular pacing for patients with severe congestive heart failure: a single center experience. Mascioli, G., Curnis, A., Bontempi, L., and Dei Cas, L.. *Ital Heart J* 2002 :598-602
- Considerations in patients undergoing implantation of a biventricular pacemaker. Lehmann, A., Lang, J., Thaler, E., Zeitler, C., Weisse, U., and Boldt, J.. *J Cardiothorac Vasc Anesth* 2002 :175-9
- Cardiac resynchronization in patients with congestive heart failure and chronic atrial fibrillation: effect of upgrading to biventricular pacing after chronic right ventricular pacing. Leon, A. R., Greenberg, J. M., Kanuru, N., Baker, C. M., Mera, F. V., Smith, A. L., Langberg, J. J., and DeLurgio, D. B.. *J Am Coll Cardiol* 2002 :1258-63
- Effects of long-term biventricular stimulation for resynchronization on echocardiographic measures of remodeling. Saxon, L. A., De Marco, T., Schafer, J., Chatterjee, K., Kumar, U. N., and Foster, E.. *Circulation* 2002 :1304-10
- Tissue Doppler echocardiographic evidence of reverse remodeling and improved synchronicity by simultaneously delaying regional contraction after biventricular pacing therapy in heart failure. Yu, C. M., Chau, E., Sanderson, J. E., Fan, K., Tang, M. O., Fung, W. H., Lin, H., Kong, S. L., Lam, Y. M., Hill, M. R., and Lau, C. P.. *Circulation* 2002 :438-45
- Exercise performance following cardiac resynchronization therapy in patients with heart failure and ventricular conduction delay. Auricchio, A., Kloss, M., Trautmann, S. I., Rodner, S., and Klein, H.. *Am J Cardiol* 2002 :198-203
- Long-term benefits of cardiac resynchronization therapy in heart failure patients. Kostic, T., Perisic, Z., Milic, D., Mitov, V., Koracevic, G., Salinger-Martinovic, S., Apostolovic, S., Zivkovic, M., Stanojevic, D., Golubovic, M., and Markovic, S.. *HealthMED* 2012 :4113-4119
- Effect of cardiac resynchronization therapy and implantable cardioverter defibrillator on quality of life in patients with heart failure: A meta-analysis. Chen, S., Yin, Y., and Krucoff, M. W.. *Europace* 2012 :1602-1607

A pilot experience with permanent biventricular pacing to treat advanced heart failure. Leclercq, C., Cazeau, S., Ritter, P., Alonso, C., Gras, D., Mabo, P., Lazarus, A., and Daubert, J. C.. *Am. Heart J.* 2000 :862-870

Evaluation of in-hospital NT-proBNP changes in heart failure patients to identify the six-month clinical response following cardiac resynchronization therapy. Davoodi G., Bagheri A., Yamini-Sharif A., Boroumand M., Saroukhani S., and Sahebjam M.. *Acta Med. Iran.* 2014 :15-23

Association between presystolic ventricular flash and left ventricular functional recovery after cardiac resynchronization therapy. Ito T., Kizawa S., Nogi S., Shimamoto S., Yokoyama K., and Ishizaka N.. *Echocardiography* 2014 :149-154

Outcome of super-responders to cardiac resynchronization therapy defined by endpoint-derived parameters of left ventricular remodeling: a two-center retrospective study. Hurlimann, D., Schmidt, S., Seifert, B., Saguner, A. M., Hindricks, G., Luscher, T. F., Ruschitzka, F., and Steffel, J.. *Clin Res Cardiol* 2014 :

Comparative Effectiveness of Cardiac Resynchronization Therapy in Combination With Implantable Defibrillator in Patients With Heart Failure and Wide QRS Duration. Bilchick, K. C. and Stukenborg, G. J.. *Am J Cardiol* 2014 :

Clinical Effectiveness of Cardiac Resynchronization Therapy vs Medical Therapy Alone Among Patients With Heart Failure: An Analysis of the ICD and ADHERE National Registries. Khazanie, P., Hammill, B. G., Qualls, L. G., Fonarow, G. C., Hammill, S. C., Heidenreich, P. A., Al-Khatib, S. M., Piccini, J. P., Masoudi, F. A., Peterson, P. N., Curtis, J. P., Hernandez, A. F., and Curtis, L. H.. *Circ Heart Fail* 2014 :

What is the lowest value of left ventricular baseline ejection fraction that predicts response to cardiac resynchronization therapy?. Agacdiken Agir, A., Celikyurt, U., Sahin, T., Yilmaz, I., Karauzum, K., Bozyel, S., Ural, D., and Vural, A.. *Med Sci Monit* 2014 :1641-6

Echocardiographic and clinical response to cardiac resynchronization therapy in heart failure patients with and without previous right ventricular pacing. Gage, R. M., Burns, K. V., and Bank, A. J.. *Eur J Heart Fail* 2014 :

Regression of Fragmented QRS Complex: A Marker of Electrical Reverse Remodeling in Cardiac Resynchronization Therapy. Yang, X. W., Hua, W., Wang, J., Liu, Z. M., Ding, L. G., Chen, K. P., and Zhang, S.. *Ann Noninvasive Electrocardiol* 2014 :

Does Prior Valve Surgery Change Outcome in Patients Treated with Cardiac Resynchronization Therapy?. Bose, A., Upadhyay, G. A., Kandala, J., Heist, E. K., Mela, T., Parks, K. A., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2014 :

Functional Response to Cardiac Resynchronization Therapy in Patients with Renal Dysfunction and Subsequent Long-Term Mortality. Bogdan, S., Klempfner, R., Sabbag, A., Luria, D., Gurevitz, O., Bar-Lev, D.,

Lipchenca, I., Nof, E., Kuperstein, R., Goldenberg, I., Eldar, M., Glikson, M., and Beinart, R.. *J Cardiovasc Electrophysiol* 2014 :

Efficacy of cardiac resynchronisation therapy in the treatment of end-stage inotrope-dependent heart failure patients. Sokal, A., Jedrzejczyk, E., Lenarczyk, R., Pluta, S., Kowalski, O., Pruszkowska, P., Mazurek, M., Swiatkowski, A., and Kalarus, Z.. *Kardiologia Pol* 2014 :777-82

Cardiac contractility modulation: first experience in heart failure patients with reduced ejection fraction and permanent atrial fibrillation. Roger, S., Schneider, R., Rudic, B., Liebe, V., Stach, K., Schimpf, R., Borggreffe, M., and Kuschyk, J.. *Europace* 2014 :1205-9

Other

The effect of concomitant cardiac resynchronization therapy on quality of life in patients with heart failure undergoing cardiac surgery. Thoren, E., Kesek, M., and Jideus, L.. *Open Cardiovasc Med J* 2014 :18-22

Circulating Endothelial Progenitor Cells as a Predictor of Response to Cardiac Resynchronization Therapy: The Missing Piece of the Puzzle?. Antonio, N., Soares, A., Carvalho, T., Fernandes, R., Paiva, A., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., Providencia, L. A., Fontes Ribeiro, C., and Mariano Pego, G.. *Pacing Clin Electrophysiol* 2014 :

The Registry Evaluating Functional Outcomes of Resynchronization Management (REFORM): quality of life and psychological functioning in patients receiving cardiac resynchronization therapy. Ford, J., Sears, S., Ramza, B., Reynolds, D. W., Nguyen, P., Fedewa, M., House, J., Kennedy, P., Thompson, R., and Murray, C.. *J Cardiovasc Electrophysiol* 2014 :43-51

Long-term clinical response to cardiac resynchronization therapy under a multidisciplinary model. O'Donnell, D., Lin, T., Swale, M., Rae, P., Flannery, D., and Srivastava, P. M.. *Intern Med J* 2013 :1216-23

Impact of ejection fraction on the clinical response to cardiac resynchronization therapy in mild heart failure. Linde, C., Daubert, C., Abraham, W. T., St John Sutton, M., Ghio, S., Hassager, C., Herre, J. M., Bergemann, T. L., and Gold, M. R.. *Circ Heart Fail* 2013 :1180-9

Cardiac-resynchronization therapy in heart failure with a narrow QRS complex. Ruschitzka, F., Abraham, W. T., Singh, J. P., Bax, J. J., Borer, J. S., Brugada, J., Dickstein, K., Ford, I., Gorcsan, J. 3rd, Gras, D., Krum, H., Sogaard, P., and Holzmeister, J.. *N Engl J Med* 2013 :1395-405

QRS duration, bundle-branch block morphology, and outcomes among older patients with heart failure receiving cardiac resynchronization therapy. Peterson, P. N., Greiner, M. A., Qualls, L. G., Al-Khatib, S. M., Curtis, J. P., Fonarow, G. C., Hammill, S. C., Heidenreich, P. A., Hammill, B. G., Piccini, J. P., Hernandez, A. F., Curtis, L. H., and Masoudi, F. A.. *JAMA* 2013 :617-26

- Strain rate dispersion index can predict changes in left ventricular volume and adverse cardiac events following cardiac resynchronization therapy. Iwano, H., Yamada, S., Watanabe, M., Mitsuyama, H., Mizukami, K., Nishino, H., Yokoyama, S., Kaga, S., Okada, K., Nishida, M., Yokoshiki, H., Mikami, T., and Tsutsui, H.. *Circ J* 2013 :2757-65
- Cystatin C as a predictor of mortality and cardiovascular morbidity after cardiac resynchronization therapy. Yamamoto, T., Shimano, M., Inden, Y., Miyata, S., Inoue, Y., Yoshida, N., Tsuji, Y., Hirai, M., and Murohara, T.. *Circ J* 2013 :2751-6
- Brain natriuretic peptide and cardiac resynchronization therapy in patients with mildly symptomatic heart failure. Brenyo, A., Barsheshet, A., Rao, M., Huang, D. T., Zareba, W., McNitt, S., Hall, W. J., Peterson, D. R., Solomon, S. D., Moss, A. J., and Goldenberg, I.. *Circ Heart Fail* 2013 :998-1004
- A novel electrocardiographic predictor of clinical response to cardiac resynchronization therapy. Mollo, R., Cosenza, A., Coviello, I., Stazi, A., Russo, G., Villano, A., Sestito, A., Bencardino, G., Lanza, G. A., and Crea, F.. *Europace* 2013 :1615-21
- Impact of carvedilol and metoprolol on inappropriate implantable cardioverter-defibrillator therapy: the MADIT-CRT trial (Multicenter Automatic Defibrillator Implantation With Cardiac Resynchronization Therapy). Ruwald, M. H., Abu-Zeitone, A., Jons, C., Ruwald, A. C., McNitt, S., Kutyla, V., Zareba, W., and Moss, A. J.. *J Am Coll Cardiol* 2013 :1343-50
- Analysis of left ventricular function in patients with heart failure undergoing cardiac resynchronization. Benfatti, R. A., Manzano, F. M., Pontes, J. C., Dias, A. E., Duarte, J. J., Silva, G. V., Gomes Junior, J. F., and Gardenal, N.. *Rev Bras Cir Cardiovasc* 2013 :69-75
- Cardiac resynchronization therapy in pacemaker-dependent patients with left ventricular dysfunction. Gierula, J., Cubbon, R. M., Jamil, H. A., Byrom, R., Baxter, P. D., Pavitt, S., Gilthorpe, M. S., Hewison, J., Kearney, M. T., and Witte, K. K.. *Europace* 2013 :1609-14
- Normalization of left ventricular ejection fraction after cardiac resynchronization therapy also normalizes survival. Manne, M., Rickard, J., Varma, N., Chung, M. K., and Tchou, P.. *Pacing Clin Electrophysiol* 2013 :970-7
- Neutrophil-to-lymphocyte ratio predicts response to cardiac resynchronization therapy. Agacdiken, A., Celikyurt, U., Sahin, T., Karauzum, K., Vural, A., and Ural, D.. *Med Sci Monit* 2013 :373-7
- Long-term impact of cardiac resynchronization therapy in mild heart failure: 5-year results from the RESynchronization REVERSES Remodeling in Systolic left vEntricular dysfunction (REVERSE) study. Linde, C., Gold, M. R., Abraham, W. T., St John Sutton, M., Ghio, S., Cerkenvenik, J., and Daubert, C.. *Eur Heart J* 2013 :2592-9
- Clinical significance of ventricular tachyarrhythmias in patients treated with CRT-D. Kutyla, V., Klein, H. U., Wang, P. J., McNitt, S., Polonsky, B., Zima, E., Merkely, B., Moss, A. J., and Zareba, W.. *Heart Rhythm* 2013 :943-50
- Biventricular pacing for adults with AV block and heart failure. *BMJ* 2013 :f2719
- The gender-paradox among patients with implantable cardioverter-defibrillators: a propensity-matched study. Bhavnani, S. P., Pavuluri, V., Coleman, C. I., Guertin, D., Yarlagadda, R. K., Clyne, C. A., and Kluger, J.. *Pacing Clin Electrophysiol* 2013 :878-84
- Cardiac resynchronization therapy: do patient selection and implant practice vary depending on the volume a center handles? Hernandez Madrid, A., Matia Frances, R., Moro, C., and Zamorano, J.. *Pacing Clin Electrophysiol* 2013 :863-71
- A randomized study of cardiac resynchronization therapy defibrillator versus dual-chamber implantable cardioverter-defibrillator in ischemic cardiomyopathy with narrow QRS: the NARROW-CRT study. Muto, C., Solimene, F., Gallo, P., Nastasi, M., La Rosa, C., Calvanese, R., Iengo, R., Cancelliello, M., Sangiulio, R., Diemberger, I., Ciardiello, C., and Tuccillo, B.. *Circ Arrhythm Electrophysiol* 2013 :538-45
- Predictors of left ventricular function deterioration in patients with left bundle branch block and ejection fraction >50%. Angheloiu, G. O., Saul, M., Edelman, K., Shah, H., Mezu, U. L., and Saba, S.. *Congest Heart Fail* 2013 :E1-4
- Interplay between right ventricular function and cardiac resynchronization therapy: an analysis of the CARE-HF trial (Cardiac Resynchronization-Heart Failure). Damy, T., Ghio, S., Rigby, A. S., Hittinger, L., Jacobs, S., Leyva, F., Delgado, J. F., Daubert, J. C., Gras, D., Tavazzi, L., and Cleland, J. G.. *J Am Coll Cardiol* 2013 :2153-60
- Notched QRS complex in lateral leads as a novel predictor of response to cardiac resynchronization therapy. Pan, W., Su, Y., Zhu, W., Shu, X., and Ge, J.. *Ann Noninvasive Electrocardiol* 2013 :181-7
- Effect of metoprolol versus carvedilol on outcomes in MADIT-CRT (multicenter automatic defibrillator implantation trial with cardiac resynchronization therapy). Ruwald, M. H., Ruwald, A. C., Jons, C., Alexis, J., McNitt, S., Zareba, W., and Moss, A. J.. *J Am Coll Cardiol* 2013 :1518-26
- Usefulness of overlapping of the E and A waves of the transmitral flow as a predictor of responders to cardiac resynchronization therapy. Minamiguchi, H., Sakata, Y., Ohtani, T., Mizote, I., Takeda, Y., Mizuno, H., Okuyama, Y., Nakatani, S., Fujita, M., Watanabe, T., Uematsu, M., and Komuro, I.. *Am J Cardiol* 2013 :1613-8
- Many response criteria are poor predictors of outcomes after cardiac resynchronization therapy: validation using data from the randomized trial. Boidol, J., Sredniawa, B., Kowalski, O., Szulik, M., Mazurek, M., Sokal, A., Pruszkowska-Skrzep, P., Kukulski, T., Kalarus, Z., and Lenarczyk, R.. *Europace* 2013 :835-44

Changes and prognostic impact of apoptotic and inflammatory cytokines in patients treated with cardiac resynchronization therapy. Osmancik, P., Herman, D., Stros, P., Linkova, H., Vondrak, K., and Paskova, E.. *Cardiology* 2013 :190-8

Resolution of left bundle branch block-induced cardiomyopathy by cardiac resynchronization therapy. Vaillant, C., Martins, R. P., Donal, E., Leclercq, C., Thebault, C., Behar, N., Mabo, P., and Daubert, J. C.. *J Am Coll Cardiol* 2013 :1089-95

Postoperative performance of the Quartet(R) left ventricular heart lead. Tomassoni, G., Baker, J., Corbisiero, R., Love, C., Martin, D., Niazi, I., Sheppard, R., Worley, S., Beau, S., Greer, G. S., Aryana, A., Cao, M., Harbert, N., and Zhang, S.. *J Cardiovasc Electrophysiol* 2013 :449-56

An 8-year single-centre experience of cardiac resynchronisation therapy: procedural success, early and late complications, and left ventricular lead performance. Ahsan, S. Y., Saberwal, B., Lambiase, P. D., Chaubey, S., Segal, O. R., Gopalumurugan, A. B., McCreedy, J., Rogers, D. P., Lowe, M. D., and Chow, A. W.. *Europace* 2013 :711-7

Predictive factors and clinical effect of optimized cardiac resynchronization therapy. Xu, G. J., Gan, T. Y., Tang, B. P., Ma, Y. T., Zhang, Y., Li, J. X., Zhang, Y. Y., Wang, J., Tang, Q., Wang, C. M., Li, Y. D., and Zhang, J. H.. *Exp Ther Med* 2013 :355-361

Effects of smoking in patients treated with cardiac resynchronization therapy. Perrotta, L., Xhaferi, B., Chiostrì, M., Pieragnoli, P., Ricciardi, G., Di Biase, L., Natale, A., Ricceri, I., Biria, M., Lakkireddy, D., Valleggi, A., Emdin, M., Michelotti, F., Mascioli, G., Pandozi, A., Santini, M., and Padeletti, L.. *Intern Emerg Med* 2014 :311-8

Influence of diabetes on left ventricular systolic and diastolic function and on long-term outcome after cardiac resynchronization therapy. Hoke, U., Thijssen, J., van Bommel, R. J., van Erven, L., van der Velde, E. T., Holman, E. R., Schali, M. J., Bax, J. J., Delgado, V., and Marsan, N. A.. *Diabetes Care* 2013 :985-91

Incremental value of inefficient deformation indices for predicting response to cardiac resynchronization therapy. Chan, Y. H., Wu, L. S., Kuo, C. T., Wang, C. L., Yeh, Y. H., Ho, W. J., and Hsu, L. A.. *J Am Soc Echocardiogr* 2013 :307-15

Prognostic Estimation of Advanced Heart Failure With Low Left Ventricular Ejection Fraction and Wide QRS Interval. Oh, C., Chang, H. J., Sung, J. M., Kim, J. Y., Yang, W., Shim, J., Kang, S. M., Ha, J., Rim, S. J., and Chung, N.. *Korean Circ J* 2012 :659-67

Cardiac resynchronization therapy in patients with chronic heart failure is associated with anti-inflammatory and anti-remodeling effects. Stanciu, A. E., Vatasescu, R. G., Stanciu, M. M., Iorgulescu, C., Vasile, A. I., and Dorobantu, M.. *Clin Biochem* 2013 :230-4

Left ventricular midwall fibrosis as a predictor of mortality and morbidity after cardiac resynchronization therapy in patients with nonischemic cardiomyopathy. Leyva, F., Taylor, R. J., Foley, P. W., Umar, F., Mulligan, L. J., Patel, K., Stegemann, B., Haddad, T., Smith, R. E., and Prasad, S. K.. *J Am Coll Cardiol* 2012 :1659-67

The risk of delayed atrioventricular and intraventricular conduction block following ablation of bundle branch reentry. Reithmann, C., Herkommer, B., Huemmer, A., von Hoch, F., and Fiek, M.. *Clin Res Cardiol* 2013 :145-53

Utility of combined assessment of baseline dyssynchrony and its acute improvement to predict long-term outcomes after cardiac resynchronization therapy. Imanishi, J., Tanaka, H., Matsumoto, K., Tatsumi, K., Miyoshi, T., Hiraishi, M., Kaneko, A., Ryo, K., Fukuda, Y., Yoshida, A., Yokoyama, M., Kawai, H., and Hirata, K.. *Am J Cardiol* 2012 :1814-9

Relationship between fragmented QRS and response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Al, N., Vural, A., and Ural, D.. *J Interv Card Electrophysiol* 2012 :337-42; discussion 342

Characteristics of responders to cardiac resynchronization therapy: the impact of echocardiographic left ventricular volume. Park, M. Y., Altman, R. K., Orencole, M., Kumar, P., Parks, K. A., Heist, K. E., Singh, J. P., and Picard, M. H.. *Clin Cardiol* 2012 :777-80

Intrathoracic impedance changes reflect reverse left ventricular remodeling in response to cardiac resynchronization therapy in chronic heart failure patients. Kaneshiro, T., Suzuki, H., Yamada, S., Kamiyama, Y., Saitoh, S., and Takeishi, Y.. *Int Heart J* 2012 :249-52

Cardiac resynchronization therapy in clinical responders: right ventricular echocardiographic changes at mid-term follow-up. Praus, R., Haman, L., Tauchman, M., Blaha, V., and Parizek, P.. *Acta Cardiol* 2012 :311-6

Improvement in coronary blood flow velocity with acute biventricular pacing is predominantly due to an increase in a diastolic backward-travelling decompression (suction) wave. Kyriacou, A., Whinnett, Z. I., Sen, S., Pabari, P. A., Wright, I., Cornelussen, R., Lefroy, D., Davies, D. W., Peters, N. S., Kanagaratnam, P., Mayet, J., Hughes, A. D., Francis, D. P., and Davies, J. E.. *Circulation* 2012 :1334-44

Permanent pacemaker-related upper extremity deep vein thrombosis: a series of 20 cases. Mandal, S., Pande, A., Mandal, D., Kumar, A., Sarkar, A., Kahali, D., Mazumdar, B., and Panja, M.. *Pacing Clin Electrophysiol* 2012 :1194-8

The ECG in cardiac resynchronization therapy: influence of left and right ventricular preactivation and relation to acute response. Bogaard, M. D., Hesselink, T., Meine, M., Loh, P., Hauer, R. N., Cramer, M. J., Doevendans, P. A., and Tuinenburg, A. E.. *J Cardiovasc Electrophysiol* 2012 :1237-45

The prevalence of methicillin resistant organisms among pacemaker and defibrillator implant recipients. Rodriguez,

D. J., Afzal, A., Evonich, R., and Haines, D. E.. *Am J Cardiovasc Dis* 2012 :116-22

Impact of cardiac resynchronisation therapy on physical ability and quality of life in patients with chronic heart failure. Kloch Badelek, M., Klocek, M., Czarnecka, D., Wojciechowska, W., Wilinski, J., and Kawecka Jaszcz, K.. *Kardiologia Pol* 2012 :581-8

Association between red blood cell distribution width and response to cardiac resynchronization therapy. Celikyurt, U., Agacdiken, A., Sahin, T., Kozdag, G., Vural, A., and Ural, D.. *J Interv Card Electrophysiol* 2012 :215-8

Changes in global longitudinal strain during rest and exercise in patients treated with cardiac resynchronization therapy. Valzania, C., Gadler, F., Boriani, G., and Eriksson, M. J.. *Clin Physiol Funct Imaging* 2012 :310-6

Usefulness of hemoglobin A(1c) to predict outcome after cardiac resynchronization therapy in patients with diabetes mellitus and heart failure. Shah, R. V., Altman, R. K., Park, M. Y., Zilinski, J., Leyton-Mange, J., Orencole, M., Picard, M. H., Barrett, C. D., Heist, E. K., Upadhyay, G., Das, R., Singh, J. P., and Das, S.. *Am J Cardiol* 2012 :683-8

Independent predictors of mortality in patients with advanced heart failure treated by cardiac resynchronization therapy. Kreuz, J., Horlbeck, F., Linhart, M., Mellert, F., Fimmers, R., Schrickel, J., Nickenig, G., and Schwab, J. O.. *Europace* 2012 :1596-601

Septal rebound stretch is a strong predictor of outcome after cardiac resynchronization therapy. Leenders, G. E., De Boeck, B. W., Teske, A. J., Meine, M., Bogaard, M. D., Prinzen, F. W., Doevendans, P. A., and Cramer, M. J.. *J Card Fail* 2012 :404-12

Comparison of cardiac resynchronization therapy outcomes in patients with New York Heart Association functional class I/II versus III/IV heart failure. Bank, A. J., Rischall, A., Gage, R. M., Burns, K. V., and Kubo, S. H.. *J Card Fail* 2012 :373-8

Extraordinarily favorable left ventricular reverse remodeling through long-term cardiac resynchronization: super-response to cardiac resynchronization. Celebi, O., Knaus, T., Blaschke, F., Habedank, D., Dohner, W., Nitardy, A., and Stockburger, M.. *Pacing Clin Electrophysiol* 2012 :870-6

Cardiac resynchronization therapy modulation of exercise left ventricular function and pulmonary O(2) uptake in heart failure. Tomczak, C. R., Paterson, I., Haykowsky, M. J., Lawrance, R., Martellotto, A., Pantano, A., Gulamhusein, S., and Haennel, R. G.. *Am J Physiol Heart Circ Physiol* 2012 :H2635-45

Small left atrium and mild mitral regurgitation predict super-response to cardiac resynchronization therapy. Stefan, L., Sedlacek, K., Cerna, D., Kryze, L., Vancura, V., Marek, T., and Kautzner, J.. *Europace* 2012 :1608-14

Influence of heart failure etiology on the effect of upgrading from right ventricular apical to biventricular or bifocal pacing in patients with permanent atrial fibrillation and advanced heart failure. Malecka, B., Zabek, A.,

Maziarz, A., and Lelakowski, J.. *Pol Arch Med Wewn* 2012 :89-97

Response to the Center for Medicare & Medicaid Services coverage with evidence development request for primary prevention implantable cardioverter-defibrillators: data from the OMNI study. Sweeney, M. O., Sakaguchi, S., Simons, G., Machado, C., Connett, J. E., and Yang, F.. *Heart Rhythm* 2012 :1058-66

Effect of cardiac resynchronization therapy on cardiotrophin-1 circulating levels in patients with heart failure. Limongelli, G., Roselli, T., Pacileo, G., Calabro, P., Maddaloni, V., Masarone, D., Riegler, L., Gravino, R., Scarafie, R., Salerno, G., Miele, T., D'Andrea, A., Santangelo, L., Romano, M., Di Salvo, G., Russo, M. G., and Calabro, R.. *Intern Emerg Med* 2014 :43-50

Right ventricular dysfunction is a predictor of non-response and clinical outcome following cardiac resynchronization therapy. Alpendurada, F., Guha, K., Sharma, R., Ismail, T. F., Clifford, A., Banya, W., Mohiaddin, R. H., Pennell, D. J., Cowie, M. R., McDonagh, T., and Prasad, S. K.. *J Cardiovasc Magn Reson* 2011 :68

Pre-implant right ventricular function might be an important predictor of the response to cardiac resynchronization therapy. Edner, M., Ring, M., and Henriksson, P.. *Cardiovasc Ultrasound* 2011 :28

Long term effects of cardiac resynchronization therapy in non-ambulatory NYHA IV heart failure patients. Theodorakis, G., Katsikis, A., Livanis, E., Kostopoulou, A., Adamopoulos, S., Tsiapras, D., and Voudris, V.. *Pacing Clin Electrophysiol* 2011 :1553-60

Effect of cardiac resynchronization therapy on thyroid function. Celikyurt, U., Agacdiken, A., Geyik, B., Kozdag, G., Vural, A., and Ural, D.. *Clin Cardiol* 2011 :703-5

Effect of cardiac resynchronization on gradient reduction in patients with obstructive hypertrophic cardiomyopathy: preliminary study. Lenarczyk, R., Wozniak, A., Kowalski, O., Sokal, A., Pruszkowska-Skrzep, P., Sredniawa, B., Szulik, M., Zielinska, T., Kukulski, T., Stabryla, J., Mazurek, M., Bialkowski, J., and Kalarus, Z.. *Pacing Clin Electrophysiol* 2011 :1544-52

Comparison between 2D and 3D echocardiography in the evaluation of reverse remodeling after CRT. Hotta, V. T., Martinelli Filho, M., Mady, C., Mathias, W. Jr, and Vieira, M. L.. *Arq Bras Cardiol* 2011 :111-21

Effect of carvedilol versus metoprolol CR/XL on mortality in patients with heart failure treated with cardiac resynchronization therapy: a COX multivariate regression analysis. Shen, X., Nair, C. K., Aronow, W. S., Hee, T., and Esterbrooks, D. J.. *Am J Ther* 2013 :247-53

Prognostic value of cardiac troponin T in patients with moderate to severe heart failure scheduled for cardiac resynchronization therapy. Aarones, M., Gullestad, L., Aakhus, S., Ueland, T., Skaardal, R., Aass, H., Wergeland, R., Smith, H. J., Aukrust, P., and Kongsgaard, E.. *Am Heart J* 2011 :1031-7

- Effect of cardiac resynchronization therapy on libido and erectile dysfunction. Vural, A., Agacdiken, A., Celikyurt, U., Culha, M., Kahraman, G., Kozdag, G., and Ural, D.. *Clin Cardiol* 2011 :437-41
- Usefulness of low-dose dobutamine echocardiography to predict response and outcome in patients undergoing cardiac resynchronization therapy. Altman, R. K., McCarty, D., Chen-Tournoux, A. A., Tournoux, F. B., Riedl, L., Orencole, M., Park, M. Y., Picard, M. H., and Singh, J. P.. *Am J Cardiol* 2011 :252-7
- Comparison of long-term survival of men versus women with heart failure treated with cardiac resynchronization therapy. Mooyaart, E. A., Marsan, N. A., van Bommel, R. J., Thijssen, J., Borleffs, C. J., Delgado, V., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2011 :63-8
- Left ventricular lead position and nonspecific conduction delay are predictors of mortality in patients during cardiac resynchronization therapy. Prochnau, D., Kuehnert, H., Heinke, M., Figulla, H. R., and Surber, R.. *Can J Cardiol* 2011 :363-8
- End-stage renal disease predicts complications in pacemaker and ICD implants. Tompkins, C., McLean, R., Cheng, A., Brinker, J. A., Marine, J. E., Nazarian, S., Spragg, D. D., Sinha, S., Halperin, H., Tomaselli, G. F., Berger, R. D., Calkins, H., and Henrikson, C. A.. *J Cardiovasc Electrophysiol* 2011 :1099-104
- Clinical and classic echocardiographic features of patients with, and without, left ventricle reverse remodeling following the introduction of cardiac resynchronization therapy. Wilinski, J., Czarnecka, D., Wojciechowska, W., Kloch-Badelek, M., Jastrzebski, M., Bacier, B., Sondej, T., Kusak, P., Przybyla, A., and Kawecka-Jaszcz, K.. *Cardiol J* 2011 :157-64
- Predicting hyperresponse among pacemaker-dependent nonischemic cardiomyopathy patients upgraded to cardiac resynchronization. Adelstein, E., Schwartzman, D., Gorcsan, J. 3rd, and Saba, S.. *J Cardiovasc Electrophysiol* 2011 :905-11
- Male gender and chronic obstructive pulmonary disease predict a poor clinical response in patients undergoing cardiac resynchronisation therapy. Kirubakaran, S., Ladwiniec, A., Arujuna, A., Ginks, M., McPhail, M., Bostock, J., Carr-White, G., and Rinaldi, C. A.. *Int J Clin Pract* 2011 :281-8
- Peak longitudinal strain delay is superior to TDI in the selection of patients for resynchronisation therapy. Scheffer, M. G., van Dessel, P. F., van Gelder, B. M., Sutherland, G. R., and van Hemel, N. M.. *Neth Heart J* 2010 :574-82
- Female gender is associated with a better outcome after cardiac resynchronization therapy. Leyva, F., Foley, P. W., Chalil, S., Irwin, N., and Smith, R. E.. *Pacing Clin Electrophysiol* 2011 :82-8
- Effects of cardiac resynchronisation therapy on dilated cardiomyopathy with isolated ventricular non-compaction. Bertini, M., Ziacchi, M., Biffi, M., Biagini, E., Rocchi, G., Martignani, C., Ferlito, M., Pasquale, F., Cervi, E., Branzi, A., Rapezzi, C., and Boriani, G.. *Heart* 2011 :295-300
- Symptom improvement after upgrade from right ventricular apical to biventricular pacing: Role of right and left ventricular volumes assessed with single-photon emission computed tomographic equilibrium radionuclide angiocardiology. Clements, I. P., Christenson, S., Hodge, D. O., Mullan, B. P., Redfield, M. M., and Hayes, D. L.. *J Nucl Cardiol* 2011 :43-51
- Inotropic contractile reserve and response to cardiac resynchronization therapy in patients with markedly remodeled left ventricle. Chaudhry, F. A., Shah, A., Bangalore, S., DeRose, J., and Steinberg, J. S.. *J Am Soc Echocardiogr* 2011 :91-7
- Effect of implantable cardioverter-defibrillator on left ventricular ejection fraction in patients with idiopathic dilated cardiomyopathy. Schaer, B., Theuns, D. A., Sticherling, C., Szili-Torok, T., Osswald, S., and Jordaens, L.. *Am J Cardiol* 2010 :1640-5
- Antiarrhythmic effect of reverse electrical remodeling associated with cardiac resynchronization therapy. Tereshchenko, L. G., Henrikson, C. A., Stempniewicz, P., Han, L., and Berger, R. D.. *Pacing Clin Electrophysiol* 2011 :357-64
- Left ventricular reverse remodelling, long-term clinical outcome, and mode of death after cardiac resynchronization therapy. Foley, P. W., Chalil, S., Khadjooi, K., Irwin, N., Smith, R. E., and Leyva, F.. *Eur J Heart Fail* 2011 :43-51
- Relationship of echocardiographic dyssynchrony to long-term survival after cardiac resynchronization therapy. Gorcsan, J. 3rd, Oyenuga, O., Habib, P. J., Tanaka, H., Adelstein, E. C., Hara, H., McNamara, D. M., and Saba, S.. *Circulation* 2010 :1910-8
- Is "hyper response" to cardiac resynchronization therapy in patients with nonischemic cardiomyopathy a recovery, a remission, or a control? Castellant, P., Orhan, E., Bertault-Valls, V., Fatemi, M., Etienne, Y., and Blanc, J. J.. *Ann Noninvasive Electrocardiol* 2010 :321-7
- Close connection between improvement in left ventricular function by cardiac resynchronization therapy and the incidence of arrhythmias in cardiac resynchronization therapy-defibrillator patients. Schaer, B. A., Osswald, S., Di Valentino, M., Soliman, O. I., Sticherling, C., ten Cate, F. J., Jordaens, L., and Theuns, D. A.. *Eur J Heart Fail* 2010 :1325-32
- Effect of cardiac resynchronization therapy in patients with New York Heart Association functional class IV heart failure. van Bommel, R. J., van Rijnsoever, E., Borleffs, C. J., Delgado, V., Marsan, N. A., Bertini, M., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2010 :1146-51
- Improvement in right ventricular systolic function after cardiac resynchronization therapy correlates with left ventricular reverse remodeling. Aksoy, H., Okutucu, S., Aytemir, K., Kaya, E. B., Tulumen, E., Evranos, B.,

Fatihoglu, S. G., Kabakci, G., Tokgozoglu, L., Ozkutlu, H., and Oto, A.. *Pacing Clin Electrophysiol* 2011 :200-7

Intramural dyssynchrony and response to cardiac resynchronization therapy in patients with and without previous right ventricular pacing. Bank, A. J., Kaufman, C. L., Burns, K. V., Parah, J. S., Johnson, L., Kelly, A. S., Shroff, S. G., and Kaiser, D. R.. *Eur J Heart Fail* 2010 :1317-24

Impact of oxygen uptake efficiency slope as a marker of cardiorespiratory reserve on response to cardiac resynchronization therapy. Berger, T., Zwick, R. H., Stuehlinger, M., Dichtl, W., Poelzl, G., Edlinger, M., Pachinger, O., and Hintringer, F.. *Clin Res Cardiol* 2011 :159-66

Isolated left ventricular pacing results in worse long-term clinical outcome when compared with biventricular pacing: a single-centre randomized study. Sedlacek, K., Burianova, L., Mlcochova, H., Peichl, P., Marek, T., and Kautzner, J.. *Europace* 2010 :1762-8

Effect of cardiac resynchronization therapy on subendo- and subepicardial left ventricular twist mechanics and relation to favorable outcome. Bertini, M., Delgado, V., Nucifora, G., Marsan, N. A., Ng, A. C., Shanks, M., Van Bommel, R. J., Borleffs, C. J., Ewe, S. H., Boriani, G., Biffi, M., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2010 :682-7

Morbidity and mortality in heart failure patients treated with cardiac resynchronization therapy: influence of pre-implantation characteristics on long-term outcome. van Bommel, R. J., Borleffs, C. J., Ypenburg, C., Marsan, N. A., Delgado, V., Bertini, M., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Eur Heart J* 2010 :2783-90

Presence of left ventricular contractile reserve predicts midterm response to cardiac resynchronization therapy--results from the LOW dose DObutamine stress-echo test in Cardiac Resynchronization Therapy (LODO-CRT) trial. Muto, C., Gasparini, M., Neja, C. P., Iacopino, S., Davinelli, M., Zanon, F., Dicandia, C., Distefano, G., Donati, R., Calvi, V., Denaro, A., and Tuccillo, B.. *Heart Rhythm* 2010 :1600-5

Dyssynchrony indices to predict response to cardiac resynchronization therapy: a comprehensive prospective single-center study. Miyazaki, C., Redfield, M. M., Powell, B. D., Lin, G. M., Herges, R. M., Hodge, D. O., Olson, L. J., Hayes, D. L., Espinosa, R. E., Rea, R. F., Bruce, C. J., Nelson, S. M., Miller, F. A., and Oh, J. K.. *Circ Heart Fail* 2010 :565-73

Predictive factors of difficult implantation procedure in cardiac resynchronization therapy. Bisch, L., Da Costa, A., Dauphinot, V., Romeyer-Bouchard, C., Khris, L., M'baye, A., and Isaaz, K.. *Europace* 2010 :1141-8

Survival in New York Heart Association class IV heart failure patients treated with cardiac resynchronization therapy compared with patients on optimal pharmacological treatment. Castel, M. A., Magnani, S., Mont, L., Roig, E., Tamborero, D., Mendez-Zurita, F.,

Femenia, J. F., Tolosana, J. M., Perez-Villa, F., and Brugada, J.. *Europace* 2010 :1136-40

Primary prevention of sudden cardiac death by implantable cardioverter-defibrillator therapy in Chinese patients with heart failure: a single-center experience. Chen, T. B., Cheng, K. A., Gao, P., Cheng, Z. W., Fan, J. B., Jiang, X. C., and Fang, Q.. *Chin Med J (Engl)* 2010 :848-51

Usefulness of left ventricle dyssynchrony assessment before cardiac resynchronization implantation. Lipoldova, J., Ozabalova, E., Meluzin, J., Novak, M., and Vitovec, J.. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2010 :39-46

Ventilatory response and peak circulatory power: new functional markers of response after cardiac resynchronization therapy. Jaussaud, J., Blanc, P., Derval, N., Bordachar, P., Courregelongue, M., Roudaut, R., and Douard, H.. *Arch Cardiovasc Dis* 2010 :184-91

Identification and characterization of super-responders after cardiac resynchronization therapy. Reant, P., Zaroui, A., Donal, E., Mignot, A., Bordachar, P., Deplagne, A., Solnon, A., Ritter, P., Daubert, J. C., Clementy, J., Leclercq, C., Roudaut, R., Habib, G., and Lafitte, S.. *Am J Cardiol* 2010 :1327-35

Prediction of appropriate defibrillator therapy in heart failure patients treated with cardiac resynchronization therapy. Soliman, O. I., Theuns, D. A., van Dalen, B. M., Vletter, W. B., Nemes, A., Jordaens, L. J., Balk, A. H., Ten Cate, F. J., and Geleijnse, M. L.. *Am J Cardiol* 2010 :105-11

Analysis of ventricular activation using surface electrocardiography to predict left ventricular reverse volumetric remodeling during cardiac resynchronization therapy. Sweeney, M. O., van Bommel, R. J., Schalij, M. J., Borleffs, C. J., Hellkamp, A. S., and Bax, J. J.. *Circulation* 2010 :626-34

Beneficial effects of biventricular pacing in chronically right ventricular paced patients with mild cardiomyopathy. van Geldorp, I. E., Vernooy, K., Delhaas, T., Prins, M. H., Crijns, H. J., Prinzen, F. W., and Dijkman, B.. *Europace* 2010 :223-9

Persistence of secondary mitral regurgitation and response to cardiac resynchronization therapy. Cabrera-Bueno, F., Molina-Mora, M. J., Alzueta, J., Pena-Hernandez, J., Jimenez-Navarro, M., Fernandez-Pastor, J., Barrera, A., and de Teresa, E.. *Eur J Echocardiogr* 2010 :131-7

Electrocardiographic patterns and long-term clinical outcome in cardiac resynchronization therapy. Kronborg, M. B., Nielsen, J. C., and Mortensen, P. T.. *Europace* 2010 :216-22

Combined resynchronization therapy and automatic defibrillator in advanced non-ischaemic heart failure: the importance of QRS width. Cabrera-Bueno, F., Fernandez-Pastor, J., Molina-Mora, M. J., Alzueta, J., Pena-Hernandez, J. L., Barrera, A., and de Teresa-Galvan, E.. *Europace* 2010 :92-5

Outcome after device implantation in chronic heart failure is dependent on concomitant medical treatment. Adlbrecht, C., Hulsmann, M., Gwechenberger, M., Strunk, G., Khazen, C., Wiesbauer, F., Elhenicky, M., Neuhold, S., Binder, T., Maurer, G., Lang, I. M., and Pacher, R.. *Eur J Clin Invest* 2009 :1073-81

Usefulness of brain natriuretic peptide level at implant in predicting mortality in patients with advanced but stable heart failure receiving cardiac resynchronization therapy. El-Saed, A., Voigt, A., and Shalaby, A.. *Clin Cardiol* 2009 :E33-8

Outcome after implantation of cardiac resynchronization/defibrillation systems in patients with congestive heart failure and left bundle-branch block. Pfau, G., Schilling, T., Kozian, A., Lux, A., Gotte, A., Huth, C., and Hachenberg, T.. *J Cardiothorac Vasc Anesth* 2010 :30-6

Long-term clinical response of cardiac resynchronization after chronic right ventricular pacing. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Elvan, A., Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am J Cardiol* 2009 :116-21

Effect of long-term resynchronization therapy on left ventricular remodeling in pacemaker patients upgraded to biventricular devices. Vatankulu, M. A., Goktekin, O., Kaya, M. G., Ayhan, S., Kucukdurmaz, Z., Sutton, R., and Henein, M.. *Am J Cardiol* 2009 :1280-4

Effects of cardiac resynchronization therapy in patients unselected for mechanical dyssynchrony. Foley, P. W., Chalil, S., Khadjooi, K., Jordan, P., Smith, R. E., Frenneaux, M. P., and Leyva, F.. *Int J Cardiol* 2010 :51-6

Identification of 'super-responders' to cardiac resynchronization therapy: the importance of symptom duration and left ventricular geometry. Antonio, N., Teixeira, R., Coelho, L., Lourenco, C., Monteiro, P., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., and Providencia, L. A.. *Europace* 2009 :343-9

Long-term prognosis after cardiac resynchronization therapy is related to the extent of left ventricular reverse remodeling at midterm follow-up. Ypenburg, C., van Bommel, R. J., Borleffs, C. J., Bleeker, G. B., Boersma, E., Schalij, M. J., and Bax, J. J.. *J Am Coll Cardiol* 2009 :483-90

Effects of global longitudinal strain and total scar burden on response to cardiac resynchronization therapy in patients with ischaemic dilated cardiomyopathy. D'Andrea, A., Caso, P., Scarafile, R., Riegler, L., Salerno, G., Castaldo, F., Gravino, R., Cocchia, R., Del Viscovo, L., Limongelli, G., Di Salvo, G., Ascione, L., Iengo, R., Cuomo, S., Santangelo, L., and Calabro, R.. *Eur J Heart Fail* 2009 :58-67

Gender- and age-related outcomes of cardiac resynchronization therapy: a pilot observational study. Kelarijani, R. B., Saleh, D. K., Chalian, M., Kabir, A., Ahmadzad Asl, M., and Dadjoo, Y.. *Gend Med* 2008 :415-22

Influence of the preimplantation QRS axis on responses to cardiac resynchronization therapy. Garcia-Seara, J., Martinez-Sande, J. L., Cid, B., Gude, F., Bastos, M., Dominguez, M., Varela, A., and Gonzalez-Juanatey, J. R.. *Rev Esp Cardiol* 2008 :1245-52

Alleviation of pulmonary hypertension by cardiac resynchronization therapy is associated with improvement in central sleep apnea. Yiu, K. H., Lee, K. L., Lau, C. P., Siu, C. W., Miu, K. M., Lam, B., Lam, J., Ip, M. S., and Tse, H. F.. *Pacing Clin Electrophysiol* 2008 :1522-7

Effect of left ventricular lead concordance to the delayed contraction segment on echocardiographic and clinical outcomes after cardiac resynchronization therapy. Fung, J. W., Lam, Y. Y., Zhang, Q., Yip, G. W., Chan, W. W., Chan, G. C., Chan, J. Y., and Yu, C. M.. *J Cardiovasc Electrophysiol* 2009 :530-5

Implementation of seven echocardiographic parameters of myocardial asynchrony to improve the long-term response rate of cardiac resynchronization therapy (CRT). Knebel, F., Schattke, S., Bondke, H., Richter, C., Melzer, C., Dreger, H., Grohmann, A., Baumann, G., and Borges, A. C.. *Cardiovasc Ultrasound* 2008 :58

Insulin-treated type 2 diabetes is associated with a decreased survival in heart failure patients after cardiac resynchronization therapy. Mangiavacchi, M., Gasparini, M., Genovese, S., Pini, D., Klersy, C., Bragato, R., Andreuzzi, B., Municino, A., Regoli, F., Galimberti, P., Ceriotti, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2008 :1425-32

Right ventricular pump function after cardiac resynchronization therapy: a strain imaging study. Donal, E., Thibault, H., Bergerot, C., Leroux, P. Y., Cannesson, M., Thivolet, S., Barthelet, M., Rivard, L., Chevalier, P., Ovize, M., Daubert, J. C., Leclercq, C., Mabo, P., and Derumeaux, G.. *Arch Cardiovasc Dis* 2008 :475-84

Preservation of renal function in response to cardiac resynchronization therapy. Kimura, S., Ito, M., Chinushi, M., Tanaka, K., Tanabe, Y., Hosaka, Y., Komura, S., Okada, S., Iijima, K., Furushima, H., Fuse, K., Sato, M., and Aizawa, Y.. *Circ J* 2008 :1794-9

Heart rate variability monitored by the implanted device predicts response to CRT and long-term clinical outcome in patients with advanced heart failure. Landolina, M., Gasparini, M., Lunati, M., Santini, M., Rordorf, R., Vincenti, A., Diotallevi, P., Montenero, A. S., Bonanno, C., De Santo, T., Valsecchi, S., and Padeletti, L.. *Eur J Heart Fail* 2008 :1073-9

Hemodynamics and prognosis after primary cardiac resynchronization system implantation compared to 'upgrade' procedures. Nagele, H., Dodeck, J., Behrens, S., Azizi, M., Hashagen, S., Eisermann, C., and Castel, M. A.. *Pacing Clin Electrophysiol* 2008 :1265-71

Association of corrected QT dispersion with symptoms improvement in patients receiving cardiac resynchronization therapy. Hina, K., Kawamura, H., Murakami, T., Yamamoto, K., Yamaji, H., Murakami, M.,

Hirohata, S., Ogawa, H., Sakane, K., and Kusachi, S.. Heart Vessels 2008 :325-33

The impact of myocardial viability on the clinical outcome of cardiac resynchronization therapy. Riedlbauchova, L., Brunken, R., Jaber, W. A., Popova, L., Patel, D., Lanska, V., Civello, K., Cummings, J., Burkhardt, J. D., Saliba, W., Martin, D., Schweikert, R., Wilkoff, B. L., Grimm, R., and Natale, A.. J Cardiovasc Electrophysiol 2009 :50-7

Real-time three-dimensional echocardiography as a novel approach to assess left ventricular and left atrium reverse remodeling and to predict response to cardiac resynchronization therapy. Marsan, N. A., Bleeker, G. B., Ypenburg, C., Van Bommel, R. J., Ghio, S., Van de Veire, N. R., Delgado, V., Holman, E. R., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. Heart Rhythm 2008 :1257-64

Endothelial dysfunction in heart failure identifies responders to cardiac resynchronization therapy. Akar, J. G., Al-Chekakie, M. O., Fugate, T., Moran, L., Froloshki, B., Varma, N., Santucci, P., Wilber, D. J., and Matsumura, M. E.. Heart Rhythm 2008 :1229-35

Myocardial collagen metabolism in failing hearts before and during cardiac resynchronization therapy. Umar, S., Bax, J. J., Klok, M., van Bommel, R. J., Hessel, M. H., den Adel, B., Bleeker, G. B., Henneman, M. M., Atsma, D. E., van der Wall, E. E., Schalij, M. J., and van der Laarse, A.. Eur J Heart Fail 2008 :878-83

Cardiac resynchronization therapy modifies the neurohormonal profile, hemodynamic and functional capacity in heart failure patients. Menardi, E., Vado, A., Rossetti, G., Racca, E., Conte, E., Deorsola, A., Bobbio, M., and Feola, M.. Arch Med Res 2008 :702-8

Relationship between QRS complex notch and ventricular dyssynchrony in patients with heart failure and prolonged QRS duration. Fazelifar, A. F., Bonakdar, H. R., Alizadeh, K., Azarnik, H., Haghighi, M., Abkenar, H. B., Samiei, N., and Sadr-Ameli, M. A.. Cardiol J 2008 :351-6

Impact of interventricular lead distance and the decrease in septal-to-lateral delay on response to cardiac resynchronization therapy. Buck, S., Maass, A. H., Nieuwland, W., Anthonio, R. L., Van Veldhuisen, D. J., and Van Gelder, I. C.. Europace 2008 :1313-9

Comparison of benefits and mortality in cardiac resynchronization therapy in patients with atrial fibrillation versus patients in sinus rhythm (Results of the Spanish Atrial Fibrillation and Resynchronization. Tolosana, J. M., Hernandez Madrid, A., Brugada, J., Sitges, M., Garcia Bolao, I., Fernandez Lozano, I., Martinez Ferrer, J., Quesada, A., Macias, A., Marin, W., Escudier, J. M., Gomez, A. A., Gimenez Alcala, M., Tamborero, D., Berrueto, A., and Mont, L.. Am J Cardiol 2008 :444-9

Predicting the long-term effects of cardiac resynchronization therapy on mortality from baseline variables and the early response: a report from the CARE-HF (Cardiac Resynchronization in Heart Failure) Trial. Cleland, J., Freemantle, N., Ghio, S., Fruhwald, F., Shankar, A., Marijanowski, M., Verboven, Y., and Tavazzi, L.. J Am Coll Cardiol 2008 :438-45

Difference in long-term clinical outcome after cardiac resynchronization therapy between ischaemic and non-ischaemic aetiologies of heart failure. Zhang, Q., Fung, J. W., Chan, J. Y., Yip, G., Lam, Y. Y., Liang, Y. J., and Yu, C. M.. Heart 2009 :113-8

Very long term follow-up of cardiac resynchronization therapy: clinical outcome and predictors of mortality. Kronborg, M. B., Mortensen, P. T., Kirkfeldt, R. E., and Nielsen, J. C.. Eur J Heart Fail 2008 :796-801

Ventricular-arterial coupling in patients with heart failure treated with cardiac resynchronization therapy: may we predict the long-term clinical response?. Zanon, F., Aggio, S., Baracca, E., Pastore, G., Corbucci, G., Boaretto, G., Braggion, G., Piergentili, C., Rigatelli, G., and Roncon, L.. Eur J Echocardiogr 2009 :106-11

The ischemic etiology of heart failure in diabetics limits reverse left ventricular remodeling after cardiac resynchronization therapy. Soliman, O. I., van Dalen, B. M., Theuns, D. A., ten Cate, F. J., Nemes, A., Jordaens, L. J., and Geleijnse, M. L.. J Diabetes Complications 2009 :365-70

The magnitude of reverse remodelling irrespective of aetiology predicts outcome of heart failure patients treated with cardiac resynchronization therapy. Di Biase, L., Auricchio, A., Sorgente, A., Civello, K., Klersy, C., Faletra, F., Riedlbauchova, L., Patel, D., Arruda, M., Schweikert, R. A., Martin, D. O., Saliba, W. I., Moccetti, T., Wilkoff, B. L., and Natale, A.. Eur Heart J 2008 :2497-505

Mechanical discoordination rather than dyssynchrony predicts reverse remodeling upon cardiac resynchronization. Kim, B., Jansen, A., Bracke, F., van Gelder, B., Arts, T., and Prinzen, F. W.. Am J Physiol Heart Circ Physiol 2008 :H640-6

Impact of cardiac resynchronization therapy on adaptation of circulatory and respiratory systems to exercise assessed by cardiopulmonary exercise test in patients with chronic heart failure. Chwyczo, T., Sterlinski, M., Maciag, A., Firek, B., Labecka, A., Jankowska, A., Kosmicki, M., Kowalik, I., Malczewska, B., and Szwed, H.. Kardiologia 2008 :406-12; discussion 413-4

Echocardiographic evaluation of patients with severe heart failure and impairment of intraventricular conduction following cardiac resynchronization therapy. Faran, A., Dabrowska-Kugacka, A., Lewicka-Nowak, E., Tybura, S., Zieba, B., Danilowicz-Szymanowicz, L., Krzyminska-Stasiuk, E., Kempa, M., Kogut, K., and Raczak, G.. Kardiologia 2008 :396-403; discussion 404-5

Totally epicardial cardiac resynchronization therapy system implantation in patients with heart failure undergoing CABG. Goscinska-Bis, K., Bis, J., Krejca, M., Ulczok, R., Szmaga, P., Bochenek, A., and Kargul, W.. Eur J Heart Fail 2008 :498-506

Effect of biventricular pacing on symptoms and cardiac remodelling in patients with end-stage hypertrophic cardiomyopathy. Rogers, D. P., Marazia, S., Chow, A. W.,

Lambiase, P. D., Lowe, M. D., Frenneaux, M., McKenna, W. J., and Elliott, P. M.. *Eur J Heart Fail* 2008 :507-13

Functional behavior of patients with conventional pacemakers undergoing cardiac resynchronization. Silva, R. T., Martinelli Filho, M., Lima, C. E., Martins, D. G., Nishioka, S. A., Pedrosa, A. A., Crevelari, E. S., Costa, R., Sosa, E. A., and Ramires, J. A.. *Arq Bras Cardiol* 2008 :138-43

Cardiac resynchronisation as a rescue therapy in patients with catecholamine-dependent overt heart failure: results from a short and mid-term study. Milliez, P., Thomas, O., Haggi, A., Schurando, P., Squara, P., Cohen-Solal, A., Mebazaa, A., and Leenhardt, A.. *Eur J Heart Fail* 2008 :291-7

Improvement in cardiac sympathetic nerve activity in responders to resynchronization therapy. Burri, H., Sunthorn, H., Somsen, A., Fleury, E., Stettler, C., Shah, D., and Righetti, A.. *Europace* 2008 :374-8

Cardiac resynchronisation therapy in patients with end-stage heart failure--long-term follow-up. Faran, A., Lewicka-Nowak, E., Dabrowska-Kugacka, A., Kempa, M., Tybura, S., Szwoch, M., Krolak, T., and Raczak, G.. *Kardiologia Pol* 2008 :19-26; discussion 27

Myocardial gene expression in heart failure patients treated with cardiac resynchronization therapy responders versus nonresponders. Vanderheyden, M., Mullens, W., Delrue, L., Goethals, M., de Bruyne, B., Wijns, W., Geelen, P., Verstreken, S., Wellens, F., and Bartunek, J.. *J Am Coll Cardiol* 2008 :129-36

Quality of life in patients undergoing cardiac resynchronisation therapy. Wojcicka, M., Sterlinski, M., Chwyczko, T., Smolis-Bak, E., Szwed, H., and Kowalik, I.. *Kardiologia Pol* 2007 :1425-30; discussion 1431-2

Usefulness of pulmonary artery pressure by echocardiography to predict outcome in patients receiving cardiac resynchronization therapy heart failure. Shalaby, A., Voigt, A., El-Saed, A., and Saba, S.. *Am J Cardiol* 2008 :238-41

Cardiac resynchronization therapy in left ventricular hypertrabeculation/non-compaction and myopathy. Stollberger, C., Blazek, G., Bucher, E., and Finsterer, J.. *Europace* 2008 :59-62

Electrocardiographic imaging of patients with heart failure with left bundle branch block and response to cardiac resynchronization therapy. Varma, N., Jia, P., and Rudy, Y.. *J Electrocardiol* 2007 :S174-8

Left ventricular apical wall motion abnormality is associated with lack of response to cardiac resynchronization therapy in patients with ischemic cardiomyopathy. Buch, E., Lellouche, N., De Diego, C., Vaseghi, M., Cesario, D. A., Fujimura, O., Wiener, I., Child, J. S., Boyle, N. G., and Shivkumar, K.. *Heart Rhythm* 2007 :1300-5

Brain natriuretic peptide--a reliable parameter for the effectiveness of cardiac resynchronization therapy after coronary artery bypass grafting. Raab, S., Oertel, F.,

Weimann, T., Danov, V., and Beyer, M.. *Interact Cardiovasc Thorac Surg* 2006 :439-43

The impact of cardiac resynchronization therapy on obstructive sleep apnea in heart failure patients: a pilot study. Stanchina, M. L., Ellison, K., Malhotra, A., Anderson, M., Kirk, M., Benser, M. E., Tosi, C., Carlisle, C., Millman, R. P., and Buxton, A.. *Chest* 2007 :433-9

Repercussion of functional mitral regurgitation on reverse remodelling in cardiac resynchronization therapy. Cabrera-Bueno, F., Garcia-Pinilla, J. M., Pena-Hernandez, J., Jimenez-Navarro, M., Gomez-Doblas, J. J., Barrera-Cordero, A., Alzueta-Rodriguez, J., and de Teresa-Galvan, E.. *Europace* 2007 :757-61

Tissue Doppler imaging of mitral annular motion is an effective surrogate of left ventricular dyssynchrony and predicts response to cardiac resynchronization therapy. Yuan, X. P., White, J. A., Yee, R., and Drangova, M.. *J Am Soc Echocardiogr* 2007 :1186-93

Acute and chronic effects of cardiac resynchronization in patients developing heart failure with long-term pacemaker therapy for acquired complete atrioventricular block. Shimano, M., Tsuji, Y., Yoshida, Y., Inden, Y., Tsuboi, N., Itoh, T., Suzuki, H., Muramatsu, T., Okada, T., Harata, S., Yamada, T., Hirayama, H., Nattel, S., and Murohara, T.. *Europace* 2007 :869-74

Predictors and treatment response with cardiac resynchronization therapy in patients with heart failure characterized by dyssynchrony: a pre-defined analysis from the CARE-HF trial. Richardson, M., Freemantle, N., Calvert, M. J., Cleland, J. G., and Tavazzi, L.. *Eur Heart J* 2007 :1827-34

Early and late effects of cardiac resynchronization therapy on exercise-induced mitral regurgitation: relationship with left ventricular dyssynchrony, remodelling and cardiopulmonary performance. Madaric, J., Vanderheyden, M., Van Laethem, C., Verhamme, K., Feys, A., Goethals, M., Verstreken, S., Geelen, P., Penicka, M., De Bruyne, B., and Bartunek, J.. *Eur Heart J* 2007 :2134-41

Comparison of temporary bifocal right ventricular pacing and biventricular pacing for heart failure: evaluation by tissue Doppler imaging. Lane, R. E., Mayet, J., Peters, N. S., Davies, D. W., and Chow, A. W.. *Heart* 2008 :53-8

Influence of cardiac resynchronisation therapy on different types of sleep disordered breathing. Oldenburg, O., Faber, L., Vogt, J., Dorszewski, A., Szabados, F., Horstkotte, D., and Lamp, B.. *Eur J Heart Fail* 2007 :820-6

Elevated estimated pulmonary artery systolic pressure is associated with an adverse clinical outcome in patients receiving cardiac resynchronization therapy. Stern, J., Heist, E. K., Murray, L., Alabiad, C., Chung, J., Picard, M. H., Semigran, M. J., Ruskin, J. N., and Singh, J. P.. *Pacing Clin Electrophysiol* 2007 :603-7

Tissue Doppler predicts long-term clinical outcome after cardiac resynchronization therapy. Penicka, M., Vanderheyden, M., Geelen, P., Mortier, L., Goethals, M.,

Verstreken, S., Karasek, J., De Bruyne, B., and Bartunek, J.. *Int J Cardiol* 2008 :40-6

Predictors of sudden cardiac death and appropriate shock in the Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure (COMPANION) Trial. Saxon, L. A., Bristow, M. R., Boehmer, J., Krueger, S., Kass, D. A., De Marco, T., Carson, P., DiCarlo, L., Feldman, A. M., Galle, E., and Ecklund, F.. *Circulation* 2006 :2766-72

Integration of three-dimensional coronary venous angiography with three-dimensional echocardiography for biventricular device implantation. Mansour, M., Rasche, V., Picard, M. H., and Ruskin, J. N.. *Heart Rhythm* 2006 :1391-2

Left ventricular lead electrical delay predicts response to cardiac resynchronization therapy. Singh, J. P., Fan, D., Heist, E. K., Alabiad, C. R., Taub, C., Reddy, V., Mansour, M., Picard, M. H., Ruskin, J. N., and Mela, T.. *Heart Rhythm* 2006 :1285-92

Impact of left ventricular epicardial and biventricular pacing on ventricular repolarization in normal-heart individuals and patients with congestive heart failure. Bai, R., Yang, X. Y., Song, Y., Lin, L., Lu, J. G., Ching, C. K., Pu, J., Kam, R., Hsu, L. F., Zhang, C. T., Teo, W. S., and Wang, L.. *Europace* 2006 :1002-10

Characteristics of ventricular tachyarrhythmias occurring in ischemic versus nonischemic patients implanted with a biventricular cardioverter-defibrillator for primary or secondary prevention of sudden death. Boriani, G., Gasparini, M., Lunati, M., Santini, M., Landolina, M., Vincenti, A., Curnis, A., Bocchiardo, M., Padeletti, L., Biffi, M., Allaria, L., and Denaro, A.. *Am Heart J* 2006 :527.e1-11

Cardiac resynchronization therapy in patients with systolic left ventricular dysfunction and symptoms of mild heart failure secondary to ischemic or nonischemic cardiomyopathy. Bleeker, G. B., Schalij, M. J., Holman, E. R., Steendijk, P., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2006 :230-5

Contrast nephropathy post cardiac resynchronization therapy: an under-recognized complication with important morbidity. Cowburn, P. J., Patel, H., Pipes, R. R., and Parker, J. D.. *Eur J Heart Fail* 2005 :899-903

Effect of cardiac resynchronization therapy on inducibility of ventricular tachyarrhythmias in cardiac arrest survivors with either ischemic or idiopathic dilated cardiomyopathy. Kies, P., Bax, J. J., Molhoek, S. G., Bleeker, G. B., Zeppenfeld, K., Bootsma, M., van Erven, L., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2005 :1111-4

Monitoring of physical activity and heart rate variability in patients with chronic heart failure using cardiac resynchronization devices. Braunschweig, F., Mortensen, P. T., Gras, D., Reiser, W., Lawo, T., Mansour, H., Sogaard, P., Stegemann, B., Bruns, H. J., and Linde, C.. *Am J Cardiol* 2005 :1104-7

Cardiac resynchronization therapy acutely improves diastolic function. Waggoner, A. D., Faddis, M. N., Gleva, M. J., De Las Fuentes, L., Osborn, J., Heuerman, S., and Davila-Roman, V. G.. *J Am Soc Echocardiogr* 2005 :216-20

Clinical and electrocardiographic predictors of a positive response to cardiac resynchronization therapy in advanced heart failure. Lecoq, G., Leclercq, C., Leray, E., Crocq, C., Alonso, C., de Place, C., Mabo, P., and Daubert, C.. *Eur Heart J* 2005 :1094-100

Cardiac resynchronization therapy: an option for inotrope-supported patients with end-stage heart failure?. Cowburn, P. J., Patel, H., Jolliffe, R. E., Wald, R. W., and Parker, J. D.. *Eur J Heart Fail* 2005 :215-7

Baseline characteristics of patients recruited into the CARE-HF study. Cleland, J. G., Daubert, J. C., Erdmann, E., Freemantle, N., Gras, D., Kappenberger, L., Klein, W., and Tavazzi, L.. *Eur J Heart Fail* 2005 :205-14

Surgical epicardial left ventricular lead versus coronary sinus lead placement in biventricular pacing. Mair, H., Sachweh, J., Meuris, B., Nollert, G., Schmoeckel, M., Schuetz, A., Reichart, B., and Daebritz, S.. *Eur J Cardiothorac Surg* 2005 :235-42

Long-term follow-up of patients with refractory heart failure and myocardial ischemia treated with cardiac resynchronization therapy. De Cock, C. C., Van Campen, L. M., Jessurun, E. R., Allaart, C. A., Vos, D. S., and Visser, C. A.. *Pacing Clin Electrophysiol* 2005 :S8-S10

Marked improvement in left ventricular function and significant reverse left ventricular remodeling within 3 months of cardiac resynchronization therapy in patients with dilated cardiomyopathy. Funck, R. C., Koelsch, S., Waldhans, S., Prinz, H., Grimm, W., Moosdorf, R., and Maisch, B.. *Pacing Clin Electrophysiol* 2005 :S5-7

Cardiac resynchronization therapy: effects on left and right ventricular ejection fraction during exercise. Boriani, G., Fallani, F., Martignani, C., Biffi, M., Saporito, D., Greco, C., Ziacchi, M., Levorato, M., Pontone, G., Valzania, C., Diemberger, I., Franchi, R., and Branzi, A.. *Pacing Clin Electrophysiol* 2005 :S11-4

Left ventricular functional recovery during cardiac resynchronization therapy: predictive role of asynchrony measured by strain rate analysis. Capasso, F., Giunta, A., Stabile, G., Turco, P., La Rocca, V., Grimaldi, G., and De Simone, A.. *Pacing Clin Electrophysiol* 2005 :S1-4

Long-term follow-up of atrioventricular delay optimization in patients with biventricular pacing. Inoue, N., Ishikawa, T., Sumita, S., Nakagawa, T., Kobayashi, T., Matsushita, K., Matsumoto, K., Ohkusu, Y., Taima, M., Kosuge, M., Uchino, K., Kimura, K., and Umemura, S.. *Circ J* 2005 :201-4

Tissue Doppler imaging and strain Doppler imaging as modalities for predicting clinical improvement in patients receiving biventricular pacing. Tada, H., Toide, H., Naito, S., Kurosaki, K., Ito, S., Miyaji, K., Yamada, M., Okaniwa,

H., Kobayashi, Y., Maruyama, H., Higuchi, R., Nogami, A., Oshima, S., and Taniguchi, K.. *Circ J* 2005 :194-200

Reduced mitral regurgitation in heart failure patients submitted to cardiac resynchronization therapy: a short-term prospective study. Zanon, F., Aggio, S., Baracca, E., Bilato, C., Corbucci, G., Rigatelli, G., and Zonzin, P.. *Ital Heart J* 2004 :826-30

Evidence of reverse remodeling after long-term biventricular stimulation for resynchronization in patients with wide QRS selected on the basis of echocardiographic electromechanical delays. Barbieri, A., Bursi, F., Bonatti, S., Coppi, F., Zanasi, V., Reggiani, L., Casali, E., Malavasi, V. L., and Modena, M. G.. *Ital Heart J* 2004 :818-25

Ventricular asynchrony predicts a better outcome in patients with chronic heart failure receiving cardiac resynchronization therapy. Pitzalis, M. V., Iacoviello, M., Romito, R., Guida, P., De Tommasi, E., Luzzi, G., Anaclerio, M., Forleo, C., and Rizzon, P.. *J Am Coll Cardiol* 2005 :65-9

Comparison of acute changes in left ventricular volume, systolic and diastolic functions, and intraventricular synchronicity after biventricular and right ventricular pacing for heart failure. Yu, C. M., Lin, H., Fung, W. H., Zhang, Q., Kong, S. L., and Sanderson, J. E.. *Am Heart J* 2003 :E18

Impact of cardiac resynchronization therapy using hemodynamically optimized pacing on left ventricular remodeling in patients with congestive heart failure and ventricular conduction disturbances. Stellbrink, C., Breithardt, O. A., Franke, A., Sack, S., Bakker, P., Auricchio, A., Pochet, T., Salo, R., Kramer, A., and Spinelli, J.. *J Am Coll Cardiol* 2001 :1957-65

Comparison of chronic biventricular pacing between epicardial and endocardial left ventricular stimulation using Doppler tissue imaging in patients with heart failure. Garrigue, S., Jais, P., Espil, G., Labeque, J. N., Hocini, M., Shah, D. C., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2001 :858-62

Impact of acute biventricular pacing on left ventricular performance and volumes in patients with severe heart failure. A tissue doppler and three-dimensional echocardiographic study. Sogaard, P., Kim, W. Y., Jensen, H. K., Mortensen, P., Pedersen, A. K., Kristensen, B. O., and Egeblad, H.. *Cardiology* 2001 :173-82

Biventricular pacing decreases the inducibility of ventricular tachycardia in patients with ischemic cardiomyopathy. Zagrodzky, J. D., Ramaswamy, K., Page, R. L., Joglar, J. A., Sheehan, C. J., Smith, M. L., and Hamdan, M. H.. *Am J Cardiol* 2001 :1208-10; A7

Three dimensional echocardiography documents haemodynamic improvement by biventricular pacing in patients with severe heart failure. Kim, W. Y., Sogaard, P., Mortensen, P. T., Jensen, H. K., Pedersen, A. K., Kristensen, B. O., and Egeblad, H.. *Heart* 2001 :514-20

Reversal of left ventricular remodeling by synchronous biventricular pacing in heart failure. Lau, C. P., Yu, C. M., Chau, E., Fan, K., Tse, H. F., Lee, K., Tang, M. O., Wan, S. H., Law, T. C., Lee, P. Y., Lam, Y. M., and Hill, M. R.. *Pacing Clin Electrophysiol* 2000 :1722-5

Should stimulation therapy for congestive heart failure be combined with defibrillation backup?. Gaita, F., Bocchiardo, M., Porciani, M. C., Vivalda, L., Colella, A., Di Donna, P., Caponi, D., Bruzzzone, M., and Padeletti, L.. *Am J Cardiol* 2000 :165K-158K

Biventricular pacing decreases sympathetic activity compared with right ventricular pacing in patients with depressed ejection fraction. Hamdan, M. H., Zagrodzky, J. D., Joglar, J. A., Sheehan, C. J., Ramaswamy, K., Erdner, J. F., Page, R. L., and Smith, M. L.. *Circulation* 2000 :1027-32

Biventricular pacing in end-stage heart failure improves functional capacity and left ventricular function. Bakker, P. F., Meijburg, H. W., de Vries, J. W., Mower, M. M., Thomas, A. C., Hull, M. L., Robles De Medina, E. O., and Bredee, J. J.. *J Interv Card Electrophysiol* 2000 :395-404

How many people with heart failure are appropriate for biventricular resynchronization?. Farwell, D., Patel, N. R., Hall, A., Ralph, S., and Sulke, A. N.. *Eur Heart J* 2000 :1246-50

Ventricular contraction abnormalities in dilated cardiomyopathy: effect of biventricular pacing to correct interventricular dyssynchrony. Kerwin, W. F., Botvinick, E. H., O'Connell, J. W., Merrick, S. H., DeMarco, T., Chatterjee, K., Scheibly, K., and Saxon, L. A.. *J Am Coll Cardiol* 2000 :1221-7

Electrocardiographic predictive factors of long-term clinical improvement with multisite biventricular pacing in advanced heart failure. Alonso, C., Leclercq, C., Victor, F., Mansour, H., de Place, C., Pavin, D., Carre, F., Mabo, P., and Daubert, J. C.. *Am J Cardiol* 99 :1417-21

Hemodynamic benefit of rest and exercise optimization of cardiac resynchronization therapy. Stanton, T., Haluska, B. A., Leano, R., and Marwick, T. H.. *Echocardiography* 2014 :

Dynamic relationship of left-ventricular dyssynchrony and contractile reserve in patients undergoing cardiac resynchronization therapy. Stankovic, I., Aaronson, M., Smith, H.-J., Voros, G., Kongsgaard, E., Neskovic, A. N., Willems, R., Aakhus, S., and Voigt, J.-U.. *Eur. Heart J* 2014 :48-55a

Acute effects of multisite left ventricular pacing on mechanical dyssynchrony in patients receiving cardiac resynchronization therapy. Rinaldi, C. A., Kranig, W., Leclercq, C., Kacet, S., Betts, T., Bordachar, P., Gutleben, K.-J., Shetty, A., Keel, A., Ryu, K., Farazi, T. G., Simon, M., and Naqvi, T. Z.. *J. Card. Fail.* 2013 :731-738

CRT-D therapy in patients with decompensated NYHA class-four CHF. Zaeem, F., Giedriemienė, D., Coleman, C., Crespo, E., Radojevic, J., Zweibel, S., Kluger, J., and Clyne, C. A.. *Cardiol. Res. Pract.* 2012 :

Comparison of the usefulness of cardiac resynchronization therapy in three age-groups (<65, 65-74 and (greater-than or equal to)75 years) (from the InSync/InSync ICD Italian Registry). Fumagalli, S., Valsecchi, S., Boriani, G., Gasparini, M., Landolina, M., Lunati, M., Padeletti, M., Tronconi, F., Marchionni, N., and Padeletti, L.. *Am. J. Cardiol.* 2011 :1510-1516

Benefits of cardiac resynchronization therapy in "Very dilated cardiomyopathy": Beneficios da terapeutica de ressincronizacao cardiaca na <<miocardiopatia muito dilatada>>. Lousinha, A., Oliveira, M. M., Feliciano, J., Galrinho, A., Branco, L. M., Cunha, P. S., Hamad, H., Ramos, R., Abreu, J., Leal, A., Santos, S., Soares, R., Da Silva, M. N., and Ferreira, R. C.. *Rev. Port. Cardiol.* 2011 :283-294

Incidence and predictors of subclavian vein obstruction following biventricular device implantation. Bulur, S., Vural, A., Yazici, M., Ertas, G., Ozhan, H., and Ural, D.. *J. Intervent. Card. Electrophysiol.* 2010 :199-202

Tricuspid annular plane systolic excursion evaluation improves selection of cardiac resynchronization therapy patients. Cappelli, F., Porciani, M. C., Ricceri, I., Perrotta, L., Ricciardi, G., Pieragnoli, P., Paladini, G., Michelucci, A., and Padeletti, L.. *Clin. Cardiol.* 2010 :578-582

Cardiac resynchronization therapy device implantation in patients with therapeutic international normalized ratios. Ghanbari, H., Feldman, D., Schmidt, M., Ottino, J., MacHado, C., Akoum, N., Wall, T. S., and Daccarett, M.. *PACE Pacing Clin. Electrophysiol.* 2010 :400-406

Assessment of cardiac resynchronization therapy response. Cattadori, G., Giraldi, F., Berti, M., Carbucicchio, C., Pepi, M., Della Bella, P., Contini, M., Apostolo, A., Berna, G., Andreini, D., Sciomer, S., and Agostoni, P.. *Int. J. Cardiol.* 2009 :240-242

Comparison of the Effects of Cardiac Resynchronization Therapy in Patients With Class II Versus Class III and IV Heart Failure (from the InSync/InSync ICD Italian Registry)(dagger)(dagger)Conflicts of interest: Landolina, M., Lunati, M., Gasparini, M., Santini, M., Padeletti, L., Achilli, A., Bianchi, S., Laurenzi, F., Curnis, A., Vincenti, A., Valsecchi, S., and Denaro, A.. *Am. J. Cardiol.* 2007 :1007-1012

Cardiac resynchronization. Socioeconomic and health care impact. Mortality of procedure. Cost-benefit ratio. Impact on functional class/quality of life. Prognosis and follow-up: Resincronizacion cardiaca. Impacto socioeconomico sanitario. Mortalidad del procedimiento. Relacion coste-beneficio. Impacto en la clase funcional/calidad de vida. Pronostico y seguimiento. Hernandez Madrid, A., Escobar Cervantes, C., Marin Marin, I., and Bernal Morell, E.. *Invest. Cardiovasc.* 2005 :135-150

Assessment of right ventricular oxidative metabolism by PET in patients with idiopathic dilated cardiomyopathy undergoing cardiac resynchronisation therapy. Knuuti, J., Sundell, J., Naum, A., Engblom, E., Koistinen, J., Ylitalo, A., Stolen, K. Q., Kalliokoski, R., Nekolla, S. G., Bax, K.

E. J. J., and Airaksinen, K. E. J.. *Eur. J. Nucl. Med. Mol. Imaging* 2004 :1592-1598

Tissue Doppler Echocardiography for Evaluation of Patients with Ventricular Resynchronization Therapy: Ecocardiografia com Doppler Tecidular para Avaliacao de Doentes com Terapeutica de Ressincronizacao Ventricular. Ferreira Santos, J., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Neves Soares, L., and Ines, L.. *Rev. Port. Cardiol.* 2003 :1363-1371

Effects of Cardiac Resynchronization Therapy on Right Ventricular Function - Evaluation with Tissue Doppler Echocardiography: Efeitos da Terapeutica de Ressincronizacao Ventricular na Funcao Ventricular Direita - Avaliacao por Ecocardiografia com Doppler Tecidular. Ferreira Santos, J., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Neves Soares, L., and Ines, L.. *Rev. Port. Cardiol.* 2003 :1347-1355

Pre-capillary pulmonary hypertension and right ventricular dilation predict clinical outcome in cardiac resynchronization therapy. Chatterjee N.A., Upadhyay G.A., Singal G., Parks K.A., Dec G.W., Singh J.P., and Lewis G.D.. *JACC Heart Fail.* 2014 :230-237

Intermediate-term mortality and incidence of ICD therapy in octogenarians after cardiac resynchronization therapy. Kelli, H. M., Merchant, F. M., Mengistu, A., Casey, M., Hoskins, M., and El-Chami, M. F.. *J Geriatr Cardiol* 2014 :180-4

Association between frequency of atrial and ventricular ectopic beats and biventricular pacing percentage and outcomes in patients with cardiac resynchronization therapy. Ruwald, M. H., Mittal, S., Ruwald, A. C., Aktas, M. K., Daubert, J. P., McNitt, S., Al-Ahmad, A., Jons, C., Kutyla, V., Steinberg, J. S., Wang, P., Moss, A. J., and Zareba, W.. *J Am Coll Cardiol* 2014 :971-81

Comparison of Low Versus High (>40 mm Hg) Pulse Pressure to Predict the Benefit of Cardiac Resynchronization Therapy for Heart Failure (from the Multicenter Automatic Defibrillator Implantation Trial-Cardiac Resynchronization Therapy Trial). Sherazi, S., Goldenberg, I., Moss, A. J., Solomon, S., Kutyla, V., McNitt, S., Shah, A. H., Huang, D. T., Aktas, M. K., Zareba, W., and Barsheshet, A.. *Am J Cardiol* 2014 :1053-8

Combined electrical and global markers of dyssynchrony predict clinical response to Cardiac Resynchronization Therapy. Bajraktari, G., Ronn, F., Ibrahim, P., Jashari, F., Lindmark, K., Jensen, S. M., and Henein, M. Y.. *Scand Cardiovasc J* 2014 :304-10

Elevated pulmonary artery pressure predicts poor outcome after cardiac resynchronization therapy. Wang, J., Su, Y., Bai, J., Wang, W., Qin, S., and Ge, J.. *J Interv Card Electrophysiol* 2014 :171-8

Association between brain natriuretic peptide, markers of inflammation and the objective and subjective response to cardiac resynchronization therapy. Brouwers, C., Versteeg, H., Meine, M., Heijnen, C. J., Kavelaars, A. M., Pedersen,

S. S., and Mommersteeg, P. M.. *Brain Behav Immun* 2014 :211-8

Left ventricular lead position and outcomes in the Resynchronization-Defibrillation for Ambulatory Heart Failure Trial (RAFT). Wilton, S. B., Exner, D. V., Healey, J. S., Birnie, D., Arnold, M. O., Sapp, J. L., Thibault, B., Simpson, C. S., Tung, S., Crystal, E., Sivakumaran, S., Khaykin, Y., Yetisir, E., Wells, G., and Tang, A. S.. *Can J Cardiol* 2014 :413-9

Impact of myocardial viability and left ventricular lead location on clinical outcome in cardiac resynchronization therapy recipients with ischemic cardiomyopathy. Bose, A., Kandala, J., Upadhyay, G. A., Riedl, L., Ahmado, I., Padmanabhan, R., Gewirtz, H., Mulligan, L. J., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2014 :507-13

A clinical prediction rule to identify patients at heightened risk for early demise following cardiac resynchronization therapy. Rickard, J., Cheng, A., Spragg, D., Cantillon, D., Baranowski, B., Varma, N., Wilkoff, B. L., and Tang, W. H.. *J Cardiovasc Electrophysiol* 2014 :278-82

Durability of the survival effect of cardiac resynchronization therapy by level of left ventricular functional improvement: fate of "nonresponders". Rickard, J., Cheng, A., Spragg, D., Bansal, S., Niebauer, M., Baranowski, B., Cantillon, D. J., Tchou, P. J., Grimm, R. A., Tang, W. H., Wilkoff, B. L., and Varma, N.. *Heart Rhythm* 2014 :412-6

Prevalence of ventricular arrhythmias in patients with cardiac resynchronization therapy without back-up ICD: a single-center experience. Bortnik, M., Degiovanni, A., Dell'era, G., Cavallino, C., Occhetta, E., and Marino, P.. *J Cardiovasc Med (Hagerstown)* 2014 :301-6

Depression, psychological distress, and quality of life in patients with cardioverter defibrillator with or without cardiac resynchronization therapy. Knackstedt, C., Arndt, M., Mischke, K., Marx, N., Nieman, F., Kunert, H. J., Schauerte, P., and Norra, C.. *Heart Vessels* 2014 :364-74

Population inclusion criteria do not fall within the QRS $\geq$ 120ms and LVEF $\leq$ 35% range

Survival of patients with biventricular devices after device infection, extraction, and reimplantation. Rickard, J., Tarakji, K., Cheng, A., Spragg, D., Cantillon, D. J., Martin, D. O., Baranowski, B., Gordon, S. M., Tang, W. H., Kanj, M., Wazni, O., and Wilkoff, B. L.. *JACC Heart Fail* 2013 :508-13

Left ventricular ejection fraction overcrossing 35% after one year of cardiac resynchronization therapy predicts long term survival and freedom from sudden cardiac death: Single center observational experience. Frigerio, M., Lunati, M., Pasqualucci, D., Vargiu, S., Foti, G., Pedretti,

S., Vittori, C., Cattafi, G., Magenta, G., Campo, C., Bisetti, S., and Mercurio, G.. *Int J Cardiol* 2014 :64-71

Clinical characteristics and outcomes of elderly patients treated with an implantable cardioverter-defibrillator or cardiac resynchronization therapy in a real-world setting: Data from the Israeli ICD Registry. Suleiman, M., Goldenberg, I., Haim, M., Schliamser, J. E., Boulos, M., Ilan, M., Swissa, M., Gavrielov-Yusim, N., Fuchs, T., Amit, G., and Glikson, M.. *Heart Rhythm* 2014 :435-41

Remote Past Left Ventricular Function before Chronic Right Ventricular Pacing Predicts Responses to Cardiac Resynchronization Therapy Upgrade. Chang, P. C., Wo, H. T., Chen, T. H., Wu, D., Lin, F. C., and Wang, C. C.. *Pacing Clin Electrophysiol* 2013 :

Changes in renal function over time in patients with cardiac resynchronisation therapy. Schaer, B. A., Hitz, L., Sticherling, C., Kuhne, M., Dickenmann, M., Jordaens, M., Osswald, L., and Theuns, S.. *Swiss Med Wkly* 2013 :w13863

Implantable defibrillators improve survival in patients with mildly symptomatic heart failure receiving cardiac resynchronization therapy: analysis of the long-term follow-up of remodeling in systolic left ventricular dysfunction (REVERSE). Gold, M. R., Daubert, J. C., Abraham, W. T., Hassager, C., Dinerman, J. L., Hudnall, J. H., Cerkenvenik, J., and Linde, C.. *Circ Arrhythm Electrophysiol* 2013 :1163-8

Cardiac-resynchronization therapy in heart failure with a narrow QRS complex. Ruschitzka, F., Abraham, W. T., Singh, J. P., Bax, J. J., Borer, J. S., Brugada, J., Dickstein, K., Ford, I., Gorgsan, J. 3rd, Gras, D., Krum, H., Sogaard, P., and Holzmeister, J.. *N Engl J Med* 2013 :1395-405

QRS duration, bundle-branch block morphology, and outcomes among older patients with heart failure receiving cardiac resynchronization therapy. Peterson, P. N., Greiner, M. A., Qualls, L. G., Al-Khatib, S. M., Curtis, J. P., Fonarow, G. C., Hammill, S. C., Heidenreich, P. A., Hammill, B. G., Piccini, J. P., Hernandez, A. F., Curtis, L. H., and Masoudi, F. A.. *JAMA* 2013 :617-26

A novel electrocardiographic predictor of clinical response to cardiac resynchronization therapy. Mollo, R., Cosenza, A., Coviello, I., Stazi, A., Russo, G., Villano, A., Sestito, A., Bencardino, G., Lanza, G. A., and Crea, F.. *Europace* 2013 :1615-21

Long-term impact of cardiac resynchronization therapy in mild heart failure: 5-year results from the REsynchronization REVerses Remodeling in Systolic left vEntricular dysfunction (REVERSE) study. Linde, C., Gold, M. R., Abraham, W. T., St John Sutton, M., Ghio, S., Cerkenvenik, J., and Daubert, C.. *Eur Heart J* 2013 :2592-9

A randomized study of cardiac resynchronization therapy defibrillator versus dual-chamber implantable cardioverter-defibrillator in ischemic cardiomyopathy with narrow QRS: the NARROW-CRT study. Muto, C., Solimene, F., Gallo, P., Nastasi, M., La Rosa, C., Calvanese, R., Iengo, R., Cancelliello, M., Sangiuolo, R., Diemberger, I., Ciardiello, C.,

and Tuccillo, B.. *Circ Arrhythm Electrophysiol* 2013 :538-45

Comparing outcome of patients with coronary artery disease and dilated cardiomyopathy in ICD and CRT recipients: data from the German DEVICE-registry. Wasmer, K., Kobe, J., Andresen, D., Zahn, R., Spitzer, S. G., Jehle, J., Brachmann, J., Stellbrink, C., Martens, E., Hochadel, M., Seneges, J., Klein, H., and Eckardt, L.. *Clin Res Cardiol* 2013 :513-21

Notched QRS complex in lateral leads as a novel predictor of response to cardiac resynchronization therapy. Pan, W., Su, Y., Zhu, W., Shu, X., and Ge, J.. *Ann Noninvasive Electrocardiol* 2013 :181-7

An 8-year single-centre experience of cardiac resynchronisation therapy: procedural success, early and late complications, and left ventricular lead performance. Ahsan, S. Y., Saberwal, B., Lambiase, P. D., Chaubey, S., Segal, O. R., Gopalumurugan, A. B., McCready, J., Rogers, D. P., Lowe, M. D., and Chow, A. W.. *Europace* 2013 :711-7

Acute and mid-term outcomes of transvenous implant of a new left ventricular quadripolar lead versus bipolar leads for cardiac resynchronization therapy: results from a single-center prospective database. Arias, M. A., Pachon, M., Puchol, A., Jimenez-Lopez, J., and Rodriguez-Padial, L.. *Cardiol J* 2012 :470-8

Chronic kidney disease and cardiac remodelling in patients with mild heart failure: results from the REsynchronization reVERses Remodeling in Systolic Left vEntricular Dysfunction (REVERSE) study. Mathew, J., Katz, R., St John Sutton, M., Dixit, S., Gerstenfeld, E. P., Ghio, S., Gold, M. R., Linde, C., Shlipak, M. G., and Deo, R.. *Eur J Heart Fail* 2012 :1420-8

Permanent pacemaker-related upper extremity deep vein thrombosis: a series of 20 cases. Mandal, S., Pande, A., Mandal, D., Kumar, A., Sarkar, A., Kahali, D., Mazumdar, B., and Panja, M.. *Pacing Clin Electrophysiol* 2012 :1194-8

Effect of QRS duration and morphology on cardiac resynchronization therapy outcomes in mild heart failure: results from the Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction (REVERSE) study. Gold, M. R., Thebault, C., Linde, C., Abraham, W. T., Gerritse, B., Ghio, S., St John Sutton, M., and Daubert, J. C.. *Circulation* 2012 :822-9

Impact of renal insufficiency on long-term clinical outcome in patients with heart failure treated by cardiac resynchronization therapy. Hosoda, J., Ishikawa, T., Matsushita, K., Matsumoto, K., Kimura, Y., Miyamoto, M., Ogawa, H., Takamura, T., Sugano, T., Ishigami, T., Uchino, K., Kimura, K., and Umemura, S.. *J Cardiol* 2012 :301-5

Acute hemodynamic response to biventricular pacing in heart failure patients with narrow, moderately, and severely prolonged QRS duration. Ploux, S., Whinnett, Z., Lumens, J., Denis, A., Zemmoura, A., De Guillebon, M., Ramoul,

K., Ritter, P., Jais, P., Clementy, J., Haissaguerre, M., and Bordachar, P.. *Heart Rhythm* 2012 :1247-50

Acute and chronic response to CRT in narrow QRS patients. Donahue, T., Niazi, I., Leon, A., Stucky, M., and Herrmann, K.. *J Cardiovasc Transl Res* 2012 :232-41

The impact of left ventricular size on response to cardiac resynchronization therapy. Rickard, J., Brennan, D. M., Martin, D. O., Hsich, E., Tang, W. H., Lindsay, B. D., Starling, R. C., Wilkoff, B. L., and Grimm, R. A.. *Am Heart J* 2011 :646-53

Adverse effect of right ventricular pacing prevented by biventricular pacing during long-term follow-up: a randomized comparison. Albertsen, A. E., Mortensen, P. T., Jensen, H. K., Poulsen, S. H., Egeblad, H., and Nielsen, J. C.. *Eur J Echocardiogr* 2011 :767-72

Multicentre study using strain delay index for predicting response to cardiac resynchronization therapy (MUSIC study). Lim, P., Donal, E., Lafitte, S., Derumeaux, G., Habib, G., Reant, P., Thivolet, S., Lellouche, N., Grimm, R. A., and Gueret, P.. *Eur J Heart Fail* 2011 :984-91

QRS fragmentation is not associated with poor response to cardiac resynchronization therapy. Rickard, J., Zardkoohi, O., Popovic, Z., Verhaert, D., Sraow, D., Baranowski, B., Martin, D. O., Grimm, R. A., Chung, M. K., Tchou, P., Lindsay, B. A., and Wilkoff, B. L.. *Ann Noninvasive Electrocardiol* 2011 :165-71

Improvement effect on endothelial function in patients with congestive heart failure treated with cardiac resynchronization therapy. Enomoto, K., Yamabe, H., Toyama, K., Matsuzawa, Y., Yamamuro, M., Uemura, T., Morihisa, K., Iwashita, S., Kaikita, K., Sugiyama, S., and Ogawa, H.. *J Cardiol* 2011 :69-73

End-stage renal disease predicts complications in pacemaker and ICD implants. Tompkins, C., McLean, R., Cheng, A., Brinker, J. A., Marine, J. E., Nazarian, S., Spragg, D. D., Sinha, S., Halperin, H., Tomaselli, G. F., Berger, R. D., Calkins, H., and Henrikson, C. A.. *J Cardiovasc Electrophysiol* 2011 :1099-104

Elevated B-type natriuretic peptide is associated with increased in-hospital mortality or cardiac arrest in patients undergoing implantable cardioverter-defibrillator implantation. Wei, S., Loyo-Berrios, N. I., Haigney, M. C., Cheng, H., Pinnow, E. E., Mitchell, K. R., Beachy, J. H., Woodward, A. M., Wang, Y., Curtis, J. P., and Marinac-Dabic, D.. *Circ Cardiovasc Qual Outcomes* 2011 :346-54

The QRS narrowing index predicts reverse left ventricular remodeling following cardiac resynchronization therapy. Rickard, J., Popovic, Z., Verhaert, D., Sraow, D., Baranowski, B., Martin, D. O., Lindsay, B. D., Varma, N., Tchou, P., Grimm, R. A., Wilkoff, B. L., and Chung, M. K.. *Pacing Clin Electrophysiol* 2011 :604-11

Real-time 3D echo in patient selection for cardiac resynchronization therapy. Kapetanakis, S., Bhan, A., Murgatroyd, F., Kearney, M. T., Gall, N., Zhang, Q., Yu, C. M., and Monaghan, M. J.. *JACC Cardiovasc Imaging* 2011 :16-26

- Female gender is associated with a better outcome after cardiac resynchronization therapy. Leyva, F., Foley, P. W., Chalil, S., Irwin, N., and Smith, R. E.. *Pacing Clin Electrophysiol* 2011 :82-8
- The impact of cardiac resynchronization therapy on the incidence of ventricular arrhythmias in mild heart failure. Gold, M. R., Linde, C., Abraham, W. T., Gardiwal, A., and Daubert, J. C.. *Heart Rhythm* 2011 :679-84
- Cardiac resynchronization therapy in asymptomatic or mildly symptomatic heart failure patients in relation to etiology: results from the REVERSE (REsynchronization reVERses Remodeling in Systolic Left vEntricular Dysfunction) study. Linde, C., Abraham, W. T., Gold, M. R., and Daubert, C.. *J Am Coll Cardiol* 2010 :1826-31
- Renal function and mortality following cardiac resynchronization therapy. Lin, G., Gersh, B. J., Greene, E. L., Redfield, M. M., Hayes, D. L., and Brady, P. A.. *Eur Heart J* 2011 :184-90
- Morbidity and mortality in heart failure patients treated with cardiac resynchronization therapy: influence of pre-implantation characteristics on long-term outcome. van Bommel, R. J., Borleffs, C. J., Ypenburg, C., Marsan, N. A., Delgado, V., Bertini, M., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Eur Heart J* 2010 :2783-90
- Effects of cardiac resynchronisation therapy in patients with heart failure having a narrow QRS Complex enrolled in PROSPECT. van Bommel, R. J., Gorcsan, J. 3rd, Chung, E. S., Abraham, W. T., Gjestvang, F. T., Leclercq, C., Monaghan, M. J., Nihoyannopoulos, P., Peraldo, C., Yu, C. M., Demas, M., Gerritse, B., and Bax, J. J.. *Heart* 2010 :1107-13
- Beta-blocker utilization and outcomes in patients receiving cardiac resynchronization therapy. Voigt, A., Shalaby, A., Adelstein, E., and Saba, S.. *Clin Cardiol* 2010 :E1-5
- A revised approach to patient selection for cardiac resynchronization treatment using multiple asynchrony parameters in Narrow- and Wide-QRS cardiomyopathy causes cardiac reverse remodelling: a single centre non-randomized prospective study. Rafique, A. M., Thomas Peter, C., and Naqvi, T. Z.. *Europace* 2010 :1127-35
- Characterization of super-response to cardiac resynchronization therapy. Rickard, J., Kumbhani, D. J., Popovic, Z., Verhaert, D., Manne, M., Sraow, D., Baranowski, B., Martin, D. O., Lindsay, B. D., Grimm, R. A., Wilkoff, B. L., and Tchou, P.. *Heart Rhythm* 2010 :885-9
- Upgrading to resynchronization therapy after chronic right ventricular pacing improves left ventricular remodelling. Frohlich, G., Steffel, J., Hurlimann, D., Enseleit, F., Luscher, T. F., Ruschitzka, F., Abraham, W. T., and Holzmeister, J.. *Eur Heart J* 2010 :1477-85
- Cardiac resynchronization therapy in non-left bundle branch block morphologies. Rickard, J., Kumbhani, D. J., Gorodeski, E. Z., Baranowski, B., Wazni, O., Martin, D. O., Grimm, R., and Wilkoff, B. L.. *Pacing Clin Electrophysiol* 2010 :590-5
- Cardiac resynchronization therapy is effective even in elderly patients with comorbidities. Antonio, N., Lourenco, C., Teixeira, R., Saraiva, F., Coelho, L., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., and Providencia, L. A.. *J Interv Card Electrophysiol* 2010 :61-8
- Right atrial size and deformation in patients with dilated cardiomyopathy undergoing cardiac resynchronization therapy. D'Andrea, A., Scarafile, R., Riegler, L., Salerno, G., Gravino, R., Cocchia, R., Castaldo, F., Allocca, F., Limongelli, G., Di Salvo, G., Cuomo, S., Pacileo, G., Caso, P., Russo, M. G., and Calabro, R.. *Eur J Heart Fail* 2009 :1169-77
- Trial-generated profiles for implantation of electrical devices in outpatients with heart failure: real-world prevalence and 1-year outcome. Boriani, G., Rapezzi, C., Diemberger, I., Gonzini, L., Gorini, M., Lucci, D., Sinagra, G., Cooke, R. M., Di Pasquale, G., Tavazzi, L., and Maggioni, A. P.. *J Eval Clin Pract* 2010 :82-91
- Cardiac resynchronization induces major structural and functional reverse remodeling in patients with New York Heart Association class I/II heart failure. St John Sutton, M., Ghio, S., Plappert, T., Tavazzi, L., Scelsi, L., Daubert, C., Abraham, W. T., Gold, M. R., Hassager, C., Herre, J. M., and Linde, C.. *Circulation* 2009 :1858-65
- Usefulness of brain natriuretic peptide level at implant in predicting mortality in patients with advanced but stable heart failure receiving cardiac resynchronization therapy. El-Saed, A., Voigt, A., and Shalaby, A.. *Clin Cardiol* 2009 :E33-8
- Outcome after implantation of cardiac resynchronization/defibrillation systems in patients with congestive heart failure and left bundle-branch block. Pfau, G., Schilling, T., Kozian, A., Lux, A., Gotte, A., Huth, C., and Hachenberg, T.. *J Cardiothorac Vasc Anesth* 2010 :30-6
- Prevention of disease progression by cardiac resynchronization therapy in patients with asymptomatic or mildly symptomatic left ventricular dysfunction: insights from the European cohort of the REVERSE (Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction) trial. Daubert, C., Gold, M. R., Abraham, W. T., Ghio, S., Hassager, C., Goode, G., Szili-Torok, T., and Linde, C.. *J Am Coll Cardiol* 2009 :1837-46
- The European cardiac resynchronization therapy survey. Dickstein, K., Bogale, N., Priori, S., Auricchio, A., Cleland, J. G., Gitt, A., Limbourg, T., Linde, C., van Veldhuisen, D. J., and Brugada, J.. *Eur Heart J* 2009 :2450-60
- Atrial fibrillation is under-recognized in chronic heart failure: insights from a heart failure cohort treated with cardiac resynchronization therapy. Caldwell, J. C., Contractor, H., Petkar, S., Ali, R., Clarke, B., Garratt, C. J., Neyses, L., and Mamas, M. A.. *Europace* 2009 :1295-300
- Correlation of electrical and mechanical reverse remodeling after cardiac resynchronization therapy. Kamireddy, S.,

Agarwal, S. K., Adelstein, E., Jain, S., and Saba, S.. *Ann Noninvasive Electrocardiol* 2009 :153-7

Effect of cardiac resynchronization therapy on the incidence of electrical storm. Nordbeck, P., Seidl, B., Fey, B., Bauer, W. R., and Ritter, O.. *Int J Cardiol* 2010 :330-6

Relationship of reverse anatomical remodeling and ventricular arrhythmias after cardiac resynchronization. Markowitz, S. M., Lewen, J. M., Wiggenhorn, C. J., Abraham, W. T., Stein, K. M., Iwai, S., and Lerman, B. B.. *J Cardiovasc Electrophysiol* 2009 :293-8

Cardiac resynchronization therapy: long-term alternative to cardiac transplantation?. Hansky, B., Vogt, J., Zittermann, A., Guldner, H., Heintze, J., Schulz, U., Horstkotte, D., Tenderich, G., and Korfer, R.. *Ann Thorac Surg* 2009 :432-8

Effect of cardiac resynchronization therapy on mean platelet volume. Alper, A. T., Akyol, A., Hasdemir, H., Yildirim, A., Nurkalem, Z., Guvenc, T. S., Cakmak, N., Oguz, E., Erdinler, I. C., and Gurkan, K.. *Acta Cardiol* 2008 :735-9

Change in blood pressure just after initiation of cardiac resynchronization therapy predicts long-term clinical outcome in patients with advanced heart failure. Tanaka, Y., Tada, H., Yamashita, E., Sato, C., Irie, T., Hori, Y., Goto, K., Iwamoto, J., Manni, H., Yokokawa, M., Naito, S., Oshima, S., and Taniguchi, K.. *Circ J* 2009 :288-94

Quantification of left ventricular systolic dyssynchrony by real-time three-dimensional echocardiography. Soliman, O. I., van Dalen, B. M., Nemes, A., Zwaan, H. B., Vletter, W. B., ten Cate, F. J., Theuns, D. A., Jordaens, L. J., and Geleijnse, M. L.. *J Am Soc Echocardiogr* 2009 :232-9

Echo Doppler parameters predict response to cardiac resynchronization therapy. Wiesbauer, F., Baytaroglu, C., Azar, D., Blessberger, H., Goliash, G., Graf, S., Mundigler, G., Pacher, R., Maurer, G., and Binder, T.. *Eur J Clin Invest* 2009 :1-10

Cardiac resynchronization therapy may improve symptoms of congestive heart failure in patients without electrical or mechanical dyssynchrony. Nazeri, A., Massumi, A., Rasekh, A., Saeed, M., Frank, C., Wilson, J. M., Lopez, J. A., and Razavi, M.. *Europace* 2009 :86-8

Randomized trial of cardiac resynchronization in mildly symptomatic heart failure patients and in asymptomatic patients with left ventricular dysfunction and previous heart failure symptoms. Linde, C., Abraham, W. T., Gold, M. R., St John Sutton, M., Ghio, S., and Daubert, C.. *J Am Coll Cardiol* 2008 :1834-43

Implantable CRT device diagnostics identify patients with increased risk for heart failure hospitalization. Perego, G. B., Landolina, M., Vergara, G., Lunati, M., Zanotto, G., Pappone, A., Lonardi, G., Specia, G., Iacopino, S., Varbaro, A., Sarkar, S., Hettrick, D. A., and Denaro, A.. *J Interv Card Electrophysiol* 2008 :235-42

Impact of interventricular lead distance and the decrease in septal-to-lateral delay on response to cardiac resynchronization therapy. Buck, S., Maass, A. H.,

Nieuwland, W., Anthonio, R. L., Van Veldhuisen, D. J., and Van Gelder, I. C.. *Europace* 2008 :1313-9

Short-term mortality and cost associated with cardiac device implantation in patients hospitalized with heart failure. Swindle, J., Burroughs, T. E., Schnitzler, M. A., and Hauptman, P. J.. *Am Heart J* 2008 :322-8

Difference in long-term clinical outcome after cardiac resynchronisation therapy between ischaemic and non-ischaemic aetiologies of heart failure. Zhang, Q., Fung, J. W., Chan, J. Y., Yip, G., Lam, Y. Y., Liang, Y. J., and Yu, C. M.. *Heart* 2009 :113-8

Very long term follow-up of cardiac resynchronization therapy: clinical outcome and predictors of mortality. Kronborg, M. B., Mortensen, P. T., Kirkfeldt, R. E., and Nielsen, J. C.. *Eur J Heart Fail* 2008 :796-801

Survival and quality of life in patients with cardiac resynchronization therapy for severe heart failure and in heart transplant recipients within a contemporary heart failure management program. Becker, M., Erdmann, N., Stegemann, E., Benke, D., Schauerte, P. N., Schaefer, W. M., Autschbach, R., Kelm, M., and Koch, K. C.. *J Heart Lung Transplant* 2008 :746-52

Ventricular-arterial coupling in patients with heart failure treated with cardiac resynchronization therapy: may we predict the long-term clinical response?. Zanon, F., Aggio, S., Baracca, E., Pastore, G., Corbucci, G., Boaretto, G., Braggion, G., Piergentili, C., Rigatelli, G., and Roncon, L.. *Eur J Echocardiogr* 2009 :106-11

Reduced ejection fraction, sudden cardiac death, and heart failure death in the mode selection trial (MOST): implications for device selection in elderly patients with sinus node disease. Sweeney, M. O., Hellkamp, A. S., Ellenbogen, K. A., and Lamas, G. A.. *J Cardiovasc Electrophysiol* 2008 :1160-6

Echocardiographic evaluation of patients with severe heart failure and impairment of intraventricular conduction following cardiac resynchronisation therapy. Faran, A., Dabrowska-Kugacka, A., Lewicka-Nowak, E., Tybura, S., Zieba, B., Danilowicz-Szymanowicz, L., Krzyminska-Stasiuk, E., Kempa, M., Kogut, K., and Raczak, G.. *Kardiol Pol* 2008 :396-403; discussion 404-5

Improvement of left atrial function is associated with lower incidence of atrial fibrillation and mortality after cardiac resynchronization therapy. Fung, J. W., Yip, G. W., Zhang, Q., Fang, F., Chan, J. Y., Li, C. M., Wu, L. W., Chan, G. C., Chan, H. C., and Yu, C. M.. *Heart Rhythm* 2008 :780-6

Elevated serum creatinine at baseline predicts poor outcome in patients receiving cardiac resynchronization therapy. Shalaby, A., El-Saed, A., Voigt, A., Albany, C., and Saba, S.. *Pacing Clin Electrophysiol* 2008 :575-9

Totally epicardial cardiac resynchronization therapy system implantation in patients with heart failure undergoing CABG. Goscinska-Bis, K., Bis, J., Krejca, M., Ulczok, R., Szmaga, P., Bochenek, A., and Kargul, W.. *Eur J Heart Fail* 2008 :498-506

- Functional behavior of patients with conventional pacemakers undergoing cardiac resynchronization. Silva, R. T., Martinelli Filho, M., Lima, C. E., Martins, D. G., Nishioka, S. A., Pedrosa, A. A., Crevelari, E. S., Costa, R., Sosa, E. A., and Ramires, J. A.. *Arq Bras Cardiol* 2008 :138-43
- Clinical response of cardiac resynchronization therapy in the elderly. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Elvan, A., Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am Heart J* 2008 :746-51
- Ventricular tachycardia storm after initiation of biventricular pacing: incidence, clinical characteristics, management, and outcome. Nayak, H. M., Verdino, R. J., Russo, A. M., Gerstenfeld, E. P., Hsia, H. H., Lin, D., Dixit, S., Cooper, J. M., Callans, D. J., and Marchlinski, F. E.. *J Cardiovasc Electrophysiol* 2008 :708-15
- Responders to cardiac resynchronization therapy with narrow or intermediate QRS complexes identified by simple echocardiographic indices of dyssynchrony: the DESIRE study. Cazeau, S. J., Daubert, J. C., Tavazzi, L., Frohlig, G., and Paul, V.. *Eur J Heart Fail* 2008 :273-80
- Cardiac resynchronisation as a rescue therapy in patients with catecholamine-dependent overt heart failure: results from a short and mid-term study. Milliez, P., Thomas, O., Haggui, A., Schurando, P., Squara, P., Cohen-Solal, A., Mebazaa, A., and Leenhardt, A.. *Eur J Heart Fail* 2008 :291-7
- Cardiac resynchronization therapy. Midterm follow-up of 128 patients. Novak, M., Lipoldova, J., Kamaryt, P., Dvorak, J. Jr, Ozabalova, E., Vank, P., Hude, P., and Krejci, J.. *Bratisl Lek Listy* 2007 :445-52
- Prognostic value of electrocardiographic measurements before and after cardiac resynchronization device implantation in patients with heart failure due to ischemic or nonischemic cardiomyopathy. Iler, M. A., Hu, T., Ayyagari, S., Callahan, T. D. 4th, Civello, K. C., Thal, S. G., Wilkoff, B. L., and Chung, M. K.. *Am J Cardiol* 2008 :359-63
- Left ventricular function and visual phase analysis with equilibrium radionuclide angiography in patients with biventricular device. Muxi, A., Paredes, P., Mont, L., Setoain, F. J., Duch, J., Fuertes, S., Ortin, J., Diaz-Infante, E., and Pons, F.. *Eur J Nucl Med Mol Imaging* 2008 :912-21
- Chronic cardiac resynchronization therapy reverses cardiac remodelling and improves invasive haemodynamics of patients with severe heart failure on optimal medical treatment. Inage, T., Yoshida, T., Hiraki, T., Ohe, M., Takeuchi, T., Nagamoto, Y., Fukuda, Y., Gondo, T., and Imaizumi, T.. *Europace* 2008 :379-83
- Effectiveness of cardiac resynchronisation therapy in patients with echocardiographic evidence of mechanical dyssynchrony. Achilli, A., Sassara, M., Pontillo, D., Turreni, F., Rossi, P., De Luca, R., Klersy, C., Patruno, N., Achilli, P., Sallusti, L., Spadaccia, P., Cricco, L., and Serra, F.. *J Cardiovasc Med (Hagerstown)* 2008 :131-6
- Health status in patients treated with cardiac resynchronization therapy: modulating effects of personality. Schiffer, A. A., Denollet, J., Pedersen, S. S., Broers, H., and Widdershoven, J. W.. *Pacing Clin Electrophysiol* 2008 :28-37
- Relation of optimal lead positioning as defined by three-dimensional echocardiography to long-term benefit of cardiac resynchronization. Becker, M., Hoffmann, R., Schmitz, F., Hundemer, A., Kuhl, H., Schauerte, P., Kelm, M., and Franke, A.. *Am J Cardiol* 2007 :1671-6
- Cardiac resynchronization therapy in left ventricular hypertrabeculation/non-compaction and myopathy. Stollberger, C., Blazek, G., Bucher, E., and Finsterer, J.. *Europace* 2008 :59-62
- Comparison of results with different left ventricular pacing leads. Nof, E., Gurevitz, O., Carraso, S., Bar-Lev, D., Luria, D., Bachar, S., Eldar, M., and Glikson, M.. *Europace* 2008 :35-9
- Electrocardiographic imaging of patients with heart failure with left bundle branch block and response to cardiac resynchronization therapy. Varma, N., Jia, P., and Rudy, Y.. *J Electrocardiol* 2007 :S174-8
- Diastolic filling pattern and left ventricular diameter predict response and prognosis after cardiac resynchronisation therapy. Gradaus, R., Stuckenberg, V., Loher, A., Kobe, J., Reinke, F., Gunia, S., Vahlhaus, C., Breithardt, G., and Bruch, C.. *Heart* 2008 :1026-31
- Cardiac resynchronization therapy: gender related differences in left ventricular reverse remodeling. Lilli, A., Ricciardi, G., Porciani, M. C., Perini, A. P., Pieragnoli, P., Musilli, N., Colella, A., Del Pace, S., Michelucci, A., Turreni, F., Sassara, M., Achilli, A., Barold, S. S., and Padeletti, L.. *Pacing Clin Electrophysiol* 2007 :1349-55
- Non-ischemic cardiomyopathy patients derive superior mortality benefit from cardiac resynchronization therapy. Rosman, J., Dhillon, S., Mayer, A., Hanon, S., and Paul, S.. *Indian Pacing Electrophysiol J* 2007 :215-7
- Improvement of atrial function and atrial reverse remodeling after cardiac resynchronization therapy for heart failure. Yu, C. M., Fang, F., Zhang, Q., Yip, G. W., Li, C. M., Chan, J. Y., Wu, L., and Fung, J. W.. *J Am Coll Cardiol* 2007 :778-85
- Burden of atrial fibrillation after cardiac resynchronization therapy. Adelstein, E. C. and Saba, S.. *Am J Cardiol* 2007 :268-72
- Usefulness of ventricular dyssynchrony measured using M-mode echocardiography to predict response to resynchronization therapy. Diaz-Infante, E., Sitges, M., Vidal, B., Mont, L., Delgado, V., Marigliano, A., Macias, A., Tolosana, J. M., Tamborero, D., Azqueta, M., Roig, E., Pare, C., and Brugada, J.. *Am J Cardiol* 2007 :84-9
- Incidence and predictors of in-hospital events after first implantation of pacemakers. van Eck, J. W., van Hemel, N. M., Zuithof, P., van Asseldonk, J. P., Voskuil, T. L., Grobbee, D. E., and Moons, K. G.. *Europace* 2007 :884-9

Effect of biventricular pacing on the exercise pathophysiology of heart failure. Wasserman, K., Sun, X. G., and Hansen, J. E.. *Chest* 2007 :250-61

Physiological approach to monitor patients in congestive heart failure: application of a new implantable device-based system to monitor daily life activity and ventilation. Page, E., Cazeau, S., Ritter, P., Galley, D., and Casset, C.. *Europace* 2007 :687-93

Preventing ventricular dysfunction in pacemaker patients without advanced heart failure: rationale and design of the PREVENT-HF study. de Teresa, E., Gomez-Doblas, J. J., Lamas, G., Alzueta, J., Fernandez-Lozano, I., Cobo, E., Navarro, X., Navarro-Lopez, F., and Stockburger, M.. *Europace* 2007 :442-6

Hemodynamic changes during cardiac resynchronization therapy. Nagele, H., Azizi, M., and Castel, M. A.. *Clin Cardiol* 2007 :141-3

The benefits of biventricular pacing in heart failure patients with narrow QRS, NYHA class II and right ventricular pacing. Ng, K., Kedia, N., Martin, D., Tchou, P., Natale, A., Wilkoff, B., Starling, R., and Grimm, R. A.. *Pacing Clin Electrophysiol* 2007 :193-8

Effect of cardiac resynchronization on morbidity and mortality of diabetic patients with severe heart failure. Hoppe, U. C., Freemantle, N., Cleland, J. G., Marijjanowski, M., and Erdmann, E.. *Diabetes Care* 2007 :722-4

Tissue synchronisation imaging accurately measures left ventricular dyssynchrony and predicts response to cardiac resynchronisation therapy. Van de Veire, N. R., Bleeker, G. B., De Sutter, J., Ypenburg, C., Holman, E. R., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Heart* 2007 :1034-9

Changes in heart rate variability, quality of life, and activity in cardiac resynchronization therapy patients: results of the HF-HRV registry. Gilliam, F. R. 3rd, Kaplan, A. J., Black, J., Chase, K. J., and Mullin, C. M.. *Pacing Clin Electrophysiol* 2007 :56-64

Prevalence and characterization of asymptomatic pacemaker and ICD lead perforation on CT. Hirschl, D. A., Jain, V. R., Spindola-Franco, H., Gross, J. N., and Haramati, L. B.. *Pacing Clin Electrophysiol* 2007 :28-32

Long-term hemodynamic benefit of biventricular pacing depending on coronary sinus lead position. Nagele, H., Hashagen, S., Azizi, M., Behrens, S., and Castel, M. A.. *Herzschrittmacherther Elektrophysiol* 2006 :185-90

Prediction of response to cardiac resynchronization therapy: the selection of candidates for CRT (SCART) study. Achilli, A., Peraldo, C., Sassara, M., Orazi, S., Bianchi, S., Laurenzi, F., Donati, R., Perego, G. B., Spampinato, A., Valsecchi, S., Denaro, A., and Puglisi, A.. *Pacing Clin Electrophysiol* 2006 :S11-9

Impact of left ventricular epicardial and biventricular pacing on ventricular repolarization in normal-heart individuals and patients with congestive heart failure. Bai, R., Yang, X. Y., Song, Y., Lin, L., Lu, J. G., Ching, C. K.,

Pu, J., Kam, R., Hsu, L. F., Zhang, C. T., Teo, W. S., and Wang, L.. *Europace* 2006 :1002-10

Are left ventricular diastolic function and diastolic asynchrony important determinants of response to cardiac resynchronization therapy?. Yu, C. M., Zhang, Q., Yip, G. W., Chan, Y. S., Lee, P. W., Wu, L. W., Lam, Y. Y., Kum, L. C., Chan, H. C., Chan, S., and Fung, J. W.. *Am J Cardiol* 2006 :1083-7

FDG PET as a predictor of response to resynchronisation therapy in patients with ischaemic cardiomyopathy. van Campen, C. M., Visser, F. C., van der Weerd, A. P., Knaapen, P., Comans, E. F., Lammertsma, A. A., de Cock, C. C., and Visser, C. A.. *Eur J Nucl Med Mol Imaging* 2007 :309-15

Effect of cardiac resynchronization therapy in patients with moderate left ventricular systolic dysfunction and wide QRS complex: a prospective study. Fung, J. W., Zhang, Q., Yip, G. W., Chan, J. Y., Chan, H. C., and Yu, C. M.. *J Cardiovasc Electrophysiol* 2006 :1288-92

Characteristics of ventricular tachyarrhythmias occurring in ischemic versus nonischemic patients implanted with a biventricular cardioverter-defibrillator for primary or secondary prevention of sudden death. Boriani, G., Gasparini, M., Lunati, M., Santini, M., Landolina, M., Vincenti, A., Curnis, A., Bocchiardo, M., Padeletti, L., Biffi, M., Allaria, L., and Denaro, A.. *Am Heart J* 2006 :527.e1-11

Improvement of congestive heart failure by upgrading of conventional to resynchronization pacemakers. Marai, I., Gurevitz, O., Carasso, S., Nof, E., Bar-Lev, D., Luria, D., Arbel, Y., Freimark, D., Feinberg, M. S., Eldar, M., and Glikson, M.. *Pacing Clin Electrophysiol* 2006 :880-4

Left ventricular lead proximity to an akinetic segment and impact on outcome of cardiac resynchronization therapy. Arzola-Castaner, D., Taub, C., Kevin Heist, E., Fan, D., Haelewyn, K., Mela, T., Picard, M. H., Ruskin, J. N., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2006 :623-7

Relation of right ventricular peak systolic pressure to major adverse events in patients undergoing cardiac resynchronization therapy. Tedrow, U. B., Kramer, D. B., Stevenson, L. W., Stevenson, W. G., Baughman, K. L., Epstein, L. M., and Lewis, E. F.. *Am J Cardiol* 2006 :1737-40

Biventricular versus conventional right ventricular stimulation for patients with standard pacing indication and left ventricular dysfunction: the Homburg Biventricular Pacing Evaluation (HOBIPACE). Kindermann, M., Hennen, B., Jung, J., Geisel, J., Bohm, M., and Frohlig, G.. *J Am Coll Cardiol* 2006 :1927-37

Differential change in left ventricular mass and regional wall thickness after cardiac resynchronization therapy for heart failure. Zhang, Q., Fung, J. W., Auricchio, A., Chan, J. Y., Kum, L. C., Wu, L. W., and Yu, C. M.. *Eur Heart J* 2006 :1423-30

Tissue Doppler velocity is superior to displacement and strain mapping in predicting left ventricular reverse

remodelling response after cardiac resynchronisation therapy. Yu, C. M., Zhang, Q., Chan, Y. S., Chan, C. K., Yip, G. W., Kum, L. C., Wu, E. B., Lee, P. W., Lam, Y. Y., Chan, S., and Fung, J. W.. *Heart* 2006 :1452-6

Clinical predictors and timing of New York Heart Association class improvement with cardiac resynchronization therapy in patients with advanced chronic heart failure: results from the Multicenter InSync Randomized Clinical Evaluation (MIRACLE) and Multicenter InSync ICD Randomized Clinical Evaluation (MIRACLE-ICD) trials. Pires, L. A., Abraham, W. T., Young, J. B., and Johnson, K. M.. *Am Heart J* 2006 :837-43

Prospective validation of stress echocardiography as an identifier of cardiac resynchronization therapy responders. Da Costa, A., Thevenin, J., Roche, F., Faure, E., Romeyer-Bouchard, C., Messier, M., Convert, G., Barthelemy, J. C., and Isaaz, K.. *Heart Rhythm* 2006 :406-13

Cardiac resynchronization therapy delays heart transplantation in patients with end-stage heart failure and mechanical dyssynchrony. Vanderheyden, M., Wellens, F., Bartunek, J., Verstreken, S., Walraevens, M., Geelen, P., De Proft, M., and Goethals, M.. *J Heart Lung Transplant* 2006 :447-53

Clinical predictors of marked improvement in left ventricular performance after cardiac resynchronization therapy in patients with chronic heart failure. Mangiavacchi, M., Gasparini, M., Faletta, F., Klersy, C., Morengi, E., Galimberti, P., Genovese, L., Regoli, F., De Chiara, F., Bragato, R., Andreuzzi, B., Pini, D., and Gronda, E.. *Am Heart J* 2006 :477.e1-477.e6

Determinants of mortality in patients undergoing cardiac resynchronization therapy: baseline clinical, echocardiographic, and angioscintigraphic evaluation prior to resynchronization. de Sisti, A., Toussaint, J. F., Lavergne, T., Ollitrault, J., Abergel, E., Pazioud, O., Ait Said, M., Sader, R., LE Heuzey, J. Y., and Guize, L.. *Pacing Clin Electrophysiol* 2005 :1260-70

Global myocardial index in patients with multisite pacing. Cozma, D., Kalifa, J., Pescariu, S., Lighezan, D., Deharo, J. C., Mornos, C., Djiane, P., Luca, C. T., Petrescu, L., and Dragulescu, S. I.. *Rom J Intern Med* 2004 :521-31

Left ventricular-based cardiac stimulation post AV nodal ablation evaluation (the PAVE study). Doshi, R. N., Daoud, E. G., Fellows, C., Turk, K., Duran, A., Hamdan, M. H., and Pires, L. A.. *J Cardiovasc Electrophysiol* 2005 :1160-5

Progression of heart failure in right univentricular pacing compared to biventricular pacing. Ritter, O., Koller, M. L., Fey, B., Seidel, B., Krein, A., Langenfeld, H., and Bauer, W. R.. *Int J Cardiol* 2006 :359-65

Reverse ventricular remodeling and improved functional capacity after ventricular resynchronization in advanced heart failure. Malfatto, G., Facchini, M., Branzi, G., Brambilla, R., Fratianni, G., Tortorici, E., Balla, E., and Perego, G. B.. *Ital Heart J* 2005 :578-83

Effects of cardiac resynchronization therapy on incidence of atrial fibrillation in patients with poor left ventricular systolic function. Fung, J. W., Yu, C. M., Chan, J. Y., Chan, H. C., Yip, G. W., Zhang, Q., and Sanderson, J. E.. *Am J Cardiol* 2005 :728-31

Left ventricular lead performance in cardiac resynchronization therapy: impact of lead localization and complications. Albertsen, A. E., Nielsen, J. C., Pedersen, A. K., Hansen, P. S., Jensen, H. K., and Mortensen, P. T.. *Pacing Clin Electrophysiol* 2005 :483-8

Regional differences in systolic and diastolic function in arrhythmogenic right ventricular dysplasia/cardiomyopathy using magnetic resonance imaging. Bomma, C., Dalal, D., Tandri, H., Prakasa, K., Nasir, K., Roguin, A., Tichnell, C., James, C., Lima, J. A., Calkins, H., and Bluemke, D. A.. *Am J Cardiol* 2005 :1507-11

Predictors of lack of response to resynchronization therapy. Diaz-Infante, E., Mont, L., Leal, J., Garcia-Bolao, I., Fernandez-Lozano, I., Hernandez-Madrid, A., Perez-Castellano, N., Sitges, M., Pavon-Jimenez, R., Barba, J., Caverio, M. A., Moya, J. L., Perez-Isla, L., and Brugada, J.. *Am J Cardiol* 2005 :1436-40

Improvement of serum NT-ProBNP predicts improvement in cardiac function and favorable prognosis after cardiac resynchronization therapy for heart failure. Yu, C. M., Fung, J. W., Zhang, Q., Chan, C. K., Chan, I., Chan, Y. S., Kong, S. L., Sanderson, J. E., and Lam, C. W.. *J Card Fail* 2005 :S42-6

Electrocardiographic remodeling during cardiac resynchronization therapy. Boriani, G., Biffi, M., Martignani, C., Ziacchi, M., Saporito, D., Grigioni, F., Domenichini, G., Valzania, C., Diemberger, I., Bertini, M., Specchia, S., and Branzi, A.. *Int J Cardiol* 2006 :165-70

Contrast nephropathy post cardiac resynchronization therapy: an under-recognized complication with important morbidity. Cowburn, P. J., Patel, H., Pipes, R. R., and Parker, J. D.. *Eur J Heart Fail* 2005 :899-903

Chronic heart failure patients with restrictive LV filling pattern have significantly less benefit from cardiac resynchronization therapy than patients with late LV filling pattern. Salukhe, T. V., Francis, D. P., Clague, J. R., Sutton, R., Poole-Wilson, P., and Henein, M. Y.. *Int J Cardiol* 2005 :5-12

Use of cardiac resynchronization therapy to optimize beta-blocker therapy in patients with heart failure and prolonged QRS duration. Aranda, J. M. Jr, Woo, G. W., Conti, J. B., Schofield, R. S., Conti, C. R., and Hill, J. A.. *Am J Cardiol* 2005 :889-91

Cardiac resynchronization therapy: an option for inotrope-supported patients with end-stage heart failure?. Cowburn, P. J., Patel, H., Jolliffe, R. E., Wald, R. W., and Parker, J. D.. *Eur J Heart Fail* 2005 :215-7

Frequency of left ventricular dyssynchrony in patients with heart failure and a narrow QRS complex. Bleeker, G. B., Schalij, M. J., Molhoek, S. G., Holman, E. R., Verwey, H.

F., Steendijk, P., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2005 :140-2

Biventricular pacing and left ventricular pacing in heart failure: similar hemodynamic improvement despite marked electromechanical differences. Bordachar, P., Lafitte, S., Reuter, S., Garrigue, S., Sanders, P., Roudaut, R., Jais, P., Haissaguerre, M., and Clementy, J.. *J Cardiovasc Electrophysiol* 2004 :1342-7

Echocardiographic parameters of ventricular dyssynchrony validation in patients with heart failure using sequential biventricular pacing. Bordachar, P., Lafitte, S., Reuter, S., Sanders, P., Jais, P., Haissaguerre, M., Roudaut, R., Garrigue, S., and Clementy, J.. *J Am Coll Cardiol* 2004 :2157-65

Comparative effects of ventricular resynchronization therapy in heart failure patients with or without coronary artery disease. Leclercq, C., Gras, D., Tang, A., Alonso, C., Thomas-Revault d'Allones, F., and Mabo, P.. *Ann Cardiol Angeiol (Paris)* 2004 :171-6

Comparison of efficacy of reverse remodeling and clinical improvement for relatively narrow and wide QRS complexes after cardiac resynchronization therapy for heart failure. Yu, C. M., Fung, J. W., Chan, C. K., Chan, Y. S., Zhang, Q., Lin, H., Yip, G. W., Kum, L. C., Kong, S. L., Zhang, Y., and Sanderson, J. E.. *J Cardiovasc Electrophysiol* 2004 :1058-65

Electrical and mechanical components of dyssynchrony in heart failure patients with normal QRS duration and left bundle-branch block: impact of left and biventricular pacing. Turner, M. S., Bleasdale, R. A., Vinereanu, D., Mumford, C. E., Paul, V., Fraser, A. G., and Frenneaux, M. P.. *Circulation* 2004 :2544-9

Long-term effectiveness of cardiac resynchronization therapy in patients with refractory heart failure and "narrow" QRS. Achilli, A., Sassara, M., Ficili, S., Pontillo, D., Achilli, P., Alessi, C., De Spirito, S., Guerra, R., Patruno, N., and Serra, F.. *J Am Coll Cardiol* 2003 :2117-24

Basal asynchrony and resynchronization with biventricular pacing predict long-term improvement of LV function in heart failure patients. Toussaint, J. F., Lavergne, T., Kerrou, K., Froissart, M., Ollitrault, J., Darondel, J. M., Alonso, C., Diebold, B., Le Heuzey, J. Y., Guize, L., and Paillard, M.. *Pacing Clin Electrophysiol* 2003 :1815-23

Cardiac resynchronization therapy improves heart rate variability in patients with symptomatic heart failure. Adamson, P. B., Kleckner, K. J., VanHout, W. L., Srinivasan, S., and Abraham, W. T.. *Circulation* 2003 :266-9

The prevalence of heart failure and asymptomatic left ventricular systolic dysfunction in a typical regional pacemaker population. Thackray, S. D., Witte, K. K., Nikitin, N. P., Clark, A. L., Kaye, G. C., and Cleland, J. G.. *Eur Heart J* 2003 :1143-52

Effects of cardiac resynchronization therapy on heart rate variability in patients with chronic systolic heart failure and

intraventricular conduction delay. Alonso, C., Ritter, P., Leclercq, C., Mabo, P., Bailleul, C., and Daubert, J. C.. *Am J Cardiol* 2003 :1144-7

Is the outcome of cardiac resynchronization therapy related to the underlying etiology?. Gasparini, M., Mantica, M., Galimberti, P., Genovese, L., Pini, D., Faletra, F., Marchesina, U. L., Mangiavacchi, M., Klersy, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :175-80

Beneficial effects of biventricular pacing in patients with a "narrow" QRS. Gasparini, M., Mantica, M., Galimberti, P., Marconi, M., Genovese, L., Faletra, F., Simonini, S., Klersy, C., Coates, R., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :169-74

Which patients with congestive heart failure may benefit from biventricular pacing?. Galizio, N. O., Pesce, R., Valero, E., Gonzalez, J. L., Favaloro, R. R., Favaloro, L., Perrone, S., Davila, P., and Godoy, M.. *Pacing Clin Electrophysiol* 2003 :158-61

Proportion of candidates for cardiac resynchronization therapy. Erdogan, A., Rueckleben, S., Tillmanns, H. H., and Waldecker, B.. *Pacing Clin Electrophysiol* 2003 :152-4

Echocardiographic modeling of cardiac dyssynchrony before and during multisite stimulation: a prospective study. Cazeau, S., Bordachar, P., Jauvert, G., Lazarus, A., Alonso, C., Vandrell, M. C., Mugica, J., and Ritter, P.. *Pacing Clin Electrophysiol* 2003 :137-43

Effect of biventricular pacing on heart rate variability in patients with chronic heart failure. Livanis, E. G., Flevari, P., Theodorakis, G. N., Kolokathis, F., Leftheriotis, D., and Kremastinos, D. T.. *Eur J Heart Fail* 2003 :175-8

Predictors of left ventricular reverse remodeling after cardiac resynchronization therapy for heart failure secondary to idiopathic dilated or ischemic cardiomyopathy. Yu, C. M., Fung, W. H., Lin, H., Zhang, Q., Sanderson, J. E., and Lau, C. P.. *Am J Cardiol* 2003 :684-8

Biventricular pacing for patients with severe congestive heart failure: a single center experience. Mascioli, G., Curnis, A., Bontempi, L., and Dei Cas, L.. *Ital Heart J* 2002 :598-602

Sequential versus simultaneous biventricular resynchronization for severe heart failure: evaluation by tissue Doppler imaging. Sogaard, P., Egeblad, H., Pedersen, A. K., Kim, W. Y., Kristensen, B. O., Hansen, P. S., and Mortensen, P. T.. *Circulation* 2002 :2078-84

Early and late QRS morphology and width in biventricular pacing: relationship to lead site and electrical remodeling. Ricci, R., Pignatelli, C., Ansalone, G., Jannone, E., Vaccaro, M. V., Denaro, A., Cavaglia, S., and Santini, M.. *J Interv Card Electrophysiol* 2002 :279-85

Interatrial septum pacing avoids the adverse effect of interatrial delay in biventricular pacing: an echo-Doppler evaluation. Porciani, M. C., Sabini, A., Colella, A., Michelucci, A., Musilli, N., Pieragnoli, P., and Padeletti, L.. *Europace* 2002 :317-24

- Ventricular pacing or dual-chamber pacing for sinus-node dysfunction. Lamas, G. A., Lee, K. L., Sweeney, M. O., Silverman, R., Leon, A., Yee, R., Marinchak, R. A., Flaker, G., Schron, E., Orav, E. J., Hellkamp, A. S., Greer, S., McAnulty, J., Ellenbogen, K., Ehlert, F., Freedman, R. A., Estes, N. A. 3rd, Greenspon, A., and Goldman, L.. *N Engl J Med* 2002 :1854-62
- Doppler myocardial imaging to evaluate the effectiveness of pacing sites in patients receiving biventricular pacing. Ansalone, G., Giannantoni, P., Ricci, R., Trambaiolo, P., Fedele, F., and Santini, M.. *J Am Coll Cardiol* 2002 :489-99
- Effect of resynchronization therapy stimulation site on the systolic function of heart failure patients. Butter, C., Auricchio, A., Stellbrink, C., Fleck, E., Ding, J., Yu, Y., Huvelle, E., and Spinelli, J.. *Circulation* 2001 :3026-9
- Doppler myocardial imaging in patients with heart failure receiving biventricular pacing treatment. Ansalone, G., Giannantoni, P., Ricci, R., Trambaiolo, P., Laurenti, A., Fedele, F., and Santini, M.. *Am Heart J* 2001 :881-96
- Comparison of chronic biventricular pacing between epicardial and endocardial left ventricular stimulation using Doppler tissue imaging in patients with heart failure. Garrigue, S., Jais, P., Espil, G., Labeque, J. N., Hocini, M., Shah, D. C., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2001 :858-62
- Prevalence of potential candidates for biventricular pacing among patients with known coronary artery disease: a prospective registry from a single center. De Sutter, J., De Bondt, P., Van de Wiele, C., Fonteyne, W., Dierckx, R., Clement, D., and Tavernier, R.. *Pacing Clin Electrophysiol* 2000 :1718-21
- Reduction of hospital days by biventricular pacing. Braunschweig, F., Linde, C., Gadler, F., and Ryden, L.. *Eur J Heart Fail* 2000 :399-406
- Potential benefit of biventricular pacing in patients with congestive heart failure and ventricular tachyarrhythmia. Stellbrink, C., Auricchio, A., Diem, B., Breithardt, O. A., Kloss, M., Schondube, F. A., Klein, H., Messmer, B. J., and Hanrath, P.. *Am J Cardiol* 99 :143D-150D
- Acute effects of intraoperative multisite ventricular pacing on left ventricular function and activation/contraction sequence in patients with depressed ventricular function. Saxon, L. A., Kerwin, W. F., Cahalan, M. K., Kalman, J. M., Olgin, J. E., Foster, E., Schiller, N. B., Shinbane, J. S., Lesh, M. D., and Merrick, S. H.. *J Cardiovasc Electrophysiol* 98 :13-21
- Acute hemodynamic improvement by pacing in patients with severe congestive heart failure. Auricchio, A. and Salo, R. W.. *Pacing Clin Electrophysiol* 97 :313-24
- Multisite pacing for end-stage heart failure: early experience. Cazeau, S., Ritter, P., Lazarus, A., Gras, D., Backdach, H., Mundler, O., and Mugica, J.. *Pacing Clin Electrophysiol* 96 :1748-57
- Mechanism of hemodynamic improvement by dual-chamber pacing for severe left ventricular dysfunction: an acute Doppler and catheterization hemodynamic study. Nishimura, R. A., Hayes, D. L., Holmes, D. R. Jr, and Tajik, A. J.. *J Am Coll Cardiol* 95 :281-8
- Cardiac resynchronization therapy in adult patients with repaired tetralogy of fallot and left ventricular systolic dysfunction. Merchant, F. M., Kella, D., Book, W. M., Langberg, J. J., and Lloyd, M. S.. *PACE Pacing Clin. Electrophysiol.* 2014 :321-328
- The effects of cardiac resynchronization treatment on autonomic functions aside from functional status in heart failure: Kardiyak resenkronizasyon tedavisinin otonom sistem uzerine fonksiyonel kapasite otesinde etkileri. Arslan, U., Balci, M. M., Kocaoglu, I., Cimen, T., Kalayci, S., and Temizhan, A.. *Anadolu Kardiyoloji Derg.* 2013 :439-445
- Utility of cardiac magnetic resonance imaging, echocardiography and electrocardiography for the prediction of clinical response and long-term survival following cardiac resynchronisation therapy. Ellims, A. H., Pfluger, H., Elsik, M., Butler, M. J., Hare, J. L., and Taylor, A. J.. *Int. J. Card. Imaging* 2013 :1303-1311
- Comparison of the Effects of Cardiac Resynchronization Therapy in Patients With Class II vs Class III and IV Heart Failure (From the InSync/InSync ICD Italian Registry). Harris, S., Tepper, D., and Ip, R.. *Congestive Heart Fail.* 2013 :
- Benefits of cardiac resynchronization therapy in "Very dilated cardiomyopathy": Beneficios da terapeutica de ressincronizacao cardiaca na <miocardiopatia muito dilatada>. Lousinha, A., Oliveira, M. M., Feliciano, J., Galrinho, A., Branco, L. M., Cunha, P. S., Hamad, H., Ramos, R., Abreu, J., Leal, A., Santos, S., Soares, R., Da Silva, M. N., and Ferreira, R. C.. *Rev. Port. Cardiol.* 2011 :283-294
- Infection after implantation of pulsatile mechanical circulatory support devices. Holman, W. L., Kirklin, J. K., Naftel, D. C., Kormos, R. L., Desvign-Nickens, P., Camacho, M. T., and Ascheim, D. D.. *J. Thorac. Cardiovasc. Surg.* 2010 :1632-1636.e2
- Cardiac resynchronization therapy device implantation in patients with therapeutic international normalized ratios. Ghanbari, H., Feldman, D., Schmidt, M., Ottino, J., MacHado, C., Akoum, N., Wall, T. S., and Daccarett, M.. *PACE Pacing Clin. Electrophysiol.* 2010 :400-406
- Right bundle branch block and impaired left ventricular function as evidence of a left ventricular conduction delay. Takamatsu, H., Tada, H., Okaniwa, H., Toide, H., Maruyama, H., Higuchi, R., Kaseno, K., Naito, S., Kurabayashi, M., Oshima, S., and Taniguchi, K.. *Circ. J.* 2008 :120-126
- Resynchronization therapy in patients with narrow QRS (RethinQ). Beshai, J. F. and Truong, Q.. *ACC Cardiosource Rev. J.* 2008 :44
- Comparison of the Effects of Cardiac Resynchronization Therapy in Patients With Class II Versus Class III and IV Heart Failure (from the InSync/InSync ICD Italian

Registry)(dagger)(dagger)Conflicts of interest:

Landolina, M., Lunati, M., Gasparini, M., Santini, M., Padeletti, L., Achilli, A., Bianchi, S., Laurenzi, F., Curnis, A., Vincenti, A., Valsecchi, S., and Denaro, A.. *Am. J. Cardiol.* 2007 :1007-1012

Left ventricular resynchronization predicted by individual performance of right and left univentricular pacing: A study on the impact of sequential biventricular pacing on ventricular dyssynchrony. Phillips, K. P., Harberts, D. B., Johnston, L. P., and O'Donnell, D.. *Heart Rhythm* 2007 :147-153

Cardiac resynchronisation therapy: An option for inotrope-supported patients with end-stage heart failure?. Cowburn, P. J., Patel, H., Jolliffe, R. E., Wald, R. W., and Parker, J. D.. *Eur. J. Heart Fail.* 2005 :215-217

The Bad Oeynhausen experience. Vogt, J., Lamp, B., Hansky, B., Heintze, J., Faber, L., Guldner, H., Korfer, R., and Horstkotte, D.. *Eur. Heart J. Suppl.* 2004 :D122-D127

Clinical Characteristics and Long-term Prognosis in Patients with Chronic Heart Failure and Reduced Ejection Fraction in China. Liu X., Yu H., Pei J., Chu J., Pu J., and Zhang S.. *Heart Lung Circul.* 2014 :

Association between prophylactic implantable cardioverter-defibrillators and survival in patients with left ventricular ejection fraction between 30% and 35%. Al-Khatib, S. M., Hellkamp, A. S., Fonarow, G. C., Mark, D. B., Curtis, L. H., Hernandez, A. F., Anstrom, K. J., Peterson, E. D., Sanders, G. D., Al-Khalidi, H. R., Hammill, B. G., Heidenreich, P. A., and Hammill, S. C.. *JAMA* 2014 :2209-15

Systolic heart failure and cardiac resynchronization therapy: a focus on diastole. Facchini, E., Varalda, M., Sartori, C., Burkhoff, D., and Marino, P. N.. *Int J Cardiovasc Imaging* 2014 :897-905

Probability and magnitude of response to cardiac resynchronization therapy according to QRS duration and gender in nonischemic cardiomyopathy and LBBB. Varma, N., Manne, M., Nguyen, D., He, J., Niebauer, M., and Tchou, P.. *Heart Rhythm* 2014 :1139-47

Metabolomic does not predict response to cardiac resynchronization therapy in patients with heart failure. Padeletti, L., Modesti, P. A., Carlei, S., Checchi, L., Ricciardi, G., Pieragnolia, P., Sacchi, S., Padeletti, M., Alterini, B., Pantaleo, P., Hu, X., Tenori, L., and Luchinat, C.. *J Cardiovasc Med (Hagerstown)* 2014 :295-300

Comparison of the relation between left ventricular anatomy and QRS duration in patients with cardiomyopathy with versus without left bundle branch block. Chan, D. D., Wu, K. C., Loring, Z., Galeotti, L., Gerstenblith, G., Tomaselli, G., Weiss, R. G., Wagner, G. S., and Strauss, D. G.. *Am J Cardiol* 2014 :1717-22

Patient-assessed short-term positive response to cardiac resynchronization therapy is an independent predictor of long-term mortality. Reitan, C., Bakos, Z., Platonov, P. G., Hoijer, C. J., Brandt, J., Wang, L., and Borgquist, R.. *Europace* 2014 :

Determination of the longest inpatient left ventricular electrical delay may predict acute hemodynamic improvement in patients after cardiac resynchronization therapy. Zanon, F., Baracca, E., Pastore, G., Fraccaro, C., Roncon, L., Aggio, S., Noventa, F., Mazza, A., and Prinzen, F.. *Circ Arrhythm Electrophysiol* 2014 :377-83

Device-measured physical activity versus six-minute walk test as a predictor of reverse remodeling and outcome after cardiac resynchronization therapy for heart failure. Vegh, E. M., Kandala, J., Orencole, M., Upadhyay, G. A., Sharma, A., Miller, A., Merkely, B., Parks, K. A., and Singh, J. P.. *Am J Cardiol* 2014 :1523-8

Predictors and outcomes of "super-response" to cardiac resynchronization therapy. Killu, A. M., Grupper, A., Friedman, P. A., Powell, B. D., Asirvatham, S. J., Espinosa, R. E., Luria, D., Rozen, G., Buber, J., Lee, Y. H., Webster, T., Brooke, K. L., Hodge, D. O., Wiste, H. J., Glikson, M., and Cha, Y. M.. *J Card Fail* 2014 :379-86

A metric for evaluating the cardiac response to resynchronization therapy. Ge, Y., Ruwald, A. C., Kutyla, V., McNitt, S., Polonsky, S., Klein, H., Goldenberg, I., Solomon, S. D., Foster, E., Zareba, W., and Moss, A. J.. *Am J Cardiol* 2014 :1371-7

Smoking is associated with an increased risk of first and recurrent ventricular tachyarrhythmias in ischemic and nonischemic patients with mild heart failure: a MADIT-CRT substudy. Plank, B., Kutyla, V., Moss, A. J., Huang, D. T., Ruwald, A. C., McNitt, S., Polonsky, B., Zareba, W., Goldenberg, I., and Aktas, M. K.. *Heart Rhythm* 2014 :822-7

Cardiac resynchronization therapy is associated with reductions in left atrial volume and inappropriate implantable cardioverter-defibrillator therapy in MADIT-CRT. Slyngstad, T., Huth Ruwald, A. C., Kutyla, V., McNitt, S., Polonsky, B., Solomon, S. D., Foster, E., Goldenberg, I., Wang, P. J., Klein, H., Zareba, W., and Moss, A. J.. *Heart Rhythm* 2014 :1001-7

Survival in octogenarians undergoing cardiac resynchronization therapy compared to the general population. Rickard, J., Cheng, A., Spragg, D., Green, A., Leff, B., Tang, W., Cantillon, D., Baranowski, B., Wilkoff, B. L., and Tchou, P.. *Pacing Clin Electrophysiol* 2014 :740-4

Long-term prognostic impact of therapeutic strategies in patients with idiopathic dilated cardiomyopathy: changing mortality over the last 30 years. Merlo, M., Pivetta, A., Pinamonti, B., Stolfo, D., Zecchin, M., Barbati, G., Di Lenarda, A., and Sinagra, G.. *Eur J Heart Fail* 2014 :317-24

Left ventricular ejection fraction overcrossing 35% after one year of cardiac resynchronization therapy predicts long term survival and freedom from sudden cardiac death: single center observational experience. Frigerio, M., Lunati, M., Pasqualucci, D., Vargiu, S., Foti, G., Pedretti, S., Vittori, C., Cattafi, G., Magenta, G., Campo, C., Bisetti, S., and Mercuro, G.. *Int J Cardiol* 2014 :64-71

The effect of weight loss on clinical outcomes in patients implanted with a cardiac resynchronization therapy device-A MADIT-CRT substudy. Aktas, M. K., Zareba, W., Huang, D. T., McNitt, S., Polonsky, S., Chen, L., Stockburger, M., Merkely, B., Moss, A. J., and Kutyla, V.. *J Card Fail* 2014 :183-9

Cardiac implantable electronic device infections: incidence, risk factors, and the effect of the AegisRx antibacterial envelope. Mittal, S., Shaw, R. E., Michel, K., Palekar, R., Arshad, A., Musat, D., Preminger, M., Sichrovsky, T., and Steinberg, J. S.. *Heart Rhythm* 2014 :595-601

The effect of intermittent atrial tachyarrhythmia on heart failure or death in cardiac resynchronization therapy with defibrillator versus implantable cardioverter-defibrillator patients: a MADIT-CRT substudy (Multicenter Automatic Defibrillator Implantation Trial With Cardiac Resynchronization Therapy). Ruwald, A. C., Pietrasik, G., Goldenberg, I., Kutyla, V., Daubert, J. P., Ruwald, M. H., Jons, C., McNitt, S., Wang, P., Zareba, W., and Moss, A. J.. *J Am Coll Cardiol* 2014 :1190-7

Remote past left ventricular function before chronic right ventricular pacing predicts responses to cardiac resynchronization therapy upgrade. Chang, P. C., Wo, H. T., Chen, T. H., Wu, D., Lin, F. C., and Wang, C. C.. *Pacing Clin Electrophysiol* 2014 :454-63

Impact of cardiac resynchronization therapy on hospitalizations in the resynchronization-defibrillation for ambulatory heart failure trial. Gillis, A. M., Kerr, C. R., Philippon, F., Newton, G., Talajic, M., Froeschl, M., Froeschl, S., Swiggum, E., Yetisir, E., Wells, G. A., and Tang, A. S.. *Circulation* 2014 :2021-30

Prognosis and response to therapy of first inpatient and outpatient heart failure event in a heart failure clinical trial: MADIT-CRT. Skali, H., Dwyer, E. M., Goldstein, R., Haigney, M., Krone, R., Kukin, M., Lichstein, E., McNitt, S., Moss, A. J., Pfeffer, M. A., and Solomon, S. D.. *European journal of heart failure* 2014 :560-5

Address remodeling outcomes but response definition not within range of LVESV $\geq$ 10%, LVEDV $\geq$ 10% or EF $\geq$ 5%

Electrical remodeling and cardiac dimensions in patients treated by cardiac resynchronization and heart failure controls. Stockburger, M., Nitardy, A., Fateh-Moghadam, S., Krebs, A., Celebi, O., Karhausen, T., and Dietz, R.. *Pacing Clin Electrophysiol* 2008 :70-7

Baseline Doppler parameters are useful predictors of chronic left ventricular reduction in size by cardiac resynchronization therapy. Stockburger, M., Fateh-Moghadam, S., Nitardy, A., Celebi, O., Krebs, A., Habedank, D., and Dietz, R.. *Europace* 2008 :69-74

Relation of optimal lead positioning as defined by three-dimensional echocardiography to long-term benefit of cardiac resynchronization. Becker, M., Hoffmann, R., Schmitz, F., Hundemer, A., Kuhl, H., Schauerte, P., Kelm, M., and Franke, A.. *Am J Cardiol* 2007 :1671-6

Relation of isovolumic times after cardiac resynchronization therapy to improvement in exercise capacity. Jansen, A. H., Peels, K. H., Bracke, F., van Dantzig, J. M., Meijer, A., van der Voort, P. H., van Gelder, B., Korsten, H. H., and van Hemel, N. M.. *Am J Cardiol* 2007 :75-8

Prognostic value of brain natriuretic peptide in the management of patients receiving cardiac resynchronization therapy. Pitzalis, M. V., Iacoviello, M., Di Serio, F., Romito, R., Guida, P., De Tommasi, E., Luzzi, G., Anacletio, M., Varraso, L., Forleo, C., and Pansini, N.. *Eur J Heart Fail* 2006 :509-14

Resynchronization of mitral valve annular segments reduces functional mitral regurgitation in cardiac resynchronization therapy. Macioce, R., Cappelli, F., Demarchi, G., Lilli, A., Ricciardi, G., Pieragnoli, P., Colella, A., Michelucci, A., Porciani, M. C., and Padeletti, L.. *Minerva Cardioangiol* 2005 :329-33

Effects of cardiac resynchronization therapy on disease progression in patients with congestive heart failure. Bonanno, C., Ometto, R., Pasinato, S., Finocchi, G., La Vecchia, L., and Fontanelli, A.. *Ital Heart J* 2004 :364-70

Stroke work or systolic dP/dtmax to evaluate acute response to cardiac resynchronization therapy: are they interchangeable?. De Roest, G., Knaapen, P., Gotte, M., Hendriks, T., Allaart, C., De Cock, C., and Van Rossum, A.. *Eur. J. Heart Fail.* 2009 :706-708

Study addresses predictor questions but does not adjust via model or participant selection for at least 2 predictor of Gender, QRS Duration and/or Morphology

Cardiac resynchronization therapy restored ventricular septal myocardial perfusion and enhanced ventricular remodeling in patients with nonischemic cardiomyopathy presenting with left bundle branch block. Ogano, M., Iwasaki, Y. K., Tanabe, J., Takagi, H., Umemoto, T., Hayashi, M., Miyauchi, Y., and Shimizu, W.. *Heart Rhythm* 2014 :

Remote Past Left Ventricular Function before Chronic Right Ventricular Pacing Predicts Responses to Cardiac Resynchronization Therapy Upgrade. Chang, P. C., Wo, H.

T., Chen, T. H., Wu, D., Lin, F. C., and Wang, C. C.. *Pacing Clin Electrophysiol* 2013 :

Left ventricular 12 segmental strain imaging predicts response to cardiac resynchronization therapy. Dong, Y. X., Oh, J. K., Yang, Y. Z., and Cha, Y. M.. *Chin Med J (Engl)* 2013 :2620-4

Indexed maximal left atrial volume predicts response to cardiac resynchronization therapy. Rossi, L., Malagoli, A., Piepoli, M., Franchi, F., Malavasi, V., Casali, E., Rusticali, G., and Villani, G. Q.. *Int J Cardiol* 2013 :3629-33

Right ventricular function is a determinant of long-term survival after cardiac resynchronization therapy. Sade, L. E., Ozin, B., Atar, I., Demir, O., Demirtas, S., and Muderrisoglu, H.. *J Am Soc Echocardiogr* 2013 :706-13

Usefulness of overlapping of the E and A waves of the transmitral flow as a predictor of responders to cardiac resynchronization therapy. Minamiguchi, H., Sakata, Y., Ohtani, T., Mizote, I., Takeda, Y., Mizuno, H., Okuyama, Y., Nakatani, S., Fujita, M., Watanabe, T., Uematsu, M., and Komuro, I.. *Am J Cardiol* 2013 :1613-8

Acute effects of withdrawal of cardiac resynchronization therapy on left and right ventricular function, dyssynchrony, and contractile function in patients with New York Heart Association functional class I/II heart failure: MADIT-CRT. Knappe, D., Pouleur, A. C., Shah, A. M., Bourgoun, M., Brown, M. W., Foster, E., Pfeiffer, M. A., Moss, A. J., and Solomon, S. D.. *J Card Fail* 2013 :149-55

Pre- and intra-procedural predictors of reverse remodeling after cardiac resynchronization therapy: an MRI study. Cochet, H., Denis, A., Ploux, S., Lumens, J., Amraoui, S., Derval, N., Sacher, F., Reant, P., Lafitte, S., Jais, P., Laurent, F., Ritter, P., Montaudon, M., and Bordachar, P.. *J Cardiovasc Electrophysiol* 2013 :682-91

Radial strain delay based on segmental timing and strain amplitude predicts left ventricular reverse remodeling and survival after cardiac resynchronization therapy. Kydd, A. C., Khan, F. Z., O'Halloran, D., Pugh, P. J., Virdee, M. S., and Dutka, D. P.. *Circ Cardiovasc Imaging* 2013 :177-84

Impact of clinical and echocardiographic response to cardiac resynchronization therapy on long-term survival. Bertini, M., Hoke, U., van Bommel, R. J., Ng, A. C., Shanks, M., Nucifora, G., Auger, D., Borleffs, C. J., van Rijnsoever, E. P., van Erven, L., Schalij, M. J., Marsan, N. A., Bax, J. J., and Delgado, V.. *Eur Heart J Cardiovasc Imaging* 2013 :774-81

The effect of cardiac resynchronization therapy on left ventricular diastolic function assessed with speckle-tracking echocardiography. Shanks, M., Antoni, M. L., Hoke, U., Bertini, M., Ng, A. C., Auger, D., Marsan, N. A., van Erven, L., Holman, E. R., Schalij, M. J., Bax, J. J., and Delgado, V.. *Eur J Heart Fail* 2011 :1133-9

Cardiac resynchronization therapy reduces the risk of cardiac events in patients with diabetes enrolled in the multicenter automatic defibrillator implantation trial with cardiac resynchronization therapy (MADIT-CRT). Martin,

D. T., McNitt, S., Nesto, R. W., Rutter, M. K., and Moss, A. J.. *Circ Heart Fail* 2011 :332-8

Prognostic importance of natriuretic peptides and atrial fibrillation in patients receiving cardiac resynchronization therapy. Smit, M. D., Maass, A. H., Hillege, H. L., Wiesfeld, A. C., Van Veldhuisen, D. J., and Van Gelder, I. C.. *Eur J Heart Fail* 2011 :543-50

Influence of aetiology on long-term effects of resynchronization on cardiac structure and function in patients treated with beta-blockers. Zaca, V., Baiocchi, C., Gaddi, R., Gentilini, R., Lunghetti, S., Padeletti, M., Pagliaro, A., Furiozzi, F., Mondillo, S., and Favilli, R.. *J Cardiovasc Med (Hagerstown)* 2011 :227-33

Differential outcome of cardiac resynchronization therapy in ischemic cardiomyopathy and idiopathic dilated cardiomyopathy. McLeod, C. J., Shen, W. K., Rea, R. F., Friedman, P. A., Hayes, D. L., Wokhlu, A., Webster, T. L., Wiste, H. J., Hodge, D. O., Bradley, D. J., Hammill, S. C., Packer, D. L., and Cha, Y. M.. *Heart Rhythm* 2011 :377-82

Effect of cardiac resynchronization therapy in patients with New York Heart Association functional class IV heart failure. van Bommel, R. J., van Rijnsoever, E., Borleffs, C. J., Delgado, V., Marsan, N. A., Bertini, M., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2010 :1146-51

Presence of left ventricular contractile reserve predicts midterm response to cardiac resynchronization therapy--results from the LOW dose DObutamine stress-echo test in Cardiac Resynchronization Therapy (LODO-CRT) trial. Muto, C., Gasparini, M., Neja, C. P., Iacopino, S., Davinelli, M., Zanon, F., Dicandia, C., Distefano, G., Donati, R., Calvi, V., Denaro, A., and Tuccillo, B.. *Heart Rhythm* 2010 :1600-5

A left hemiblock improves cardiac resynchronization therapy outcomes in patients with a right bundle branch block. Chandra, R., Zolty, R., and Palma, E.. *Clin Cardiol* 2010 :89-93

Cardiac resynchronization therapy--clinical and echocardiographic characteristics of responders and exceptional responders. Galrinho, A., Branco, L. M., Oliveira, M. M., Da Silva, N., Abreu, J., Santos, S., Leal, A., and Ferreira, R. C.. *Rev Port Cardiol* 2009 :959-69

Value of right ventricular-left ventricular interlead electrical delay to predict reverse remodelling in cardiac resynchronization therapy: the INTER-V pilot study. Sassone, B., Gabrieli, L., Sacca, S., Boggian, G., Fusco, A., Pratola, C., Bacchi-Reggiani, M. L., Padeletti, L., and Barold, S. S.. *Europace* 2010 :78-83

Cardiac resynchronization therapy in patients with right ventricular pacing-induced cardiomyopathy. Nazeri, A., Massumi, A., Rasekh, A., Saeed, M., Frank, C., and Razavi, M.. *Pacing Clin Electrophysiol* 2010 :37-40

Prediction of response to cardiac resynchronization therapy using simple electrocardiographic and echocardiographic tools. Bonakdar, H. R., Jorat, M. V., Fazelifar, A. F.,

Alizadeh, A., Givtaj, N., Sameie, N., Sadeghpour, A., and Haghjoo, M.. *Europace* 2009 :1330-7

Characteristics of heart failure patients associated with good and poor response to cardiac resynchronization therapy: a PROSPECT (Predictors of Response to CRT) sub-analysis. van Bommel, R. J., Bax, J. J., Abraham, W. T., Chung, E. S., Pires, L. A., Tavazzi, L., Zimetbaum, P. J., Gerritse, B., Kristiansen, N., and Ghio, S.. *Eur Heart J* 2009 :2470-7

Different response rates to cardiac resynchronization therapy (CRT) according to the applied definition. Wilinski, J., Czarnecka, D., Wojciechowska, W., Kloch-Badelek, M., Jastrzebski, M., Baciur, B., Kwiecien-Sobstel, A., and Kawecka-Jaszcz, K.. *Przegl Lek* 2009 :130-3

Assessment of intraventricular mechanical dyssynchrony and prediction of response to cardiac resynchronization therapy: comparison between tissue Doppler imaging and real-time three-dimensional echocardiography. Kleijn, S. A., van Dijk, J., de Cock, C. C., Allaart, C. P., van Rossum, A. C., and Kamp, O.. *J Am Soc Echocardiogr* 2009 :1047-54

Longitudinal two-dimensional strain rate imaging: a potential approach to predict the response to cardiac resynchronization therapy. Shi, H., Shu, X., Wang, F., Cui, J., Chen, H., Sun, B., and Liu, S.. *Int J Cardiovasc Imaging* 2009 :677-87

Development and validation of a clinical index to predict survival after cardiac resynchronisation therapy. Leyva, F., Foley, P. W., Stegeman, B., Ward, J. A., Ng, L. L., Frenneaux, M. P., Regoli, F., Smith, R. E., and Auricchio, A.. *Heart* 2009 :1619-25

Improvement of P wave dispersion after cardiac resynchronization therapy for heart failure. Ding, L., Hua, W., Zhang, S., Chu, J., Chen, K., Wang, F., and Chen, X.. *J Electrocardiol* 2009 :334-8

Changes in global left ventricular function by multidirectional strain assessment in heart failure patients undergoing cardiac resynchronization therapy. Delgado, V., Ypenburg, C., Zhang, Q., Mollema, S. A., Fung, J. W., Schalij, M. J., Yu, C. M., and Bax, J. J.. *J Am Soc Echocardiogr* 2009 :688-94

Usefulness of left ventricular systolic dyssynchrony by real-time three-dimensional echocardiography to predict long-term response to cardiac resynchronization therapy. Soliman, O. I., Geleijnse, M. L., Theuns, D. A., van Dalen, B. M., Vletter, W. B., Jordaens, L. J., Metawe, A. K., Al-Amin, A. M., and ten Cate, F. J.. *Am J Cardiol* 2009 :1586-91

Long-term effects of upgrading from right ventricular pacing to cardiac resynchronization therapy in patients with heart failure. Foley, P. W., Muhyaldeen, S. A., Chalil, S., Smith, R. E., Sanderson, J. E., and Leyva, F.. *Europace* 2009 :495-501

Patients with non-ischaemic dilated cardiomyopathy and hyper-responders to cardiac resynchronization therapy: characteristics and long-term evolution. Castellant, P.,

Fatemi, M., Orhan, E., Etienne, Y., and Blanc, J. J.. *Europace* 2009 :350-5

Importance of heart rate during exercise for response to cardiac resynchronization therapy. Maass, A. H., Buck, S., Nieuwland, W., Bruggemann, J., van Veldhuisen, D. J., and Van Gelder, I. C.. *J Cardiovasc Electrophysiol* 2009 :773-80

Relationship of reverse anatomical remodeling and ventricular arrhythmias after cardiac resynchronization. Markowitz, S. M., Lewen, J. M., Wiggernhorn, C. J., Abraham, W. T., Stein, K. M., Iwai, S., and Lerman, B. B.. *J Cardiovasc Electrophysiol* 2009 :293-8

Effect of cardiac resynchronization therapy on mean platelet volume. Alper, A. T., Akyol, A., Hasdemir, H., Yildirim, A., Nurkalem, Z., Guvenc, T. S., Cakmak, N., Oguz, E., Erdinler, I. C., and Gurkan, K.. *Acta Cardiol* 2008 :735-9

Cardiac resynchronization therapy evaluated by myocardial scintigraphy with ^{99m}Tc-MIBI: changes in left ventricular uptake, dyssynchrony, and function. Brandao, S. C., Nishioka, S. A., Giorgi, M. C., Chen, J., Abe, R., Martinelli Filho, M., Hotta, V. T., Vieira, M. L., Garcia, E. V., and Meneghetti, J. C.. *Eur J Nucl Med Mol Imaging* 2009 :986-96

Six-minute walking test predicts long-term cardiac death in patients who received cardiac resynchronization therapy. Castel, M. A., Mendez, F., Tamborero, D., Mont, L., Magnani, S., Tolosana, J. M., Berrueto, A., Godoy, M., Sitges, M., Vidal, B., Roig, E., and Brugada, J.. *Europace* 2009 :338-42

Validation of an echocardiographic multiparametric strategy to increase responders patients after cardiac resynchronization: a multicentre study. Lafitte, S., Reant, P., Zaroui, A., Donal, E., Mignot, A., Bougied, H., Belghiti, H., Bordachar, P., Deplagne, A., Chabaneix, J., Franceschi, F., Deharo, J. C., Dos Santos, P., Clementy, J., Roudaut, R., Leclercq, C., and Habib, G.. *Eur Heart J* 2009 :2880-7

Change in blood pressure just after initiation of cardiac resynchronization therapy predicts long-term clinical outcome in patients with advanced heart failure. Tanaka, Y., Tada, H., Yamashita, E., Sato, C., Irie, T., Hori, Y., Goto, K., Iwamoto, J., Manni, H., Yokokawa, M., Naito, S., Oshima, S., and Taniguchi, K.. *Circ J* 2009 :288-94

Gender- and age-related outcomes of cardiac resynchronization therapy: a pilot observational study. Kelarijani, R. B., Saleh, D. K., Chalian, M., Kabir, A., Ahmadzad Asl, M., and Dadjoo, Y.. *Gend Med* 2008 :415-22

Echo Doppler parameters predict response to cardiac resynchronization therapy. Wiesbauer, F., Baytaroglu, C., Azar, D., Blessberger, H., Goliasch, G., Graf, S., Mundigler, G., Pacher, R., Maurer, G., and Binder, T.. *Eur J Clin Invest* 2009 :1-10

Influence of the preimplantation QRS axis on responses to cardiac resynchronization therapy. Garcia-Seara, J., Martinez-Sande, J. L., Cid, B., Gude, F., Bastos, M.,

Dominguez, M., Varela, A., and Gonzalez-Juanatey, J. R.. *Rev Esp Cardiol* 2008 :1245-52

Electrical storm in patients with biventricular implantable cardioverter defibrillator: incidence, predictors, and prognostic implications. Gasparini, M., Lunati, M., Landolina, M., Santini, M., Padeletti, L., Perego, G., Vincenti, A., Curnis, A., Carboni, A., Denaro, A., Spotti, A., Grammatico, A., Regoli, F., and Boriani, G.. *Am Heart J* 2008 :847-54

Effect of left ventricular lead concordance to the delayed contraction segment on echocardiographic and clinical outcomes after cardiac resynchronization therapy. Fung, J. W., Lam, Y. Y., Zhang, Q., Yip, G. W., Chan, W. G., Chan, G. C., Chan, J. Y., and Yu, C. M.. *J Cardiovasc Electrophysiol* 2009 :530-5

Sleep apnoea as a predictor of mid- and long-term outcome in patients undergoing cardiac resynchronization therapy. Sredniawa, B., Lenarczyk, R., Kowalski, O., Pruszkowska-Skrzep, P., Kowalczyk, J., Musialik-Lydk, A., Cebula, S., and Kalarus, Z.. *Europace* 2009 :106-14

Toward understanding response to cardiac resynchronization therapy: left ventricular dyssynchrony is only one of multiple mechanisms. Parsai, C., Bijmens, B., Sutherland, G. R., Baltabaeva, A., Claus, P., Marciniak, M., Paul, V., Scheffer, M., Donal, E., Derumeaux, G., and Anderson, L.. *Eur Heart J* 2009 :940-9

Exercise stress echocardiography is superior to rest echocardiography in predicting left ventricular reverse remodelling and functional improvement after cardiac resynchronization therapy. Rocchi, G., Bertini, M., Biffi, M., Ziacchi, M., Biagini, E., Gallelli, I., Martignani, C., Cervi, E., Ferlito, M., Rapezzi, C., Branzi, A., and Boriani, G.. *Eur Heart J* 2009 :89-97

Effects of cardiac resynchronization therapy on health-related quality of life in older adults with heart failure. Hoth, K. F., Nash, J., Poppas, A., Ellison, K. E., Paul, R. H., and Cohen, R. A.. *Clin Interv Aging* 2008 :553-60

Relationship between New York Heart Association class change and ventricular tachyarrhythmia occurrence in patients treated with cardiac resynchronization plus defibrillator. Lepillier, A., Piot, O., Gerritse, B., Copie, X., Laverigne, T., Paziaud, O., Lascault, G., Waintraub, X., Otmani, A., and Le Heuzey, J. Y.. *Europace* 2009 :80-5

Insulin-treated type 2 diabetes is associated with a decreased survival in heart failure patients after cardiac resynchronization therapy. Mangiacavalli, M., Gasparini, M., Genovese, S., Pini, D., Klersy, C., Bragato, R., Andreuzzi, B., Municino, A., Regoli, F., Galimberti, P., Ceriotti, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2008 :1425-32

Preservation of renal function in response to cardiac resynchronization therapy. Kimura, S., Ito, M., Chinushi, M., Tanaka, K., Tanabe, Y., Hosaka, Y., Komura, S., Okada, S., Iijima, K., Furushima, H., Fuse, K., Sato, M., and Aizawa, Y.. *Circ J* 2008 :1794-9

Heart rate variability monitored by the implanted device predicts response to CRT and long-term clinical outcome in patients with advanced heart failure. Landolina, M., Gasparini, M., Lunati, M., Santini, M., Rordorf, R., Vincenti, A., Diotallevi, P., Montenero, A. S., Bonanno, C., De Santo, T., Valsecchi, S., and Padeletti, L.. *Eur J Heart Fail* 2008 :1073-9

Hemodynamics and prognosis after primary cardiac resynchronization system implantation compared to "upgrade" procedures. Nagele, H., Dodeck, J., Behrens, S., Azizi, M., Hashagen, S., Eisermann, C., and Castel, M. A.. *Pacing Clin Electrophysiol* 2008 :1265-71

Association of corrected QT dispersion with symptoms improvement in patients receiving cardiac resynchronization therapy. Hina, K., Kawamura, H., Murakami, T., Yamamoto, K., Yamaji, H., Murakami, M., Hirohata, S., Ogawa, H., Sakane, K., and Kusachi, S.. *Heart Vessels* 2008 :325-33

The impact of myocardial viability on the clinical outcome of cardiac resynchronization therapy. Riedlbauchova, L., Brunken, R., Jaber, W. A., Popova, L., Patel, D., Lanska, V., Civello, K., Cummings, J., Burkhardt, J. D., Saliba, W., Martin, D., Schweikert, R., Wilkoff, B. L., Grimm, R., and Natale, A.. *J Cardiovasc Electrophysiol* 2009 :50-7

Real-time three-dimensional echocardiography as a novel approach to assess left ventricular and left atrium reverse remodeling and to predict response to cardiac resynchronization therapy. Marsan, N. A., Bleeker, G. B., Ypenburg, C., Van Bommel, R. J., Ghio, S., Van de Veire, N. R., Delgado, V., Holman, E. R., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Heart Rhythm* 2008 :1257-64

Myocardial collagen metabolism in failing hearts before and during cardiac resynchronization therapy. Umar, S., Bax, J. J., Klok, M., van Bommel, R. J., Hessel, M. H., den Adel, B., Bleeker, G. B., Henneman, M. M., Atsma, D. E., van der Wall, E. E., Schalij, M. J., and van der Laarse, A.. *Eur J Heart Fail* 2008 :878-83

The magnitude of reverse remodelling irrespective of aetiology predicts outcome of heart failure patients treated with cardiac resynchronization therapy. Di Biase, L., Auricchio, A., Sorgente, A., Civello, K., Klersy, C., Faletra, F., Riedlbauchova, L., Patel, D., Arruda, M., Schweikert, R. A., Martin, D. O., Saliba, W. I., Moccetti, T., Wilkoff, B. L., and Natale, A.. *Eur Heart J* 2008 :2497-505

Mechanical discoordination rather than dyssynchrony predicts reverse remodeling upon cardiac resynchronization. Kirn, B., Jansen, A., Bracke, F., van Gelder, B., Arts, T., and Prinzen, F. W.. *Am J Physiol Heart Circ Physiol* 2008 :H640-6

Benefit of cardiac resynchronization therapy in atrial fibrillation patients vs. patients in sinus rhythm: the role of atrioventricular junction ablation. Ferreira, A. M., Adragao, P., Cavaco, D. M., Candeias, R., Morgado, F. B., Santos, K. R., Santos, E., and Silva, J. A.. *Europace* 2008 :809-15

Impact of cardiac resynchronisation therapy on adaptation of circulatory and respiratory systems to exercise assessed

by cardiopulmonary exercise test in patients with chronic heart failure. Chwyczko, T., Sterlinski, M., Maciag, A., Firek, B., Labecka, A., Jankowska, A., Kosmicki, M., Kowalik, I., Malczewska, B., and Szwed, H.. *Kardiologia Polska* 2008 :406-12; discussion 413-4

Over-time mitral regurgitation changes following cardiac resynchronization therapy. Kelarijani, R. B., Dadjoo, Y., Chalian, H., Naserbakht, M., Kabir, K., and Saleh, D. K.. *Adv Med Sci* 2008 :94-8

Results of the Predictors of Response to CRT (PROSPECT) trial. Chung, E. S., Leon, A. R., Tavazzi, L., Sun, J. P., Nihoyannopoulos, P., Merlino, J., Abraham, W. T., Ghio, S., Leclercq, C., Bax, J. J., Yu, C. M., Gorcsan, J. 3rd, St John Sutton, M., De Sutter, J., and Murillo, J.. *Circulation* 2008 :2608-16

Elevated serum creatinine at baseline predicts poor outcome in patients receiving cardiac resynchronization therapy. Shalaby, A., El-Saed, A., Voigt, A., Albany, C., and Saba, S.. *Pacing Clin Electrophysiol* 2008 :575-9

Effect of biventricular pacing on symptoms and cardiac remodelling in patients with end-stage hypertrophic cardiomyopathy. Rogers, D. P., Marazia, S., Chow, A. W., Lambiase, P. D., Lowe, M. D., Frenneaux, M., McKenna, W. J., and Elliott, P. M.. *Eur J Heart Fail* 2008 :507-13

Effect of cardiac resynchronization therapy in isolated ventricular noncompaction in adults: follow-up of four cases. Oginosawa, Y., Nogami, A., Soejima, K., Aonuma, K., Kubota, S., Sato, T., Sugiyasu, A., Yoshida, K., Kowase, S., Sakamaki, M., Kurosaki, K., and Kato, K.. *J Cardiovasc Electrophysiol* 2008 :935-8

Clinical response of cardiac resynchronization therapy in the elderly. Delnoy, P. P., Ottervanger, J. P., Lutikhuis, H. O., Elvan, A., Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am Heart J* 2008 :746-51

Ventricular tachycardia storm after initiation of biventricular pacing: incidence, clinical characteristics, management, and outcome. Nayak, H. M., Verdino, R. J., Russo, A. M., Gerstenfeld, E. P., Hsia, H. H., Lin, D., Dixit, S., Cooper, J. M., Callans, D. J., and Marchlinski, F. E.. *J Cardiovasc Electrophysiol* 2008 :708-15

Improvement in cardiac sympathetic nerve activity in responders to resynchronization therapy. Burri, H., Sunthorn, H., Somsen, A., Fleury, E., Stettler, C., Shah, D., and Righetti, A.. *Europace* 2008 :374-8

Reverse of left ventricular volumetric and structural remodeling in heart failure patients treated with cardiac resynchronization therapy. Soliman, O. I., Geleijnse, M. L., Theuns, D. A., Nemes, A., Vletter, W. B., van Dalen, B. M., Motawea, A. K., Jordaens, L. J., and ten Cate, F. J.. *Am J Cardiol* 2008 :651-7

Cardiac resynchronization therapy. Midterm follow-up of 128 patients. Novak, M., Lipoldova, J., Kamaryt, P., Dvorak, J. Jr, Ozabalova, E., Vank, P., Hude, P., and Krejci, J.. *Bratisl Lek Listy* 2007 :445-52

Cardiac resynchronization therapy in patients with end-stage heart failure--long-term follow-up. Faran, A.,

Lewicka-Nowak, E., Dabrowska-Kugacka, A., Kempa, M., Tybura, S., Szwoch, M., Krolak, T., and Raczak, G.. *Kardiologia Polska* 2008 :19-26; discussion 27

Cardiac resynchronization therapy: "nonresponders" and "hyperresponders". Castellant, P., Fatemi, M., Bertault-Valls, V., Etienne, Y., and Blanc, J. J.. *Heart Rhythm* 2008 :193-7

Long-term effects of cardiac resynchronization therapy in patients with atrial fibrillation. Khadjooi, K., Foley, P. W., Chalil, S., Anthony, J., Smith, R. E., Frenneaux, M. P., and Leyva, F.. *Heart* 2008 :879-83

Improvement of left ventricular myocardial short-axis, but not long-axis function or torsion after cardiac resynchronization therapy: an assessment by two-dimensional speckle tracking. Zhang, Q., Fung, J. W., Yip, G. W., Chan, J. Y., Lee, A. P., Lam, Y. Y., Wu, L. W., Wu, E. B., and Yu, C. M.. *Heart* 2008 :1464-71

Myocardial gene expression in heart failure patients treated with cardiac resynchronization therapy responders versus nonresponders. Vanderheyden, M., Mullens, W., Delrue, L., Goethals, M., de Bruyne, B., Wijns, W., Geelen, P., Verstreken, S., Wellens, F., and Bartunek, J.. *J Am Coll Cardiol* 2008 :129-36

Quality of life in patients undergoing cardiac resynchronization therapy. Wojcicka, M., Sterlinski, M., Chwyczko, T., Smolis-Bak, E., Szwed, H., and Kowalik, I.. *Kardiologia Polska* 2007 :1425-30; discussion 1431-2

Mortality in patients with heart failure treated with cardiac resynchronization therapy. A long-term multi-centre follow-up study. Sterlinski, M., Maciag, A., Kowalski, O., Goscinska-Bis, K., Pytkowski, M., Kowalik, I., Lewicka-Nowak, E., Mitkowski, P., Kazmierczak, J., Kalarus, Z., Kargul, W., Lubinski, A., Cieslinski, A., Kornacewicz-Jach, Z., Szwed, H., and Sadowski, Z.. *Kardiologia Polska* 2007 :1287-93; discussion 1294-5

Usefulness of QRS duration to predict response to cardiac resynchronization therapy in patients with end-stage heart failure. Mollema, S. A., Bleeker, G. B., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Am J Cardiol* 2007 :1665-70

Cardiac sympathetic activity pre and post resynchronization therapy evaluated by 123I-MIBG myocardial scintigraphy. Nishioka, S. A., Martinelli Filho, M., Brandao, S. C., Giorgi, M. C., Vieira, M. L., Costa, R., Mathias, W., and Meneghetti, J. C.. *J Nucl Cardiol* 2007 :852-9

Diastolic filling pattern and left ventricular diameter predict response and prognosis after cardiac resynchronization therapy. Gradaus, R., Stuckenberg, V., Loher, A., Kobe, J., Reinke, F., Gunia, S., Vahlhaus, C., Breithardt, G., and Bruch, C.. *Heart* 2008 :1026-31

Cardiac resynchronization therapy response is associated with shorter duration of atrial fibrillation. Lellouche, N., De Diego, C., Vaseghi, M., Buch, E., Cesario, D. A., Mahajan, A., Wiener, I., Fonarow, G. C., Boyle, N. G., and Shivkumar, K.. *Pacing Clin Electrophysiol* 2007 :1363-8

- The impact of age and gender on cardiac resynchronization therapy outcome. Zardkoobi, O., Nandigam, V., Murray, L., Heist, E. K., Mela, T., Orencole, M., Ruskin, J. N., and Singh, J. P.. *Pacing Clin Electrophysiol* 2007 :1344-8
- Reduced atrial tachyarrhythmia susceptibility after upgrade of conventional implanted pulse generator to cardiac resynchronization therapy in patients with heart failure. Yannopoulos, D., Lurie, K. G., Sakaguchi, S., Milstein, S., Ermis, C., VanHeel, L., and Benditt, D. G.. *J Am Coll Cardiol* 2007 :1246-51
- Comparison of the effects of cardiac resynchronization therapy in patients with class II versus class III and IV heart failure (from the InSync/InSync ICD Italian Registry). Landolina, M., Lunati, M., Gasparini, M., Santini, M., Padeletti, L., Achilli, A., Bianchi, S., Laurenzi, F., Curnis, A., Vincenti, A., Valsecchi, S., and Denaro, A.. *Am J Cardiol* 2007 :1007-12
- Feasibility, safety, and mid-term efficacy of cardiac resynchronization therapy in patients with severe heart failure and ventricular conduction delay: Chulalongkorn experience. Sunsaneewitayakul, B., Sitthisook, S., Sangwatanaroj, S., Prechawat, S., and Songmuang, S. B.. *J Med Assoc Thai* 2007 :1458-66
- Improvement of atrial function and atrial reverse remodeling after cardiac resynchronization therapy for heart failure. Yu, C. M., Fang, F., Zhang, Q., Yip, G. W., Li, C. M., Chan, J. Y., Wu, L., and Fung, J. W.. *J Am Coll Cardiol* 2007 :778-85
- The BRIGHT study: bifocal right ventricular resynchronization therapy: a randomized study. Res, J. C., Bokern, M. J., de Cock, C. C., van Loenhout, T., Bronzwaer, P. N., and Spierenburg, H. A.. *Europace* 2007 :857-61
- Volume overload modulates effects of cardiac resynchronization therapy independently of myocardial reperfusion: results of the RESYNC study. Gimelli, A., Stanislao, M., Valle, G., Frumento, P., Zanco, P., Ometto, R., Inglese, E., Martino, G., Startari, U., Bertelli, P., and Marzullo, P.. *J Cardiovasc Med (Hagerstown)* 2007 :575-81
- Twenty-millisecond interventricular difference as assessed by body surface potential mapping identifies patients with clinical improvement after implantation of cardiac resynchronization device. Samesima, N., Douglas, R., Tobias, N., Pedrosa, A., Martinelli Filho, M., Ramires, J. A., and Pastore, C. A.. *Anadolu Kardiyol Derg* 2007 :213-5
- Value of baseline left lateral wall postsystolic displacement assessed by M-mode to predict reverse remodeling by cardiac resynchronization therapy. Sassone, B., Capecechi, A., Boggian, G., Gabrieli, L., Sacca, S., Vandelli, R., Petracci, E., and Mele, D.. *Am J Cardiol* 2007 :470-5
- Cardiac resynchronization therapy in patients with end-stage inotrope-dependent class IV heart failure. Herweg, B., Ilercil, A., Cutro, R., Dewhurst, R., Krishnan, S., Weston, M., and Barold, S. S.. *Am J Cardiol* 2007 :90-3
- Functional capacity and changes in the neurohormonal and cytokine status after long-term CRT in heart failure patients. Seifert, M., Schlegl, M., Hoersch, W., Fleck, E., Doelger, A., Stockburger, M., and Butter, C.. *Int J Cardiol* 2007 :68-73
- Can LV dyssynchrony as assessed with phase analysis on gated myocardial perfusion SPECT predict response to CRT?. Henneman, M. M., Chen, J., Dibbets-Schneider, P., Stokkel, M. P., Bleeker, G. B., Ypenburg, C., van der Wall, E. E., Schalij, M. J., Garcia, E. V., and Bax, J. J.. *J Nucl Med* 2007 :1104-11
- Repercussion of functional mitral regurgitation on reverse remodelling in cardiac resynchronization therapy. Cabrera-Bueno, F., Garcia-Pinilla, J. M., Pena-Hernandez, J., Jimenez-Navarro, M., Gomez-Doblas, J. J., Barrera-Cordero, A., Alzueta-Rodriguez, J., and de Teresa-Galvan, E.. *Europace* 2007 :757-61
- Tissue Doppler imaging of mitral annular motion is an effective surrogate of left ventricular dyssynchrony and predicts response to cardiac resynchronization therapy. Yuan, X. P., White, J. A., Yee, R., and Drangova, M.. *J Am Soc Echocardiogr* 2007 :1186-93
- Acute and chronic effects of cardiac resynchronization in patients developing heart failure with long-term pacemaker therapy for acquired complete atrioventricular block. Shimano, M., Tsuji, Y., Yoshida, Y., Inden, Y., Tsuboi, N., Itoh, T., Suzuki, H., Muramatsu, T., Okada, T., Harata, S., Yamada, T., Hirayama, H., Nattel, S., and Murohara, T.. *Europace* 2007 :869-74
- Predictors and treatment response with cardiac resynchronization therapy in patients with heart failure characterized by dyssynchrony: a pre-defined analysis from the CARE-HF trial. Richardson, M., Freemantle, N., Calvert, M. J., Cleland, J. G., and Tavazzi, L.. *Eur Heart J* 2007 :1827-34
- Effect of cardiac resynchronization therapy on myocardial gene expression in patients with nonischemic dilated cardiomyopathy. Iyengar, S., Haas, G., Lamba, S., Orsinelli, D. A., Babu, G. J., Ferketich, A. K., Yamokoski, L., Periasamy, M., and Abraham, W. T.. *J Card Fail* 2007 :304-11
- Early and late effects of cardiac resynchronization therapy on exercise-induced mitral regurgitation: relationship with left ventricular dyssynchrony, remodelling and cardiopulmonary performance. Madaric, J., Vanderheyden, M., Van Laethem, C., Verhamme, K., Feys, A., Goethals, M., Verstreken, S., Geelen, P., Penicka, M., De Bruyne, B., and Bartunek, J.. *Eur Heart J* 2007 :2134-41
- Comparison of temporary bifocal right ventricular pacing and biventricular pacing for heart failure: evaluation by tissue Doppler imaging. Lane, R. E., Mayet, J., Peters, N. S., Davies, D. W., and Chow, A. W.. *Heart* 2008 :53-8
- Comparison of usefulness of cardiac resynchronization therapy in patients with atrial fibrillation and heart failure versus patients with sinus rhythm and heart failure. Delnoy, P. P., Ottervanger, J. P., Luttikhuis, H. O., Elvan, A.,

Misier, A. R., Beukema, W. P., and van Hemel, N. M.. *Am J Cardiol* 2007 :1252-7

Influence of cardiac resynchronisation therapy on different types of sleep disordered breathing. Oldenburg, O., Faber, L., Vogt, J., Dorszewski, A., Szabados, F., Horstkotte, D., and Lamp, B.. *Eur J Heart Fail* 2007 :820-6

Elevated estimated pulmonary artery systolic pressure is associated with an adverse clinical outcome in patients receiving cardiac resynchronization therapy. Stern, J., Heist, E. K., Murray, L., Alabiad, C., Chung, J., Picard, M. H., Semigran, M. J., Ruskin, J. N., and Singh, J. P.. *Pacing Clin Electrophysiol* 2007 :603-7

Relation of inflammatory status to major adverse cardiac events and reverse remodeling in patients undergoing cardiac resynchronization therapy. Michelucci, A., Ricciardi, G., Sofi, F., Gori, A. M., Pirolo, F., Pieragnoli, P., Giaccardi, M., Colella, A., Porciani, M. C., Di Biase, L., Padeletti, L., Abbate, R., and Gensini, G. F.. *J Card Fail* 2007 :207-10

Optimized cardiac resynchronization therapy in patients with congestive heart failure. Niu, H. X., Hua, W., Zhang, S., Sun, X., Chen, K. P., Wang, F. Z., and Chen, X.. *Chin Med J (Engl)* 2007 :605-7

Tissue Doppler predicts long-term clinical outcome after cardiac resynchronization therapy. Penicka, M., Vanderheyden, M., Geelen, P., Mortier, L., Goethals, M., Verstreken, S., Karasek, J., De Bruyne, B., and Bartunek, J.. *Int J Cardiol* 2008 :40-6

Effect of cardiac resynchronization on morbidity and mortality of diabetic patients with severe heart failure. Hoppe, U. C., Freemantle, N., Cleland, J. G., Marijjanowski, M., and Erdmann, E.. *Diabetes Care* 2007 :722-4

Prognostic value of heart rate variability footprint and standard deviation of average 5-minute intrinsic R-R intervals for mortality in cardiac resynchronization therapy patients. Gilliam, F. R. 3rd, Singh, J. P., Mullin, C. M., McGuire, M., and Chase, K. J.. *J Electrocardiol* 2007 :336-42

Effect of total scar burden on contrast-enhanced magnetic resonance imaging on response to cardiac resynchronization therapy. Ypenburg, C., Roes, S. D., Bleeker, G. B., Kaandorp, T. A., de Roos, A., Schalij, M. J., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2007 :657-60

Impact of left ventricular lead position on the efficacy of cardiac resynchronisation therapy: a two-dimensional strain echocardiography study. Becker, M., Franke, A., Breithardt, O. A., Ocklenburg, C., Kaminski, T., Kramann, R., Knackstedt, C., Stellbrink, C., Hanrath, P., Schauerte, P., and Hoffmann, R.. *Heart* 2007 :1197-203

Acute left ventricular dyssynchrony improvement predicts long-term benefit from cardiac resynchronization therapy. Capasso, F., Giunta, A., De Simone, A., Turco, P., La Rocca, V., Grimaldi, M. G., Iuliano, A., and Stabile, G.. *Pacing Clin Electrophysiol* 2007 :S62-5

Segmental wall motion abnormality analyzed by equilibrium radionuclide angiography and improvement in ventricular function by cardiac resynchronization therapy. Eder, V., Fauchier, L., Courtehoux, M., Bonnet, P., and Babuty, D.. *Pacing Clin Electrophysiol* 2007 :S58-61

Maximum ventricular dyssynchrony predicts clinical improvement and reverse remodeling during cardiac resynchronization therapy. Tada, H., Toide, H., Okaniwa, H., Higuchi, R., Nakajima, T., Utsugi, R., Hashimoto, T., Miyaji, K., Kaseno, K., Tadokoro, K., Naito, S., Nogami, A., Oshima, S., and Taniguchi, K.. *Pacing Clin Electrophysiol* 2007 :S13-8

Changes in heart rate variability, quality of life, and activity in cardiac resynchronization therapy patients: results of the HF-HRV registry. Gilliam, F. R. 3rd, Kaplan, A. J., Black, J., Chase, K. J., and Mullin, C. M.. *Pacing Clin Electrophysiol* 2007 :56-64

Effect of left ventricular endocardial activation pattern on echocardiographic and clinical response to cardiac resynchronization therapy. Fung, J. W., Chan, J. Y., Yip, G. W., Chan, H. C., Chan, W. W., Zhang, Q., and Yu, C. M.. *Heart* 2007 :432-7

Usefulness of preimplantation B-type natriuretic peptide level for predicting response to cardiac resynchronization therapy. Lellouche, N., De Diego, C., Cesario, D. A., Vaseghi, M., Horowitz, B. N., Mahajan, A., Wiener, I., Boyle, N. G., Fonarow, G. C., and Shivkumar, K.. *Am J Cardiol* 2007 :242-6

Spectral pulsed-wave tissue Doppler imaging lateral-to-septal delay fails to predict clinical or echocardiographic outcome after cardiac resynchronization therapy. Soliman, O. I., Theuns, D. A., Geleijnse, M. L., Anwar, A. M., Nemes, A., Caliskan, K., Vletter, W. B., Jordaens, L. J., and Cate, F. J.. *Europace* 2007 :113-8

Long-term hemodynamic benefit of biventricular pacing depending on coronary sinus lead position. Nagele, H., Hashagen, S., Azizi, M., Behrens, S., and Castel, M. A.. *Herzschrittmacherther Elektrophysiol* 2006 :185-90

Relation of isovolumic times after cardiac resynchronization therapy to improvement in exercise capacity. Jansen, A. H., Peels, K. H., Bracke, F., van Dantzig, J. M., Meijer, A., van der Voort, P. H., van Gelder, B., Korsten, H. H., and van Hemel, N. M.. *Am J Cardiol* 2007 :75-8

Relative merits of M-mode echocardiography and tissue Doppler imaging for prediction of response to cardiac resynchronization therapy in patients with heart failure secondary to ischemic or idiopathic dilated cardiomyopathy. Bleeker, G. B., Schalij, M. J., Boersma, E., Holman, E. R., Steendijk, P., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2007 :68-74

Reverse perfusion-metabolism mismatch predicts good prognosis in patients undergoing cardiac resynchronization therapy: a pilot study. Inoue, N., Takahashi, N., Ishikawa, T., Sumita, S., Kobayashi, T., Matsushita, K., Matsumoto, K., Taima, M., Shimura, M., Uchino, K., Kimura, K., Inoue, T., and Umemura, S.. *Circ J* 2007 :126-31

- Prognostic value of renal function in patients with cardiac resynchronization therapy. Fung, J. W., Szeto, C. C., Chan, J. Y., Zhang, Q., Chan, H. C., Yip, G. W., and Yu, C. M.. *Int J Cardiol* 2007 :10-6
- Long-term survival in patients treated with cardiac resynchronization therapy: a 3-year follow-up study from the InSync/InSync ICD Italian Registry. Gasparini, M., Lunati, M., Santini, M., Tritto, M., Curnis, A., Bocchiardo, M., Vincenti, A., Pistis, G., Valsecchi, S., and Denaro, A.. *Pacing Clin Electrophysiol* 2006 :S2-10
- Predictors of sudden cardiac death and appropriate shock in the Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure (COMPANION) Trial. Saxon, L. A., Bristow, M. R., Boehmer, J., Krueger, S., Kass, D. A., De Marco, T., Carson, P., DiCarlo, L., Feldman, A. M., Galle, E., and Ecklund, F.. *Circulation* 2006 :2766-72
- Impact of viability and scar tissue on response to cardiac resynchronization therapy in ischaemic heart failure patients. Ypenburg, C., Schalij, M. J., Bleeker, G. B., Steendijk, P., Boersma, E., Dibbets-Schneider, P., Stokkel, M. P., van der Wall, E. E., and Bax, J. J.. *Eur Heart J* 2007 :33-41
- Delayed enhancement magnetic resonance imaging predicts response to cardiac resynchronization therapy in patients with intraventricular dyssynchrony. White, J. A., Yee, R., Yuan, X., Krahn, A., Skanes, A., Parker, M., Klein, G., and Drangova, M.. *J Am Coll Cardiol* 2006 :1953-60
- Left ventricular lead electrical delay predicts response to cardiac resynchronization therapy. Singh, J. P., Fan, D., Heist, E. K., Alabiad, C. R., Taub, C., Reddy, V., Mansour, M., Picard, M. H., Ruskin, J. N., and Mela, T.. *Heart Rhythm* 2006 :1285-92
- Biventricular pacing demonstrates similar effects in elderly and younger patients with advanced heart failure in the mid-term follow-up. Lewicka-Nowak, E., Dabrowska-Kugacka, A., Faran, A., Kutarski, A., Wilczek, R., Swiatecka, G., and Raczak, G.. *Kardiologia Polska* 2006 :975-83; discussion 984-5
- Brain natriuretic peptide levels and response to cardiac resynchronization therapy in heart failure patients. Delgado, R. M., Palanichamy, N., Radovancevic, R., Vrtovc, B., and Radovancevic, B.. *Congest Heart Fail* 2006 :250-3
- FDG PET as a predictor of response to resynchronisation therapy in patients with ischaemic cardiomyopathy. van Campen, C. M., Visser, F. C., van der Weerd, A. P., Knaapen, P., Comans, E. F., Lammertsma, A. A., de Cock, C. C., and Visser, C. A.. *Eur J Nucl Med Mol Imaging* 2007 :309-15
- Predictors of response to cardiac resynchronization therapy--importance of left ventricular dyssynchrony. Santos, J. F., Pereira, L., Madeira, J., Seixo, F., Mendes, L., Lopes, C., Venancio, J., Lourenco, J., Caetano, F., Ines, L., and Mendes, M.. *Rev Port Cardiol* 2006 :569-81
- Extent of viability to predict response to cardiac resynchronization therapy in ischemic heart failure patients. Ypenburg, C., Schalij, M. J., Bleeker, G. B., Steendijk, P., Boersma, E., Dibbets-Schneider, P., Stokkel, M. P., van der Wall, E. E., and Bax, J. J.. *J Nucl Med* 2006 :1565-70
- Velocity vector imaging to quantify ventricular dyssynchrony and predict response to cardiac resynchronization therapy. Cannesson, M., Tanabe, M., Suffoletto, M. S., Schwartzman, D., and Gorcsan, J. 3rd. *Am J Cardiol* 2006 :949-53
- Short-term effect of cardiac resynchronization therapy in patients with ischaemic or nonischaemic cardiomyopathy. Hua, W., Niu, H. X., Wang, F. Z., Zhang, S., Chen, K. P., and Chen, X.. *Chin Med J (Engl)* 2006 :1507-10
- Dilated cardiomyopathy following right ventricular pacing for AV block in young patients: resolution after upgrading to biventricular pacing systems. Moak, J. P., Hasbani, K., Ramwell, C., Freedenberg, V., Berger, J. T., DiRusso, G., and Callahan, P.. *J Cardiovasc Electrophysiol* 2006 :1068-71
- Effect of cardiac resynchronization therapy in patients with moderate left ventricular systolic dysfunction and wide QRS complex: a prospective study. Fung, J. W., Zhang, Q., Yip, G. W., Chan, J. Y., Chan, H. C., and Yu, C. M.. *J Cardiovasc Electrophysiol* 2006 :1288-92
- Improvement of congestive heart failure by upgrading of conventional to resynchronization pacemakers. Marai, I., Gurevitz, O., Carasso, S., Nof, E., Bar-Lev, D., Luria, D., Arbel, Y., Freimark, D., Feinberg, M. S., Eldar, M., and Glikson, M.. *Pacing Clin Electrophysiol* 2006 :880-4
- Four-year efficacy of cardiac resynchronization therapy on exercise tolerance and disease progression: the importance of performing atrioventricular junction ablation in patients with atrial fibrillation. Gasparini, M., Auricchio, A., Regoli, F., Fantoni, C., Kawabata, M., Galimberti, P., Pini, D., Ceriotti, C., Gronda, E., Klersy, C., Fratini, S., and Klein, H. H.. *J Am Coll Cardiol* 2006 :734-43
- Anti-inflammatory effect of cardiac resynchronization therapy. Lappegard, K. T. and Bjornstad, H.. *Pacing Clin Electrophysiol* 2006 :753-8
- Comparison of segmental and global markers of dyssynchrony in predicting clinical response to cardiac resynchronization. Duncan, A. M., Lim, E., Clague, J., Gibson, D. G., and Henein, M. Y.. *Eur Heart J* 2006 :2426-32
- Benefit of combined resynchronization and defibrillator therapy in heart failure patients with and without ventricular arrhythmias. Ypenburg, C., van Erven, L., Bleeker, G. B., Bax, J. J., Bootsma, M., Wijffels, M. C., van der Wall, E. E., and Schalij, M. J.. *J Am Coll Cardiol* 2006 :464-70
- Long-term effects of cardiac resynchronization therapy on heart rate and heart rate variability. Akyol, A., Alper, A. T., Cakmak, N., Hasdemir, H., Eksik, A., Oguz, E., Erdinler, I., Ulufar, F. T., and Gurkan, K.. *Tohoku J Exp Med* 2006 :337-46

- Sympathetic control after cardiac resynchronization therapy: responders versus nonresponders. Najem, B., Unger, P., Preumont, N., Jansens, J. L., Houssiere, A., Pathak, A., Xhaet, O., Gabriel, L., Friart, A., De Roy, L., Vandenbossche, J. L., and van de Borne, P.. *Am J Physiol Heart Circ Physiol* 2006 :H2647-52
- Left ventricular lead proximity to an akinetic segment and impact on outcome of cardiac resynchronization therapy. Arzola-Castaner, D., Taub, C., Kevin Heist, E., Fan, D., Haelewyn, K., Mela, T., Picard, M. H., Ruskin, J. N., and Singh, J. P.. *J Cardiovasc Electrophysiol* 2006 :623-7
- Neurohormonal and inflammatory markers as predictors of short-term outcome in patients with heart failure and cardiac resynchronization therapy. Glick, A., Michowitz, Y., Keren, G., and George, J.. *Isr Med Assoc J* 2006 :391-5
- Utility of a new left ventricular asynchrony index as a predictor of reverse remodelling after cardiac resynchronization therapy. Porciani, M. C., Lilli, A., Macioce, R., Cappelli, F., Demarchi, G., Pappone, A., Ricciardi, G., and Padeletti, L.. *Eur Heart J* 2006 :1818-23
- Effect of cardiac resynchronization on the incidence of atrial fibrillation in patients with severe heart failure. Hoppe, U. C., Casares, J. M., Eiskjaer, H., Hagemann, A., Cleland, J. G., Freemantle, N., and Erdmann, E.. *Circulation* 2006 :18-25
- Suboptimal medical therapy in patients with systolic heart failure is associated with less improvement by cardiac resynchronization therapy. Fung, J. W., Chan, J. Y., Kum, L. C., Chan, H. C., Yip, G. W., Zhang, Q., and Yu, C. M.. *Int J Cardiol* 2007 :214-9
- Relation of right ventricular peak systolic pressure to major adverse events in patients undergoing cardiac resynchronization therapy. Tedrow, U. B., Kramer, D. B., Stevenson, L. W., Stevenson, W. G., Baughman, K. L., Epstein, L. M., and Lewis, E. F.. *Am J Cardiol* 2006 :1737-40
- Usefulness of a novel "response score" to predict hemodynamic and clinical outcome from cardiac resynchronization therapy. Heist, E. K., Taub, C., Fan, D., Arzola-Castaner, D., Alabiad, C. R., Reddy, V. Y., Mansour, M., Mela, T., Picard, M. H., Ruskin, J. N., and Singh, J. P.. *Am J Cardiol* 2006 :1732-6
- Usefulness of biventricular pacing to improve cardiac symptoms, exercise capacity and sympathetic nerve activity in patients with moderate to severe chronic heart failure. Higuchi, K., Toyama, T., Tada, H., Naito, S., Ohshima, S., and Kurabayashi, M.. *Circ J* 2006 :703-9
- Biventricular pacemaker upgrade in previously paced heart failure patients--improvements in ventricular dyssynchrony. Witte, K. K., Pipes, R. R., Nanthakumar, K., and Parker, J. D.. *J Card Fail* 2006 :199-204
- Tissue Doppler velocity is superior to displacement and strain mapping in predicting left ventricular reverse remodelling response after cardiac resynchronisation therapy. Yu, C. M., Zhang, Q., Chan, Y. S., Chan, C. K., Yip, G. W., Kum, L. C., Wu, E. B., Lee, P. W., Lam, Y. Y., Chan, S., and Fung, J. W.. *Heart* 2006 :1452-6
- Neurohormones and inflammatory mediators in patients with heart failure undergoing cardiac resynchronization therapy: time courses and prediction of response. Boriani, G., Regoli, F., Saporito, D., Martignani, C., Toselli, T., Biffi, M., Francolini, G., Diemberger, I., Bacchi, L., Rapezzi, C., Ferrari, R., and Branzi, A.. *Peptides* 2006 :1776-86
- Urgent cardiac resynchronization therapy in patients with decompensated chronic heart failure receiving inotropic therapy. A case series. Konstantino, Y., Iakobishvili, Z., Arad, O., Ben-Gal, T., Kusniec, J., Mazur, A., Porter, A., Strasberg, B., Battler, A., and Hasdai, D.. *Cardiology* 2006 :59-62
- Left intraventricular myocardial deformation dyssynchrony identifies responders to cardiac resynchronization therapy in patients with heart failure. Mele, D., Pasanisi, G., Capasso, F., De Simone, A., Morales, M. A., Poggio, D., Capucci, A., Tabacchi, G., Sallusti, L., and Ferrari, R.. *Eur Heart J* 2006 :1070-8
- Biventricular pacing for heart failure patients on inotropic support: a review of 38 consecutive cases. James, K. B., Militello, M., Barbara, G., and Wilkoff, B. L.. *Tex Heart Inst J* 2006 :19-22
- Clinical predictors and timing of New York Heart Association class improvement with cardiac resynchronization therapy in patients with advanced chronic heart failure: results from the Multicenter InSync Randomized Clinical Evaluation (MIRACLE) and Multicenter InSync ICD Randomized Clinical Evaluation (MIRACLE-ICD) trials. Pires, L. A., Abraham, W. T., Young, J. B., and Johnson, K. M.. *Am Heart J* 2006 :837-43
- The benefit of upgrading chronically right ventricle-paced heart failure patients to resynchronization therapy demonstrated by strain rate imaging. Eldadah, Z. A., Rosen, B., Hay, I., Edvardsen, T., Jayam, V., Dickfeld, T., Meininger, G. R., Judge, D. P., Hare, J., Lima, J. B., Calkins, H., and Berger, R. D.. *Heart Rhythm* 2006 :435-42
- Prospective validation of stress echocardiography as an identifier of cardiac resynchronization therapy responders. Da Costa, A., Thevenin, J., Roche, F., Faure, E., Romeyer-Bouchard, C., Messier, M., Convert, G., Barthelemy, J. C., and Isaaz, K.. *Heart Rhythm* 2006 :406-13
- Decrease in plasma B-type natriuretic peptide early after initiation of cardiac resynchronization therapy predicts clinical improvement at 12 months. Kubanek, M., Malek, I., Bytesnik, J., Fridl, P., Riedlbachova, L., Karasova, L., Lanska, V., and Kautzner, J.. *Eur J Heart Fail* 2006 :832-40
- Biventricular pacing has an advantage over left ventricular epicardial pacing alone to minimize proarrhythmic perturbation of repolarization. Harada, M., Osaka, T., Yokoyama, E., Takemoto, Y., Ito, A., and Kodama, I.. *J Cardiovasc Electrophysiol* 2006 :151-6

- Hemodynamic effects of long-term cardiac resynchronization therapy: analysis by pressure-volume loops. Steendijk, P., Tulner, S. A., Bax, J. J., Oemrawsingh, P. V., Bleeker, G. B., van Erven, L., Putter, H., Verwey, H. F., van der Wall, E. E., and Schalij, M. J.. *Circulation* 2006 :1295-304
- Relation of response to cardiac resynchronization therapy to left ventricular reverse remodeling. Vidal, B., Sitges, M., Marigliano, A., Diaz-Infante, E., Azqueta, M., Tamborero, D., Macias, A., Roig, E., Brugada, J., Pare, C., and Mont, L.. *Am J Cardiol* 2006 :876-81
- Prognostic value of brain natriuretic peptide in the management of patients receiving cardiac resynchronization therapy. Pitzalis, M. V., Iacoviello, M., Di Serio, F., Romito, R., Guida, P., De Tommasi, E., Luzzi, G., Anaclerio, M., Varraso, L., Forleo, C., and Pansini, N.. *Eur J Heart Fail* 2006 :509-14
- Clinical outcomes after cardiac resynchronization therapy: importance of left ventricular diastolic function and origin of heart failure. Waggoner, A. D., Rovner, A., de las Fuentes, L., Faddis, M. N., Gleva, M. J., Sawhney, N., and Davila-Roman, V. G.. *J Am Soc Echocardiogr* 2006 :307-13
- Effect of posterolateral scar tissue on clinical and echocardiographic improvement after cardiac resynchronization therapy. Bleeker, G. B., Kaandorp, T. A., Lamb, H. J., Boersma, E., Steendijk, P., de Roos, A., van der Wall, E. E., Schalij, M. J., and Bax, J. J.. *Circulation* 2006 :969-76
- Novel speckle-tracking radial strain from routine black-and-white echocardiographic images to quantify dyssynchrony and predict response to cardiac resynchronization therapy. Suffoletto, M. S., Dohi, K., Cannesson, M., Saba, S., and Gorcsan, J. 3rd. *Circulation* 2006 :960-8
- Clinical predictors of marked improvement in left ventricular performance after cardiac resynchronization therapy in patients with chronic heart failure. Mangiacavalli, M., Gasparini, M., Faletta, F., Klersy, C., Morenghi, E., Galimberti, P., Genovese, L., Regoli, F., De Chiara, F., Bragato, R., Andreuzzi, B., Pini, D., and Gronda, E.. *Am Heart J* 2006 :477.e1-477.e6
- Clinical versus echocardiographic parameters to assess response to cardiac resynchronization therapy. Bleeker, G. B., Bax, J. J., Fung, J. W., van der Wall, E. E., Zhang, Q., Schalij, M. J., Chan, J. Y., and Yu, C. M.. *Am J Cardiol* 2006 :260-3
- Determinants of mortality in patients undergoing cardiac resynchronization therapy: baseline clinical, echocardiographic, and angioscintigraphic evaluation prior to resynchronization. de Sisti, A., Toussaint, J. F., Lavergne, T., Ollitrault, J., Abergel, E., Paziaud, O., Ait Said, M., Sader, R., LE Heuzey, J. Y., and Guize, L.. *Pacing Clin Electrophysiol* 2005 :1260-70
- Clinical evaluation of combination therapy for biventricular pacing after cardiac surgery in patients with intractable heart failure. Sakamoto, S., Matsubara, J., Nagayoshi, Y., Nishizawa, H., Takeuchi, K., and Nonaka, T.. *Ann Thorac Cardiovasc Surg* 2005 :408-12
- Effects of cardiac resynchronization therapy on the mechanisms underlying functional mitral regurgitation in congestive heart failure. Porciani, M. C., Macioce, R., Demarchi, G., Chiostri, M., Musilli, N., Cappelli, F., Lilli, A., Ricciardi, G., and Padeletti, L.. *Eur J Echocardiogr* 2006 :31-9
- CRT improves the exercise capacity and functional reserve of the failing heart through enhancing the cardiac flow- and pressure-generating capacity. Schlosshan, D., Barker, D., Pepper, C., Williams, G., Morley, C., and Tan, L. B.. *Eur J Heart Fail* 2006 :515-21
- Global myocardial index in patients with multisite pacing. Cozma, D., Kalifa, J., Pescariu, S., Lighezan, D., Deharo, J. C., Mornos, C., Djiane, P., Luca, C. T., Petrescu, L., and Dragulescu, S. I.. *Rom J Intern Med* 2004 :521-31
- The incremental benefit of rate-adaptive pacing on exercise performance during cardiac resynchronization therapy. Tse, H. F., Siu, C. W., Lee, K. L., Fan, K., Chan, H. W., Tang, M. O., Tsang, V., Lee, S. W., and Lau, C. P.. *J Am Coll Cardiol* 2005 :2292-7
- Left ventricular dyssynchrony predicts right ventricular remodeling after cardiac resynchronization therapy. Bleeker, G. B., Schalij, M. J., Nihoyannopoulos, P., Steendijk, P., Molhoek, S. G., van Erven, L., Bootsma, M., Holman, E. R., van der Wall, E. E., and Bax, J. J.. *J Am Coll Cardiol* 2005 :2264-9
- Improvements in left ventricular diastolic function after cardiac resynchronization therapy are coupled to response in systolic performance. Waggoner, A. D., Faddis, M. N., Gleva, M. J., de las Fuentes, L., and Davila-Roman, V. G.. *J Am Coll Cardiol* 2005 :2244-9
- Septal to posterior wall motion delay fails to predict reverse remodeling or clinical improvement in patients undergoing cardiac resynchronization therapy. Marcus, G. M., Rose, E., Vilorio, E. M., Schafer, J., De Marco, T., Saxon, L. A., and Foster, E.. *J Am Coll Cardiol* 2005 :2208-14
- Evolution and prognostic significance of diastolic filling pattern in cardiac resynchronization therapy. Porciani, M. C., Valsecchi, S., Demarchi, G., Colella, A., Michelucci, A., Pieragnoli, P., Musilli, N., Gensini, G. F., and Padeletti, L.. *Int J Cardiol* 2006 :322-8
- Effects of biventricular pacing on interstitial remodelling, tumor necrosis factor-alpha expression, and apoptotic death in failing human myocardium. D'Ascia, C., Cittadini, A., Monti, M. G., Riccio, G., and Sacca, L.. *Eur Heart J* 2006 :201-6
- Extent of myocardial viability predicts response to biventricular pacing in ischemic cardiomyopathy. Hummel, J. P., Lindner, J. R., Belcik, J. T., Ferguson, J. D., Mangrum, J. M., Bergin, J. D., Haines, D. E., Lake, D. E., DiMarco, J. P., and Mounsey, J. P.. *Heart Rhythm* 2005 :1211-7
- Contractile response and mitral regurgitation after temporary interruption of long-term cardiac

- resynchronization therapy. Brandt, R. R., Reiner, C., Arnold, R., Sperzel, J., Pitschner, H. F., and Hamm, C. W.. *Eur Heart J* 2006 :187-92
- Transoesophageal left ventricular pacing in heart failure patients with permanent right ventricular pacing. Heinke, M., Surber, R., Kuhnert, H., Dannberg, G., Schwarz, G., and Figulla, H. R.. *Europace* 2005 :617-20
- Predictive parameters of left ventricular reverse remodeling in response to cardiac resynchronization therapy in patients with severe congestive heart failure. De Maria, E., Gallo, P., Damiano, M., Scognamiglio, G., De Simone, C., Nilo, S., Guarini, P., Mascioli, G., and Curnis, A.. *Ital Heart J* 2005 :734-9
- Sympathetic nerve activity after thoracoscopic cardiac resynchronization therapy in congestive heart failure. Najem, B., Preumont, N., Unger, P., Jansens, J. L., Houssiere, A., Ciarka, A., Stoupel, E., Degaute, J. P., and van de Borne, P.. *J Card Fail* 2005 :529-33
- Tailored echocardiographic interventricular delay programming further optimizes left ventricular performance after cardiac resynchronization therapy. Vanderheyden, M., De Backer, T., Rivero-Ayerza, M., Geelen, P., Bartunek, J., Verstreken, S., De Zutter, M., and Goethals, M.. *Heart Rhythm* 2005 :1066-72
- Resynchronization of mitral valve annular segments reduces functional mitral regurgitation in cardiac resynchronization therapy. Macioce, R., Cappelli, F., Demarchi, G., Lilli, A., Ricciardi, G., Pieragnoli, P., Colella, A., Michelucci, A., Porciani, M. C., and Padeletti, L.. *Minerva Cardioangiol* 2005 :329-33
- Optimizing sequential biventricular pacing using radionuclide ventriculography. Burri, H., Sunthorn, H., Somsen, A., Zaza, S., Fleury, E., Shah, D., and Righetti, A.. *Heart Rhythm* 2005 :960-5
- Comparison of effectiveness of cardiac resynchronization therapy in patients <70 versus ≥70 years of age. Bleeker, G. B., Schalij, M. J., Molhoek, S. G., Boersma, E., Steendijk, P., van der Wall, E. E., and Bax, J. J.. *Am J Cardiol* 2005 :420-2
- Long-term follow-up of cardiac resynchronization therapy in patients with end-stage heart failure. Molhoek, S. G., Bax, J. J., Bleeker, G. B., Holman, E. R., Van Erven, L., Bootsma, M., Boersma, E., Steendijk, P., Van Der Wall, E. E., and Schalij, M. J.. *J Cardiovasc Electrophysiol* 2005 :701-7
- Area of left ventricular regional conduction delay and preserved myocardium predict responses to cardiac resynchronization therapy. Tse, H. F., Lee, K. L., Wan, S. H., Yu, Y., Hoersch, W., Pastore, J., Zhu, Q., KenKnight, B., Spinelli, J., and Lau, C. P.. *J Cardiovasc Electrophysiol* 2005 :690-5
- Effect of cardiac resynchronization therapy on left ventricular diastolic filling pattern in responder and nonresponder patients. Agacdiken, A., Vural, A., Ural, D., Sahin, T., Kozdag, G., Kahraman, G., Bildirici, U., Ural, E., and Komsuoglu, B.. *Pacing Clin Electrophysiol* 2005 :654-60
- Improvement in Cheyne-Stokes respiration following cardiac resynchronisation therapy. Gabor, J. Y., Newman, D. A., Barnard-Roberts, V., Korley, V., Mangat, I., Dorian, P., and Hanly, P. J.. *Eur Respir J* 2005 :95-100
- Predictors of response to cardiac resynchronization therapy (PROSPECT)--study design. Yu, C. M., Abraham, W. T., Bax, J., Chung, E., Fedewa, M., Ghio, S., Leclercq, C., Leon, A. R., Merlino, J., Nihoyannopoulos, P., Notabartolo, D., Sun, J. P., and Tavazzi, L.. *Am Heart J* 2005 :600-5
- Comparison of effectiveness of cardiac resynchronization therapy in patients with versus without diabetes mellitus. Kies, P., Bax, J. J., Molhoek, S. G., Bleeker, G. B., Boersma, E., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2005 :108-11
- Regional differences in systolic and diastolic function in arrhythmogenic right ventricular dysplasia/cardiomyopathy using magnetic resonance imaging. Bomma, C., Dalal, D., Tandri, H., Prakasa, K., Nasir, K., Roguin, A., Tichnell, C., James, C., Lima, J. A., Calkins, H., and Bluemke, D. A.. *Am J Cardiol* 2005 :1507-11
- Effects of cardiac resynchronization therapy on ventricular repolarization in patients with congestive heart failure. Berger, T., Hanser, F., Hintringer, F., Poelzl, G., Fischer, G., Modre, R., Tilg, B., Pachinger, O., and Roithinger, F. X.. *J Cardiovasc Electrophysiol* 2005 :611-7
- Effect of cardiac resynchronization therapy on left atrial appendage function and pulmonary venous flow pattern. Vural, A., Agacdiken, A., Ural, D., Sahin, T., Kozdag, G., Kahraman, G., Ural, E., Akbas, H., Suzer, K., and Komsuoglu, B.. *Int J Cardiol* 2005 :103-9
- Haemodynamic effects of dual-chamber pacing versus ventricular pacing during a walk test in patients with depressed or normal left ventricular function. Ferro, A., Duilio, C., Santomauro, M., Salvatore, M., and Cuocolo, A.. *Eur J Nucl Med Mol Imaging* 2005 :1075-80
- Right atrial pacing impairs cardiac function during resynchronization therapy: acute effects of DDD pacing compared to VDD pacing. Bernheim, A., Ammann, P., Sticherling, C., Burger, P., Schaer, B., Brunner-La Rocca, H. P., Eckstein, J., Kiencke, S., Kaiser, C., Linka, A., Buser, P., Pfisterer, M., and Osswald, S.. *J Am Coll Cardiol* 2005 :1482-7
- Long-term outcome of cardiac resynchronization therapy in patients with severe congestive heart failure. Davis, D. R., Krahn, A. D., Tang, A. S., Lemery, R., Green, M. S., Gollob, M., Yee, R., Skanes, A. C., Klein, G. J., and Birnie, D. H.. *Can J Cardiol* 2005 :413-7
- Effect of cardiac resynchronization therapy on inducibility of ventricular tachyarrhythmias in cardiac arrest survivors with either ischemic or idiopathic dilated cardiomyopathy. Kies, P., Bax, J. J., Molhoek, S. G., Bleeker, G. B., Zeppenfeld, K., Bootsma, M., van Erven, L., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2005 :1111-4

- Cardiac resynchronization induces favorable neurohumoral changes. Erol-Yilmaz, A., Verberne, H. J., Schrama, T. A., Hrudova, J., De Winter, R. J., Van Eck-Smit, B. L., De Bruin, R., Bax, J. J., Schalij, M. J., Wilde, A. A., and Tukkie, R.. *Pacing Clin Electrophysiol* 2005 :304-10
- Ventricular reverse remodeling and 6-month outcomes in patients receiving cardiac resynchronization therapy: analysis of the MIRACLE study. Woo, G. W., Petersen-Stejskal, S., Johnson, J. W., Conti, J. B., Aranda, J. A. Jr, and Curtis, A. B.. *J Interv Card Electrophysiol* 2005 :107-13
- Left ventricular functional recovery during cardiac resynchronization therapy: predictive role of asynchrony measured by strain rate analysis. Capasso, F., Giunta, A., Stabile, G., Turco, P., La Rocca, V., Grimaldi, G., and De Simone, A.. *Pacing Clin Electrophysiol* 2005 :S1-4
- Long-term follow-up of atrioventricular delay optimization in patients with biventricular pacing. Inoue, N., Ishikawa, T., Sumita, S., Nakagawa, T., Kobayashi, T., Matsushita, K., Matsumoto, K., Ohkusu, Y., Taima, M., Kosuge, M., Uchino, K., Kimura, K., and Umemura, S.. *Circ J* 2005 :201-4
- Tissue Doppler imaging and strain Doppler imaging as modalities for predicting clinical improvement in patients receiving biventricular pacing. Tada, H., Toide, H., Naito, S., Kurosaki, K., Ito, S., Miyaji, K., Yamada, M., Okaniwa, H., Kobayashi, Y., Maruyama, H., Higuchi, R., Nogami, A., Oshima, S., and Taniguchi, K.. *Circ J* 2005 :194-200
- Reduced mitral regurgitation in heart failure patients submitted to cardiac resynchronization therapy: a short-term prospective study. Zanon, F., Aggio, S., Baracca, E., Bilato, C., Corbucci, G., Rigatelli, G., and Zonzin, P.. *Ital Heart J* 2004 :826-30
- Evidence of reverse remodeling after long-term biventricular stimulation for resynchronization in patients with wide QRS selected on the basis of echocardiographic electromechanical delays. Barbieri, A., Bursi, F., Bonatti, S., Coppi, F., Zanasi, V., Reggiani, L., Casali, E., Malavasi, V. L., and Modena, M. G.. *Ital Heart J* 2004 :818-25
- Cardiac resynchronization therapy in patients with heart failure and conduction abnormalities other than left bundle-branch block: analysis of the Multicenter InSync Randomized Clinical Evaluation (MIRACLE). Aranda, J. M. Jr, Conti, J. B., Johnson, J. W., Petersen-Stejskal, S., and Curtis, A. B.. *Clin Cardiol* 2004 :678-82
- Biventricular pacing and left ventricular pacing in heart failure: similar hemodynamic improvement despite marked electromechanical differences. Bordachar, P., Lafitte, S., Reuter, S., Garrigue, S., Sanders, P., Roudaut, R., Jais, P., Haissaguerre, M., and Clementy, J.. *J Cardiovasc Electrophysiol* 2004 :1342-7
- Comparison of response to cardiac resynchronization therapy in patients with sinus rhythm versus chronic atrial fibrillation. Molhoek, S. G., Bax, J. J., Bleeker, G. B., Boersma, E., van Erven, L., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2004 :1506-9
- Effect of cardiac resynchronization therapy on functional mitral regurgitation in heart failure. Lancellotti, P., Melon, P., Sakalihan, N., Waleffe, A., Dubois, C., Bertholet, M., and Pierard, L. A.. *Am J Cardiol* 2004 :1462-5
- Reverse remodelling of systolic left ventricular contraction pattern by long term cardiac resynchronisation therapy: colour Doppler shows resynchronisation. Schuster, P., Faerstrand, S., and Ohm, O. J.. *Heart* 2004 :1411-6
- Relationship of baseline electrocardiographic characteristics with the response to cardiac resynchronization therapy for heart failure. Reynolds, M. R., Joventino, L. P., and Josephson, M. E.. *Pacing Clin Electrophysiol* 2004 :1513-8
- Reduction in hospitalization rates following cardiac resynchronisation therapy in cardiac failure: experience from a single centre. Dixon, L. J., Murtagh, J. G., Richardson, S. G., and Chew, E. W.. *Europace* 2004 :586-9
- Left ventricular dyssynchrony predicts response and prognosis after cardiac resynchronization therapy. Bax, J. J., Bleeker, G. B., Marwick, T. H., Molhoek, S. G., Boersma, E., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *J Am Coll Cardiol* 2004 :1834-40
- Impact of coronary sinus lead position on biventricular pacing: mortality and echocardiographic evaluation during long-term follow-up. Rossillo, A., Verma, A., Saad, E. B., Corrado, A., Gasparini, G., Marrouche, N. F., Golshayan, A. R., McCurdy, R., Bhargava, M., Khaykin, Y., Burkhardt, J. D., Martin, D. O., Wilkoff, B. L., Saliba, W. I., Schweikert, R. A., Raviele, A., and Natale, A.. *J Cardiovasc Electrophysiol* 2004 :1120-5
- Comparison of efficacy of reverse remodeling and clinical improvement for relatively narrow and wide QRS complexes after cardiac resynchronization therapy for heart failure. Yu, C. M., Fung, J. W., Chan, C. K., Chan, Y. S., Zhang, Q., Lin, H., Yip, G. W., Kum, L. C., Kong, S. L., Zhang, Y., and Sanderson, J. E.. *J Cardiovasc Electrophysiol* 2004 :1058-65
- Comparison of left ventricular-biventricular pacing on ventricular synchrony, mitral regurgitation, and global left ventricular function in patients with severe chronic heart failure. Vinereanu, D., Bleasdale, R., Turner, M., Frenneaux, M. P., and Fraser, A. G.. *Am J Cardiol* 2004 :519-21
- Assessment of upgrading to biventricular pacing in patients with right ventricular pacing and congestive heart failure after atrioventricular junctional ablation for chronic atrial fibrillation. Valls-Bertault, V., Fatemi, M., Gilard, M., Pennec, P. Y., Etienne, Y., and Blanc, J. J.. *Europace* 2004 :438-43
- Assessment of right ventricular oxidative metabolism by PET in patients with idiopathic dilated cardiomyopathy undergoing cardiac resynchronization therapy. Knuuti, J., Sundell, J., Naum, A., Engblom, E., Koistinen, J., Ylitalo, A., Stolen, K. Q., Kalliokoski, R., Nekolla, S. G., Bax, K. E., and Airaksinen, K. E.. *Eur J Nucl Med Mol Imaging* 2004 :1592-8

- Effect of left ventricular remodeling after cardiac resynchronization therapy on frequency of ventricular arrhythmias. Kies, P., Bax, J. J., Molhoek, S. G., Bleeker, G. B., Zeppenfeld, K., Bootsma, M., St John Sutton, M., van Erven, L., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2004 :130-2
- Relationship between QRS duration and left ventricular dyssynchrony in patients with end-stage heart failure. Bleeker, G. B., Schalij, M. J., Molhoek, S. G., Verwey, H. F., Holman, E. R., Boersma, E., Steendijk, P., Van Der Wall, E. E., and Bax, J. J.. *J Cardiovasc Electrophysiol* 2004 :544-9
- Electrical and mechanical components of dyssynchrony in heart failure patients with normal QRS duration and left bundle-branch block: impact of left and biventricular pacing. Turner, M. S., Bleasdale, R. A., Vinereanu, D., Mumford, C. E., Paul, V., Fraser, A. G., and Frenneaux, M. P.. *Circulation* 2004 :2544-9
- Effect of biventricular pacing therapy in patients with dilated cardiomyopathy with severe congestive heart failure. Takemoto, M., Sakamoto, M., Kawagoe, J., Goto, K., Baba, H., Noma, M., Origuchi, H., Yoshimura, H., Sese, A., and Yamamoto, H.. *Jpn J Thorac Cardiovasc Surg* 2004 :175-80
- Performance of left ventricular versus biventricular pacing in chronic heart failure assessed by stress echocardiography. Riedlbauchova, L., Fridl, P., Kautzner, J., and Peichl, P.. *Pacing Clin Electrophysiol* 2004 :626-31
- Comparison of benefits from cardiac resynchronization therapy in patients with ischemic cardiomyopathy versus idiopathic dilated cardiomyopathy. Molhoek, S. G., Bax, J. J., van Erven, L., Bootsma, M., Boersma, E., Steendijk, P., van der Wall, E. E., and Schalij, M. J.. *Am J Cardiol* 2004 :860-3
- The effects of cardiac resynchronization therapy on left ventricular function, myocardial energetics, and metabolic reserve in patients with dilated cardiomyopathy and heart failure. Sundell, J., Engblom, E., Koistinen, J., Ylitalo, A., Naum, A., Stolen, K. Q., Kalliokoski, R., Nekolla, S. G., Airaksinen, K. E., Bax, J. J., and Knuuti, J.. *J Am Coll Cardiol* 2004 :1027-33
- QRS duration and shortening to predict clinical response to cardiac resynchronization therapy in patients with end-stage heart failure. Molhoek, S. G., VAN Erven, L., Bootsma, M., Steendijk, P., Van Der Wall, E. E., and Schalij, M. J.. *Pacing Clin Electrophysiol* 2004 :308-13
- Effect of cardiac resynchronization therapy on left atrial reverse remodeling and spontaneous echo contrast. Vural, A., Agacdiken, A., Ural, D., Sahin, T., Kozdag, G., Kahraman, G., Ural, E., Akbas, H., Suzer, K., and Komsuoglu, B.. *Tohoku J Exp Med* 2004 :143-53
- Improvement of left ventricular wall synchronization with multisite ventricular pacing in heart failure: a prospective study using Doppler tissue imaging. Lafitte, S., Garrigue, S., Perron, J. M., Bordachar, P., Reuter, S., Jais, P., Haissaguerre, M., Clementy, J., and Roudaut, R.. *Eur J Heart Fail* 2004 :203-12
- Tissue Doppler echocardiography for evaluation of patients with ventricular resynchronization therapy. Santos, J. F., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Soares, L. N., and Ines, L.. *Rev Port Cardiol* 2003 :1363-71
- Effects of cardiac resynchronization therapy on right ventricular function--evaluation with tissue Doppler echocardiography. Santos, J. F., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Soares, L. N., and Ines, L.. *Rev Port Cardiol* 2003 :1347-55
- Effect of biventricular pacing on heart function evaluated by gated blood pool study in patients with end-stage heart failure. Cholewinski, W., Tarkowska, A., Kutarski, A., Stefaniak, B., Poniatowicz-Frasunek, E., and Oleszczak, K.. *Nucl Med Rev Cent East Eur* 2002 :155-7
- Basal asynchrony and resynchronization with biventricular pacing predict long-term improvement of LV function in heart failure patients. Toussaint, J. F., Lavergne, T., Kerrou, K., Froissart, M., Ollitrault, J., Darondel, J. M., Alonso, C., Diebold, B., Le Heuzey, J. Y., Guize, L., and Paillard, M.. *Pacing Clin Electrophysiol* 2003 :1815-23
- Echocardiographic features of patients with heart failure who may benefit from biventricular pacing. Makaryus, A. N., Arduini, A. D., Mallin, J., Chung, E., Kort, S., Shi, Q., Jadonath, R., and Mangion, J.. *Echocardiography* 2003 :217-23
- Comparison between biventricular pacing and single site pacing in patients with poor ventricular function: a hemodynamic study. Varma, C., O'Callaghan, P., Rowland, E., Mahon, N. G., McKenna, W., Camm, A. J., and Brecker, S. J.. *Pacing Clin Electrophysiol* 2003 :551-8
- Biventricular pacing via a persistent left superior vena cava: report of four cases. Gasparini, M., Mantica, M., Galimberti, P., Coltorti, F., Simonini, S., Ceriotti, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :192-6
- Is the outcome of cardiac resynchronization therapy related to the underlying etiology?. Gasparini, M., Mantica, M., Galimberti, P., Genovese, L., Pini, D., Faletta, F., Marchesina, U. L., Mangiavacchi, M., Klersy, C., and Gronda, E.. *Pacing Clin Electrophysiol* 2003 :175-80
- Effect of biventricular pacing on myocardial glucose metabolism in patients with heart failure using fluoro-18-deoxyglucose positron emission tomography. Ohkusu, Y., Takahashi, N., Ishikawa, T., Sumita, S., Kobayashi, T., Matsushita, K., Yamakawa, Y., Uchino, K., Kimura, K., Inoue, T., and Umemura, S.. *Pacing Clin Electrophysiol* 2003 :144-7
- Regional myocardial perfusion during chronic biventricular pacing and after acute change of the pacing mode in patients with congestive heart failure and bundle branch block treated with an atrioventricular sequential biventricular pacemaker. Nielsen, J. C., Bottcher, M., Jensen, H. K., Nielsen, T. T., Pedersen, A. K., and Mortensen, P. T.. *Eur J Heart Fail* 2003 :179-86

Usefulness of brain natriuretic peptide release as a surrogate marker of the efficacy of long-term cardiac resynchronization therapy in patients with heart failure. Sinha, A. M., Filzmaier, K., Breithardt, O. A., Kunz, D., Graf, J., Markus, K. U., Hanrath, P., and Stellbrink, C.. *Am J Cardiol* 2003 :755-8

Predictors of left ventricular reverse remodeling after cardiac resynchronization therapy for heart failure secondary to idiopathic dilated or ischemic cardiomyopathy. Yu, C. M., Fung, W. H., Lin, H., Zhang, Q., Sanderson, J. E., and Lau, C. P.. *Am J Cardiol* 2003 :684-8

Acute effects of cardiac resynchronization therapy on functional mitral regurgitation in advanced systolic heart failure. Breithardt, O. A., Sinha, A. M., Schwammenthal, E., Bidaoui, N., Markus, K. U., Franke, A., and Stellbrink, C.. *J Am Coll Cardiol* 2003 :765-70

Echocardiographic atrioventricular interval optimization in patients with dual-chamber pacemakers and symptomatic left ventricular systolic dysfunction. Gilligan, D. M., Sargent, D., Ponnathpur, V., Dan, D., Zakaib, J. S., and Ellenbogen, K. A.. *Am J Cardiol* 2003 :629-31

Biventricular pacing for congestive heart failure: early experience in surgical epicardial versus coronary sinus lead placement. Izutani, H., Quan, K. J., Biblo, L. A., and Gill, I. S.. *Heart Surg Forum* 2002 :E1-6; discussion E1-6

Noninvasive assessment of cardiac resynchronization therapy for congestive heart failure using myocardial strain and left ventricular peak power as parameters of myocardial synchrony and function. Popovic, Z. B., Grimm, R. A., Perlic, G., Chinchoy, E., Geraci, M., Sun, J. P., Donal, E., Xu, X. F., Greenberg, N. L., Wilkoff, B. L., and Thomas, J. D.. *J Cardiovasc Electrophysiol* 2002 :1203-8

Cardiac resynchronization therapy tailored by echocardiographic evaluation of ventricular asynchrony. Pitzalis, M. V., Iacoviello, M., Romito, R., Massari, F., Rizzon, B., Luzzi, G., Guida, P., Andriani, A., Mastropasqua, F., and Rizzon, P.. *J Am Coll Cardiol* 2002 :1615-22

Tissue Doppler imaging predicts improved systolic performance and reversed left ventricular remodeling during long-term cardiac resynchronization therapy. Sogaard, P., Egeblad, H., Kim, W. Y., Jensen, H. K., Pedersen, A. K., Kristensen, B. O., and Mortensen, P. T.. *J Am Coll Cardiol* 2002 :723-30

Echocardiographic quantification of left ventricular asynchrony predicts an acute hemodynamic benefit of cardiac resynchronization therapy. Breithardt, O. A., Stellbrink, C., Kramer, A. P., Sinha, A. M., Franke, A., Salo, R., Schiffgens, B., Huvelle, E., and Auricchio, A.. *J Am Coll Cardiol* 2002 :536-45

Long-term survival after permanent pacemaker implantation: analysis of predictors for increased mortality. Pyatt, J. R., Somauroo, J. D., Jackson, M., Grayson, A. D., Osula, S., Aggarwal, R. K., Charles, R. G., and Connelly, D. T.. *Europace* 2002 :113-9

Quantitation of basal dyssynchrony and acute resynchronization from left or biventricular pacing by novel echo-contrast variability imaging. Kawaguchi, M., Murabayashi, T., Fetics, B. J., Nelson, G. S., Samejima, H., Nevo, E., and Kass, D. A.. *J Am Coll Cardiol* 2002 :2052-8

Effects of resynchronization therapy on sympathetic activity in patients with depressed ejection fraction and intraventricular conduction delay due to ischemic or idiopathic dilated cardiomyopathy. Hamdan, M. H., Barbera, S., Kowal, R. C., Page, R. L., Ramaswamy, K., Joglar, J. A., Karimkhani, V., and Smith, M. L.. *Am J Cardiol* 2002 :1047-51

Considerations in patients undergoing implantation of a biventricular pacemaker. Lehmann, A., Lang, J., Thaler, E., Zeitler, C., Weisse, U., and Boldt, J.. *J Cardiothorac Vasc Anesth* 2002 :175-9

Cardiac resynchronization in patients with congestive heart failure and chronic atrial fibrillation: effect of upgrading to biventricular pacing after chronic right ventricular pacing. Leon, A. R., Greenberg, J. M., Kanuru, N., Baker, C. M., Mera, F. V., Smith, A. L., Langberg, J. J., and DeLurgio, D. B.. *J Am Coll Cardiol* 2002 :1258-63

Biventricular pacing--early experience. Pires, R., Elvas, L., Monteiro, P., Cristovao, J., Antunes, A., Ventura, M., Costa, M., Ermida, P., and Providencia, L. A.. *Rev Port Cardiol* 2001 :1235-9

Patient selection for biventricular pacing. Lunati, M., Paolucci, M., Oliva, F., Frigerio, M., Magenta, G., Cattafi, G., Vecchi, R., Vicini, I., and Cavaglia, S.. *J Cardiovasc Electrophysiol* 2002 :S63-7

Tissue Doppler echocardiographic evidence of reverse remodeling and improved synchronicity by simultaneously delaying regional contraction after biventricular pacing therapy in heart failure. Yu, C. M., Chau, E., Sanderson, J. E., Fan, K., Tang, M. O., Fung, W. H., Lin, H., Kong, S. L., Lam, Y. M., Hill, M. R., and Lau, C. P.. *Circulation* 2002 :438-45

Echocardiographic prediction of long-term response to biventricular pacemaker in severe heart failure. Oguz, E., Dagdeviren, B., Bilsel, T., Akdemir, O., Erdinler, I., Akyol, A., Ulufer, T., Tezel, T., and Gurkan, K.. *Eur J Heart Fail* 2002 :83-90

Comparison of characteristics in responders versus nonresponders with biventricular pacing for drug-resistant congestive heart failure. Reuter, S., Garrigue, S., Barold, S. S., Jais, P., Hocini, M., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2002 :346-50

Usefulness of biventricular pacing in patients with congestive heart failure and right bundle branch block. Garrigue, S., Reuter, S., Labeque, J. N., Jais, P., Hocini, M., Shah, D. C., Haissaguerre, M., and Clementy, J.. *Am J Cardiol* 2001 :1436-41, A8

Impact of cardiac resynchronization therapy using hemodynamically optimized pacing on left ventricular remodeling in patients with congestive heart failure and

- ventricular conduction disturbances. Stellbrink, C., Breithardt, O. A., Franke, A., Sack, S., Bakker, P., Auricchio, A., Pochet, T., Salo, R., Kramer, A., and Spinelli, J.. *J Am Coll Cardiol* 2001 :1957-65
- Biventricular pacing decreases the inducibility of ventricular tachycardia in patients with ischemic cardiomyopathy. Zagrodzky, J. D., Ramaswamy, K., Page, R. L., Joglar, J. A., Sheehan, C. J., Smith, M. L., and Hamdan, M. H.. *Am J Cardiol* 2001 :1208-10; A7
- Three dimensional echocardiography documents haemodynamic improvement by biventricular pacing in patients with severe heart failure. Kim, W. Y., Sogaard, P., Mortensen, P. T., Jensen, H. K., Pedersen, A. K., Kristensen, B. O., and Egeblad, H.. *Heart* 2001 :514-20
- Reversal of left ventricular remodeling by synchronous biventricular pacing in heart failure. Lau, C. P., Yu, C. M., Chau, E., Fan, K., Tse, H. F., Lee, K., Tang, M. O., Wan, S. H., Law, T. C., Lee, P. Y., Lam, Y. M., and Hill, M. R.. *Pacing Clin Electrophysiol* 2000 :1722-5
- Reduction of hospital days by biventricular pacing. Braunschweig, F., Linde, C., Gadler, F., and Ryden, L.. *Eur J Heart Fail* 2000 :399-406
- Biventricular pacing decreases sympathetic activity compared with right ventricular pacing in patients with depressed ejection fraction. Hamdan, M. H., Zagrodzky, J. D., Joglar, J. A., Sheehan, C. J., Ramaswamy, K., Erdner, J. F., Page, R. L., and Smith, M. L.. *Circulation* 2000 :1027-32
- Biventricular pacing in end-stage heart failure improves functional capacity and left ventricular function. Bakker, P. F., Meijburg, H. W., de Vries, J. W., Mower, M. M., Thomas, A. C., Hull, M. L., Robles De Medina, E. O., and Bredee, J. J.. *J Interv Card Electrophysiol* 2000 :395-404
- How many people with heart failure are appropriate for biventricular resynchronization?. Farwell, D., Patel, N. R., Hall, A., Ralph, S., and Sulke, A. N.. *Eur Heart J* 2000 :1246-50
- Ventricular contraction abnormalities in dilated cardiomyopathy: effect of biventricular pacing to correct interventricular dyssynchrony. Kerwin, W. F., Botvinick, E. H., O'Connell, J. W., Merrick, S. H., DeMarco, T., Chatterjee, K., Scheibly, K., and Saxon, L. A.. *J Am Coll Cardiol* 2000 :1221-7
- Electrocardiographic predictive factors of long-term clinical improvement with multisite biventricular pacing in advanced heart failure. Alonso, C., Leclercq, C., Victor, F., Mansour, H., de Place, C., Pavin, D., Carre, F., Mabo, P., and Daubert, J. C.. *Am J Cardiol* 99 :1417-21
- Potential benefit of biventricular pacing in patients with congestive heart failure and ventricular tachyarrhythmia. Stellbrink, C., Auricchio, A., Diem, B., Breithardt, O. A., Kloss, M., Schondube, F. A., Klein, H., Messmer, B. J., and Hanrath, P.. *Am J Cardiol* 99 :143D-150D
- Acute effects of intraoperative multisite ventricular pacing on left ventricular function and activation/contraction sequence in patients with depressed ventricular function. Saxon, L. A., Kerwin, W. F., Cahalan, M. K., Kalman, J. M., Olgin, J. E., Foster, E., Schiller, N. B., Shinbane, J. S., Lesh, M. D., and Merrick, S. H.. *J Cardiovasc Electrophysiol* 98 :13-21
- Acute hemodynamic improvement by pacing in patients with severe congestive heart failure. Auricchio, A. and Salo, R. W.. *Pacing Clin Electrophysiol* 97 :313-24
- Multisite pacing for end-stage heart failure: early experience. Cazeau, S., Ritter, P., Lazarus, A., Gras, D., Backdach, H., Mundler, O., and Mugica, J.. *Pacing Clin Electrophysiol* 96 :1748-57
- Mechanism of hemodynamic improvement by dual-chamber pacing for severe left ventricular dysfunction: an acute Doppler and catheterization hemodynamic study. Nishimura, R. A., Hayes, D. L., Holmes, D. R. Jr, and Tajik, A. J.. *J Am Coll Cardiol* 95 :281-8
- Hemodynamic benefit of rest and exercise optimization of cardiac resynchronization therapy. Stanton, T., Haluska, B. A., Leano, R., and Marwick, T. H.. *Echocardiography* 2014 :
- QRS analysis using wavelet transformation for the prediction of response to cardiac resynchronization therapy: A prospective pilot study. Vassilikos, V. P., Mantziari, L., Dakos, G., Kamperidis, V., Chouvarda, I., Chatzizisis, Y. S., Kalpidis, P., Theofilogiannakos, E., Paraskevidis, S., Karvounis, H., Mochlas, S., Maglaveras, N., and Styliadis, I. H.. *J Electrocardiol.* 2014 :59-65
- New Approach for Rotational Dyssynchrony Using Three-Dimensional Speckle Tracking Echocardiography. Lee, Y., Mori, N., Nakamura, D., Yoshimura, T., Taniike, M., Makino, N., Kato, H., Egami, Y., Shutta, R., Tanouchi, J., Yamada, Y., and Nishino, M.. *Echocardiography* 2013 :
- Utility of cardiac magnetic resonance imaging, echocardiography and electrocardiography for the prediction of clinical response and long-term survival following cardiac resynchronisation therapy. Ellims, A. H., Pfluger, H., Elsik, M., Butler, M. J., Hare, J. L., and Taylor, A. J.. *Int. J. Card. Imaging* 2013 :1303-1311
- Acute haemodynamic comparison of multisite and biventricular pacing with a quadripolar left ventricular lead. Thibault, B., Dubuc, M., Khairy, P., Guerra, P. G., MacLe, L., Rivard, L., Roy, D., Talajic, M., Karst, E., Ryu, K., Paiement, P., and Farazi, T. G.. *Europace* 2013 :984-991
- Effect of cardiac resynchronization therapy on left ventricular diastolic function: Implications for clinical outcome. Doltra, A., Bijnens, B., Tolosana, J. M., Gabrielli, L., Castel, M. A., Berruezo, A., Brugada, J., Mont, L., and Sitges, M.. *J. Card. Fail.* 2013 :795-801
- Left ventricular dyssynchrony assessed by gated SPECT phase analysis is an independent predictor of death in patients with advanced coronary artery disease and reduced left ventricular function not undergoing cardiac resynchronization therapy. Uebleis, C., Hellweger, S., Laubender, R. P., Becker, A., Sohn, H.-Y., Lehner, S., Haug, A., Bartenstein, P., Cumming, P., Van Kriekinge, S.

D., Slomka, P. J., and Hacker, M.. Eur. J. Nucl. Med. Mol. Imaging 2012 :1561-1569

The role of real time three dimensional echocardiography to guide optimal lead positioning and improve response to cardiac resynchronization therapy: A prospective pilot study. Fouad, D. A. and Eldeen, R. M. S.. Egypt. Heart J. 2012 :155-163

Usefulness of cardiac resynchronisation therapy in patients with right bundle branch block: Is viability an important piece of the puzzle?. O'Connor, K., Senechal, M., Lancellotti, P., Dubois, M., Magne, J., Champagne, J., Philippon, F., Pierard, L., and O'Hara, G.. Int. J. Cardiol. 2010 :e17-e20

Iterative cardiac output measurement for optimizing cardiac resynchronization therapy: A randomized, blinded, crossover study. Reinsch, N., Konorza, T., Woydowski, D., Bruck, H., Volsek, M., Muller-Tasch, T., Neumann, T., Erbel, R., and Wieneke, H.. PACE Pacing Clin. Electrophysiol. 2010 :1188-1194

Original articles dyssynchrony indices to predict response to cardiac resynchronization therapy a comprehensive prospective single-center study. Miyazaki, C., Redfield, M. M., Powell, B. D., Lin, G. M., Herges, R. M., Hodge, D. O., Olson, L. J., Hayes, D. L., Espinosa, R. E., Rea, R. F., Bruce, C. J., Nelson, S. M., Miller, F. A., and Oh, J. K.. Circ. Heart Fail. 2010 :565-573

Evaluation of exercise tolerance and quality of life and their correlation in patients treated with cardiac resynchronization therapy (CRT): Ocena wydolnosci fizycznej i jakosci zycia oraz zaleznosci wystepujacych pomiedzy badanymi parametrami u pacjentow leczonych stymulacja resynchronizujaca (CRT). Smolis-Bak, E., Chwyczko, T., Wojcicka, M., Kowalik, I., Kazimierska, B., Dabrowski, R., Sterlinski, M., Maciag, A., and Szwed, H.. Fizjoterapia 2009 :3-9

Assessment of cardiac resynchronization therapy response. Cattadori, G., Giralaldi, F., Berti, M., Carbucicchio, C., Pepi, M., Della Bella, P., Contini, M., Apostolo, A., Berna, G., Andreini, D., Sciomer, S., and Agostoni, P.. Int. J. Cardiol. 2009 :240-242

Comparison of benefits from cardiac resynchronization therapy between patients with ischemic cardiomyopathy and patients with idiopathic dilated cardiomyopathy. Saeid, A. K., Bozorgi, A., Davoodi, G., Sadeghian, S., Yaminisharif, A., Moezi, A., Alenabi, T., and Khoshnevis, M.. J. Tehran. Uni. Heart. Cent. 2009 :115-118

Stroke work or systolic dP/dtmax to evaluate acute response to cardiac resynchronization therapy: are they interchangeable?. De Roest, G., Knaapen, P., Gotte, M., Hendriks, T., Allaart, C., De Cock, C., and Van Rossum, A.. Eur. J. Heart Fail. 2009 :706-708

Predicting Response to Cardiac Resynchronization Therapy with Cross-Correlation Analysis of Myocardial Systolic Acceleration: A New Approach to Echocardiographic Dyssynchrony Evaluation. Olsen, N. T., Mogelvang, R., Jons, C., Fritz-Hansen, T., and Sogaard, P.. J. Am. Soc. Echocardiogr. 2009 :657-664

Prevalence and inter-relationship of different Doppler measures of dyssynchrony in patients with heart failure and prolonged QRS: A report from CARE-HF. Edner, M., Kim, Y., Hansen, K. N., Nissen, H., Espersen, G., La Rosee, K., Maru, F., Freemantle, N., Cleland, J., and Sogaard, P.. Cardiovasc. Ultrasound 2009 :

Comparison of Benefits and Mortality in Cardiac Resynchronization Therapy in Patients With Atrial Fibrillation Versus Patients in Sinus Rhythm (Results of the Spanish Atrial Fibrillation and Resynchronization [SPARE] Study). Tolosana, J. M., Hernandez Madrid, A., Brugada, J., Sitges, M., Garcia Bolao, I., Fernandez Lozano, I., Martinez Ferrer, J., Quesada, A., Macias, A., Marin, W., Escudier, J. M., Gomez, A. A., Gimenez Alcala, M., Tamborero, D., Berrueto, A., and Mont, L.. Am. J. Cardiol. 2008 :444-449

Left ventricular resynchronization predicted by individual performance of right and left univentricular pacing: A study on the impact of sequential biventricular pacing on ventricular dyssynchrony. Phillips, K. P., Harberts, D. B., Johnston, L. P., and O'Donnell, D.. Heart Rhythm 2007 :147-153

Predictors of response to cardiac resynchronization therapy - Importance of left ventricular dyssynchrony: Preditores de resposta a terapeutica de ressincronizac ao cardiaca - Importancia da dessincronia ventricular esquerda. Santos, J. F., Parreira, L., Madeira, J., Seixo, F., Mendes, L., Lopes, C., Venancio, J., Lourenco, J., Caetano, F., Ines, L., and Mendes, M.. Rev. Port. Cardiol. 2006 :569-581

Predicting mortality and rehospitalization in heart failure patients with Home Monitoring - The Home CARE pilot study. Ellery, S., Pakrashi, T., Paul, V., and Sack, S.. Clin. Res. Cardiol. 2006 :III/29-III/35

Cardiac resynchronization. Socioeconomic and health care impact. Mortality of procedure. Cost-benefit ratio. Impact on functional class/quality of life. Prognosis and follow-up: Resincronizacion cardiaca. Impacto socioeconomico sanitario. Mortalidad del procedimiento. Relacion coste-beneficio. Impacto en la clase funcional/calidad de vida. Pronostico y seguimiento. Hernandez Madrid, A., Escobar Cervantes, C., Marin Marin, I., and Bernal Morell, E.. Invest. Cardiovasc. 2005 :135-150

Cardiac resynchronisation therapy: An option for inotrope-supported patients with end-stage heart failure?. Cowburn, P. J., Patel, H., Jolliffe, R. E., Wald, R. W., and Parker, J. D.. Eur. J. Heart Fail. 2005 :215-217

Assessment of right ventricular oxidative metabolism by PET in patients with idiopathic dilated cardiomyopathy undergoing cardiac resynchronisation therapy. Knuuti, J., Sundell, J., Naum, A., Engblom, E., Koistinen, J., Ylitalo, A., Stolen, K. Q., Kalliokoski, R., Nekolla, S. G., Bax, K. E. J. J., and Airaksinen, K. E. J.. Eur. J. Nucl. Med. Mol. Imaging 2004 :1592-1598

Tissue Doppler Echocardiography for Evaluation of Patients with Ventricular Resynchronization Therapy: Ecocardiografia com Doppler Tecidular para Avaliacao de Doentes com Terapeutica de Ressincronizacao Ventricular.

- Ferreira Santos, J., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Neves Soares, L., and Ines, L.. *Rev. Port. Cardiol.* 2003 :1363-1371
- Effects of Cardiac Resynchronization Therapy on Right Ventricular Function - Evaluation with Tissue Doppler Echocardiography: Efeitos da Terapeutica de Ressincronizacao Ventricular na Funcao Ventricular Direita - Avaliacao por Ecocardiografia com Doppler Tecidular. Ferreira Santos, J., Caetano, F., Parreira, L., Madeira, J., Cardoso, P., Fonseca, N., Segurado, F., Neves Soares, L., and Ines, L.. *Rev. Port. Cardiol.* 2003 :1347-1355
- Acute Improvement of Left Ventricular Relaxation as a Predictor of Volume Reduction after Cardiac Resynchronization Therapy: A Pilot Study Assessing the Value of Left Ventricular Hemodynamic Parameter. Kato H., Shimano M., Sumi T., Murakami H., Kada K., Inden Y., Tsuboi N., and Murohara T.. *PACE Pacing Clin. Electrophysiol.* 2014 :
- A U-shaped type II contraction pattern in patients with strict left bundle branch block predicts super-response to cardiac resynchronization therapy. Jackson T., Sohal M., Chen Z., Child N., Sammut E., Behar J., Claridge S., Carr-White G., Razavi R., and Rinaldi C.A.. *Heart Rhythm* 2014 :
- CHADS2 and CHA2DS2-VASc scores to predict morbidity and mortality in heart failure patients candidates to cardiac resynchronization therapy. Paoletti Perini A., Bartolini S., Pieragnoli P., Ricciardi G., Perrotta L., Valleggi A., Vergaro G., Michelotti F., Boggian G., Sassone B., Mascioli G., Emdin M., and Padeletti L.. *Europace* 2014 :71-80
- Left atrial volume and the benefit of cardiac resynchronization therapy in the MADIT-CRT Trial. Kuperstein R., Goldenberg I., Moss A.J., Solomon S., Bourgoun M., Shah A., McNitt S., Zareba W., and Klempfner R.. *Circ. Heart Fail.* 2014 :154-160
- Relationship between two-dimensional speckle-tracking septal strain and response to cardiac resynchronization therapy in patients with left ventricular dysfunction and left bundle branch block: A prospective pilot study. Marechaux S., Guiot A., Castel A.L., Guyomar Y., Semichon M., Delelis F., Heuls S., Ennezat P.-V., Graux P., and Tribouilloy C.. *J. Am. Soc. Echocardiogr.* 2014 :501-511
- Evaluation of in-hospital NT-proBNP changes in heart failure patients to identify the six-month clinical response following cardiac resynchronization therapy. Davoodi G., Bagheri A., Yamini-Sharif A., Boroumand M., Saroukhani S., and Sahebjam M.. *Acta Med. Iran.* 2014 :15-23
- Predictors of response to cardiac resynchronization therapy in heart failure patients. Kazemisaeid A., Sardari A., Ejmalian G., Lotfi-Tokaldany M., Sahebjam M., Safir-Mardanloo A., Yaminisharif A., Montazeri M., Jalali A., and Sadeghian H.. *Exp. Clin. Cardiol.* 2014 :3982-3990
- The left ventricular lead electrical delay predicts response to cardiac resynchronisation therapy. Zhang H., Dai Z., Xiao P., Pan C., Zhang J., Hu Z., and Chen S.. *Heart Lung Circul.* 2014 :936-942
- The impact of age on clinical outcomes following cardiac resynchronisation therapy. Guha K., Konstantinou D., Mantziari L., Modi B.N., Chandrasekaran B., Khalique Z., McDonagh T., and Sharma R.. *J. Intervent. Card. Electrophysiol.* 2014 :95-102
- Association between presystolic ventricular flash and left ventricular functional recovery after cardiac resynchronization therapy. Ito T., Kizawa S., Nogi S., Shimamoto S., Yokoyama K., and Ishizaka N.. *Echocardiography* 2014 :149-154
- Presence of notched QRS on paced electrocardiographs as a predictor of poor response to cardiac resynchronization therapy. Wang J.Y., Zhang P., Li X.B., Zhu T.G., Li H., Wang L., Li D., Wu C.C., Gao Y., Tian Y., and Guo J.H.. *Chin. Med. J.* 2014 :2727-2734
- Pre-capillary pulmonary hypertension and right ventricular dilation predict clinical outcome in cardiac resynchronization therapy. Chatterjee N.A., Upadhyay G.A., Singal G., Parks K.A., Dec G.W., Singh J.P., and Lewis G.D.. *JACC Heart Fail.* 2014 :230-237
- Dynamic relationship of left-ventricular dyssynchrony and contractile reserve in patients undergoing cardiac resynchronization therapy. Stankovic I., Aaronson M., Smith H.-J., Voros G., Kongsgaard E., Neskovic A.N., Willems R., Aakhus S., and Voigt J.-U.. *Eur. Heart J.* 2014 :48-55a
- QRS analysis using wavelet transformation for the prediction of response to cardiac resynchronization therapy: A prospective pilot study. Vassilikos V.P., Mantziari L., Dakos G., Kamperidis V., Chouvarda I., Chatzizisis Y.S., Kalpidis P., Theofilogiannakos E., Paraskevaidis S., Karvounis H., Mochlas S., Maglaveras N., and Styliadis I.H.. *J. Electrocardiol.* 2014 :59-65
- Development and optimization of SPECT gated blood pool cluster analysis for the prediction of CRT outcome. Lalonde M., Wells R.G., Birnie D., Ruddy T.D., and Wassenaar R.. *Med. Phys.* 2014 :
- Predictive value of serum cystatin C on cardiac resynchronization therapy. Ruan Z.-B., Zhu L., Chen G.-C., and Yin Y.-G.. *Exp. Clin. Cardiol.* 2014 :3434-3446
- Quality of Life in Cardiac Resynchronization Recipients: Association with Response and Impact on Outcome. Lenarczyk, R., Jedrzejczyk-Patej, E., Mazurek, M., Szulik, M., Kowalski, O., Pruszkowska, P., Sokal, A., Sredniawa, B., Boidol, J., Kowalczyk, J., Podolecki, T., Mencil, G., and Kalarus, Z.. *Pacing Clin Electrophysiol* 2014 :
- Effects of immune system on long-term results of cardiac resynchronization therapy. Mascioli, G., Lombardi, C., Franceschini, F., Metra, M., Lucca, E., Michelotti, F., Canevese, F., Bakhtadze, N., Belvito, C., Sciatti, E., Vizzardi, E., Bontempi, L., and Curnis, A.. *Minerva Cardioangiol* 2014 :
- Left ventricular electrical activation during right ventricular pacing in heart failure patients with LBBB: Visualization by electrocardiographic imaging and implications for

cardiac resynchronization therapy. Varma, N.. J Electrocardiol 2014 :

Comparative Effectiveness of Cardiac Resynchronization Therapy in Combination With Implantable Defibrillator in Patients With Heart Failure and Wide QRS Duration. Bilchick, K. C. and Stukenborg, G. J.. Am J Cardiol 2014 :

T-Wave Area Predicts Response to Cardiac Resynchronization Therapy in Patients with Left Bundle Branch Block. Engels, E. B., Vegh, E. M., VAN Deursen, C. J., Vernooy, K., Singh, J. P., and Prinzen, F. W.. J Cardiovasc Electrophysiol 2014 :

Women with nonischemic cardiomyopathy have a favorable prognosis and a better left ventricular remodeling than men after cardiac resynchronization therapy. Cipriani, M., Landolina, M., Oliva, F., Ghio, S., Vargiu, S., Rordorf, R., Raineri, C., Ammirati, E., Petracci, B., Campo, C., Bisetti, S., and Lunati, M.. J Cardiovasc Med (Hagerstown) 2014 :

What is the lowest value of left ventricular baseline ejection fraction that predicts response to cardiac resynchronization therapy?. Agacdiken Agir, A., Celikyurt, U., Sahin, T., Yilmaz, I., Karauzum, K., Bozyel, S., Ural, D., and Vural, A.. Med Sci Monit 2014 :1641-6

Identification of Genetic Markers for Treatment Success in Heart Failure Patients: Insight from Cardiac Resynchronization Therapy. Schmitz, B., DeMaria, R., Gatsios, D., Chrysanthakopoulou, T., Landolina, M., Gasparini, M., Campolo, J., Parolini, M., Sanzo, A., Galimberti, P., Bianchi, M., Lenders, M., Brand, E., Parodi, O., Lunati, M., and Brand, S. M.. Circ Cardiovasc Genet 2014 :

Relationship between pre-implant ejection fraction and outcome after cardiac resynchronization therapy in symptomatic patients. Schuchert, A., Muto, C., Maounis, T., Ella, R. O., Polauck, A., and Padeletti, L.. Acta Cardiol 2014 :424-32

Clinical effectiveness of CRT and ICD therapy in heart failure patients by racial/ethnic classification: insights from the IMPROVE HF registry. Ziaieian, B., Zhang, Y., Albert, N. M., Curtis, A. B., Gheorghiade, M., Heywood, J. T., Mehra, M. R., O'Connor, C. M., Reynolds, D., Walsh, M. N., Yancy, C. W., and Fonarow, G. C.. J Am Coll Cardiol 2014 :797-807

Echocardiographic and clinical response to cardiac resynchronization therapy in heart failure patients with and without previous right ventricular pacing. Gage, R. M., Burns, K. V., and Bank, A. J.. Eur J Heart Fail 2014 :

The association between biventricular pacing and cardiac resynchronization therapy-defibrillator efficacy when compared with implantable cardioverter defibrillator on outcomes and reverse remodelling. Ruwald, A. C., Kutiyifa, V., Ruwald, M. H., Solomon, S., Daubert, J. P., Jons, C., Brenyo, A., McNitt, S., Do, D., Tanabe, K., Al-Ahmad, A., Wang, P., Moss, A. J., and Zareba, W.. Eur Heart J 2014 :

Progressive ventricular dysfunction among nonresponders to cardiac resynchronization therapy: Baseline predictors and associated clinical outcomes. Friedman, D. J., Upadhyay, G. A., Rajabali, A., Altman, R. K., Orencole, M., Parks, K. A., Moore, S. A., Park, M. Y., Picard, M. H., Ruskin, J. N., Singh, J. P., and Heist, E. K.. Heart Rhythm 2014 :

A prospective evaluation of cardiovascular magnetic resonance measures of dyssynchrony in the prediction of response to cardiac resynchronization therapy. Sohal, M., Duckett, S. G., Zhuang, X., Shi, W., Ginks, M., Shetty, A., Sammut, E., Kozerke, S., Niederer, S., Smith, N., Ourselin, S., Rinaldi, C., Rueckert, D., Carr-White, G., and Razavi, R.. J Cardiovasc Magn Reson 2014 :58

Prognostic role of coronary flow reserve for left ventricular functional improvement after cardiac resynchronization therapy in patients with dilated cardiomyopathy. Djordjevic Dikic, A., Nikcevic, G., Raspopovic, S., Jovanovic, V., Tesic, M., Beleslin, B., Stepanovic, J., Giga, V., and Milasinovic, G.. Eur Heart J Cardiovasc Imaging 2014 :

Regression of Fragmented QRS Complex: A Marker of Electrical Reverse Remodeling in Cardiac Resynchronization Therapy. Yang, X. W., Hua, W., Wang, J., Liu, Z. M., Ding, L. G., Chen, K. P., and Zhang, S.. Ann Noninvasive Electrocardiol 2014 :

Association between Resolution of Fragmented QRS and Response to Cardiac Resynchronization Therapy. Celikyurt, U., Karauzum, K., Sahin, T., Agacdiken, A., Vural, A., and Ural, D.. Ann Noninvasive Electrocardiol 2014 :

Coronary sinus biomarker sampling compared to peripheral venous blood for predicting outcomes in patients with severe heart failure undergoing cardiac resynchronization therapy: The BIOCRT study. Truong, Q. A., Januzzi, J. L., Szymonifka, J., Thai, W. E., Wai, B., Lavender, Z., Sharma, U., Sandoval, R. M., Grunau, Z. S., Basnet, S., Babatunde, A., Ajijola, O. A., Min, J. K., and Singh, J. P.. Heart Rhythm 2014 :

Transient variations of transthoracic impedance as a predictor of heart failure and death in patients with implanted defibrillators. Mitrani, R. D., Sager, S. J., Moscucci, M., Cogan, J., and Myerburg, R. J.. Int J Cardiol 2014 :473-7

Patients with long-term permanent pacemakers have a high prevalence of left ventricular dysfunction. Gierula, J., Cubbon, R. M., Jamil, H. A., Byrom, R. J., Waldron, Z. L., Pavitt, S., Kearney, M. T., and Witte, K. K.. J Cardiovasc Med (Hagerstown) 2014 :

PR interval identifies clinical response in patients with non-left bundle branch block: a Multicenter Automatic Defibrillator Implantation Trial-Cardiac Resynchronization Therapy substudy. Kutiyifa, V., Stockburger, M., Daubert, J. P., Holmqvist, F., Olshansky, B., Schuger, C., Klein, H., Goldenberg, I., Brenyo, A., McNitt, S., Merkely, B., Zareba, W., and Moss, A. J.. Circ Arrhythm Electrophysiol 2014 :645-51

Does Prior Valve Surgery Change Outcome in Patients Treated with Cardiac Resynchronization Therapy?. Bose, A., Upadhyay, G. A., Kandala, J., Heist, E. K., Mela, T., Parks, K. A., and Singh, J. P.. J Cardiovasc Electrophysiol 2014 :

Impact of Pacing Site on QRS Duration and Its Relationship to Hemodynamic Response in Cardiac Resynchronization Therapy for Congestive Heart Failure. Derval, N., Bordachar, P., Lim, H. S., Sacher, F., Ploux, S., Laborde, J., Steendijk, P., Deplagne, A., Ritter, P., Garrigue, S., Denis, A., Hocini, M., Haissaguerre, M., Clementy, J., and Jais, P.. J Cardiovasc Electrophysiol 2014 :1012-20

Functional Response to Cardiac Resynchronization Therapy in Patients with Renal Dysfunction and Subsequent Long-Term Mortality. Bogdan, S., Klempfner, R., Sabbag, A., Luria, D., Gurevitz, O., Bar-Lev, D., Lipchenca, I., Nof, E., Kuperstein, R., Goldenberg, I., Eldar, M., Glikson, M., and Beinart, R.. J Cardiovasc Electrophysiol 2014 :

EAARN score, a predictive score for mortality in patients receiving cardiac resynchronization therapy based on pre-implantation risk factors. Khatib, M., Tolosana, J. M., Trucco, E., Borrás, R., Castel, A., Berrueto, A., Doltra, A., Sitges, M., Arbelo, E., Matas, M., Brugada, J., and Mont, L.. Eur J Heart Fail 2014 :802-9

Usefulness of hyponatremia as a predictor for adverse events in patients with heart failure receiving cardiac resynchronization therapy. Sharma, A. K., Vegh, E. M., Kandala, J., Orencole, M., Januszkiewicz, L., Bose, A., Miller, A., Parks, K. A., Heist, E. K., and Singh, J. P.. Am J Cardiol 2014 :83-7

Predictors of positive response to cardiac resynchronization therapy. Rinkuniene, D., Bucyte, S., Ceseviciute, K., Abramavicius, S., Baronaite-Dudoniene, K., Laukaitiene, J., Kazakevicius, T., Zabiela, V., Sileikis, V., Puodziukynas, A., and Jurkevicius, R.. BMC Cardiovasc Disord 2014 :55

Renal Dysfunction and Clinical Outcomes of Patients Undergoing ICD and CRTD Implantation: Data from the Israeli ICD Registry. Eisen, A., Suleiman, M., Strasberg, B., Sela, R., Rosenheck, S., Freedberg, N. A., Geist, M., Ben-Zvi, S., Goldenberg, I., Glikson, M., and Haim, M.. J Cardiovasc Electrophysiol 2014 :990-7

Cardiac resynchronisation therapy: pacemaker versus internal cardioverter-defibrillator in patients with impaired left ventricular function. Looi, K. L., Gajendragadkar, P. R., Khan, F. Z., Elsik, M., Begley, D. A., Fynn, S. P., Grace, A. A., Heck, P. M., Virdee, M., and Agarwal, S.. Heart 2014 :794-9

Outcomes in pacemaker-dependent patients upgraded from conventional pacemakers to cardiac resynchronization therapy-defibrillators. Adelstein, E., Schwartzman, D., Bazaz, R., Jain, S., Gorcsan, J. 3rd, and Saba, S.. Heart Rhythm 2014 :1008-14

Impact of mechanical activation, scar, and electrical timing on cardiac resynchronization therapy response and clinical

outcomes. Bilchick, K. C., Kuruvilla, S., Hamirani, Y. S., Ramachandran, R., Clarke, S. A., Parker, K. M., Stukenborg, G. J., Mason, P., Ferguson, J. D., Moorman, J. R., Malhotra, R., Mangrum, J. M., Darby, A. E., Dimarco, J., Holmes, J. W., Salerno, M., Kramer, C. M., and Epstein, F. H.. J Am Coll Cardiol 2014 :1657-66

Septal flash predicts cardiac resynchronization therapy response in patients with permanent atrial fibrillation. Gabrielli, L., Marincheva, G., Bijns, B., Doltra, A., Tolosana, J. M., Borrás, R., Castel, M. A., Berrueto, A., Brugada, J., Mont, L., and Sitges, M.. Europace 2014 :1342-9

Cardiac resynchronization therapy restored ventricular septal myocardial perfusion and enhanced ventricular remodeling in patients with nonischemic cardiomyopathy presenting with left bundle branch block. Ogano, M., Iwasaki, Y. K., Tanabe, J., Takagi, H., Umemoto, T., Hayashi, M., Miyauchi, Y., and Shimizu, W.. Heart Rhythm 2014 :836-41

Impact of diabetes mellitus on the clinical response to cardiac resynchronization therapy in elderly people. Sardu, C., Marfella, R., and Santulli, G.. J Cardiovasc Transl Res 2014 :362-8

Incremental value of larger interventricular conduction time in improving cardiac resynchronization therapy outcome in patients with different QRS duration. D'Onofrio, A., Botto, G., Mantica, M., LA Rosa, C., Occhetta, E., Verlati, R., Molon, G., Ammendola, E., Villani, G. Q., Bongiorno, M. G., Bianchi, V., Gelmini, G. P., Valsecchi, S., and Ciardiello, C.. J Cardiovasc Electrophysiol 2014 :500-6

Not left ventricular lead position, but the extent of immediate asynchrony reduction predicts long-term response to cardiac resynchronization therapy. Poller, W. C., Dreger, H., Schwerg, M., Bondke, H., and Melzer, C.. Clin Res Cardiol 2014 :457-66

Effect of cardiac resynchronization therapy on the sequence of mechanical activation assessed by two-dimensional radial strain imaging. Auger, D., Hoke, U., Thijssen, J., Abate, E., Yiu, K. H., Ewe, S. H., Witkowski, T. G., Leong, D. P., Holman, E. R., Ajmone Marsan, N., Schalij, M. J., Bax, J. J., and Delgado, V.. Am J Cardiol 2014 :982-7

Circulating endothelial progenitor cells as a predictor of response to cardiac resynchronization therapy: the missing piece of the puzzle?. Antonio, N., Soares, A., Carvalho, T., Fernandes, R., Paiva, A., Ventura, M., Cristovao, J., Elvas, L., Goncalves, L., Providencia, L. A., Ribeiro, C. F., and Pego, G. M.. Pacing Clin Electrophysiol 2014 :731-9

The effect of intermittent atrial tachyarrhythmia on heart failure or death in cardiac resynchronization therapy with defibrillator versus implantable cardioverter-defibrillator patients: a MADIT-CRT substudy (Multicenter Automatic Defibrillator Implantation Trial With Cardiac Resynchronization Therapy). Ruwald, A. C., Pietrasik, G., Goldenberg, I., Kutyla, V., Daubert, J. P., Ruwald, M. H., Jons, C., McNitt, S., Wang, P., Zareba, W., and Moss, A. J.. J Am Coll Cardiol 2014 :1190-7

Utility of speckle tracking echocardiography to characterize dysfunctional myocardium in patients with ischemic cardiomyopathy referred for cardiac resynchronization therapy. Kydd, A. C., Khan, F., Gopalan, D., Ring, L., Rana, B. S., Virdee, M. S., and Dutka, D. P.. Echocardiography 2014 :736-43

Long-term outcome of 'super-responder' patients to cardiac resynchronization therapy. Zecchin, M., Proclemer, A., Magnani, S., Vitali-Serdoz, L., Facchin, D., Muser, D., Nordio, A., Barbati, G., Puggia, I., Sinagra, G., and Proclemer, A.. Europace 2014 :363-71

Usefulness of echocardiographically guided left ventricular lead placement for cardiac resynchronization therapy in patients with intermediate QRS width and non-left bundle branch block morphology. Marek, J. J., Saba, S., Onishi, T., Ryo, K., Schwartzman, D., Adelstein, E. C., and Gorcsan, I. I. J. American journal of cardiology 2014 :107-16

Appendix D: Evidence tables

Table D1: Study characteristics of included articles

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
CARE-HF Main Trial- Cleland,2004 ¹ Sub Studies- Cleland,2006 ² Cleland,2007 ³ Cleland,2009 ⁴ Cleland,2012 ⁵ Ghio,2009 ⁶ Gras,2007 ⁷ Wikstrom,2009 ⁸	18	RCT	CRT-P Medtronic InSync or InSync III device	Industry
MADIT CRT Main Trial- Moss,2009 ⁹ Sub Studies- Arshad,2011 ¹⁰ Barsheshet,2011 ¹¹ Goldenberg,2011 ¹² Goldenberg,2014 ¹³ Hsu,2012 ¹⁴ Jamerson,2014 ¹⁵ Ouellet,2012 ¹⁶ Penn, 2010 ¹⁷ Ruwald,2014 ¹⁸ Solomon,2010 ¹⁹ Tompkins,2013 ²⁰ Zareba,2011, ²¹	36	RCT	CRT-D Boston Scientific	Industry
RAFT Main Trial- Tang,2010 ²² Sub Studies- Birnie,2013 ²³ Gilis,2014 ²⁴ Healey,2012 ²⁵	NR	RCT	CRT-D Commercially available transvenous leads and devices (Medtronic)	Funded by the Canadian Institutes of Health Research and Medtronic of Canada
MIRACLE ICD Main Trial- Young,2003 ²⁶	6	RCT	CRT-D InSync Model 8040, Medtronic	Industry
MIRACLE Main Trial- Abraham,2002 ²⁷ Sub Study- Sutton,2003 ²⁸	6	RCT	CRT-P InSync Model 8040, Medtronic	Industry

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
COMPANION Main Trial- Bristow,2004 ²⁹ Sub Studies- Anand, 2009 ³⁰ Carson,2005 ³¹	2 years; median follow-up varied for each group (11.9 months arm 1; 16.2 months arm 2; 15.7 months arm 3)	RCT	CRT-P and D Pacemakers were Contak TR model 1241, Guidant; CRT-D was Contac CD model 1823, Guidant)	Industry
MUSTIC Main Trial- Cazeau,2001 ³² Sub Study- Leclercq,2002 ³³	6	RCT	CRT-P Chorum 7336 MSP, ELA Medical, Montrouge, France, and InSync 8040, Medtronic	Industry
Abraham,2004 ³⁴ MIRACLE ICD II Trial	6	RCT	CRT-D Model 7272 InSync ICD, Medtronic, Inc Industry	NR
SMART AV Sub Studies- Cheng, 2012 ³⁵ Gold,2011 ³⁶		RCT	CRT-P NR	Industry
MASCOT Sub Study- Schuchert,2013 ³⁷	12	RCT	CRT-P and D Frontierw or Frontierw II CRT-P or Epicw HF or Atlasw HF CRT-D	Industry St. Jude Medical
Diab, 2011 ³⁸	6	RCT	CRT-D NR	Unclear, some investigators receive funds, but not wholly funded study
Garikipati,2014 ³⁹	12	RCT	CRT-P NR	NR
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	6	RCT	CRT-D Industry	NR
Lozano,2000 ⁴¹	3	RCT	CRT-P NR	NR
Pinter,2009 ⁴²	6	RCT	CRT-D CONTAK CD CHF Device, model no.	Industry

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
			1,823, or CONTAK RENEWAL HF Device, model no. H135	
Pokushalov,2010 ⁴³	18	RCT	CRT-P InSync III® CRT-P NA	NR
Leclercq,2007 ⁴⁴ RD-CHF Study	6	Randomiz ed cross over	CRT-P NR	NR
Auricchio,2014 ⁴⁵ CLEPSYDRA Sub Study-	13	Prospectiv e cohort	CRT-D Paradym™ RF CRT-D	Industry
Azizi, 2006 ⁴⁶	1.7 +/- 1.3 years	Retrospec tive cohort	CRT-P and D Tripos DR, Stratos, Chorus MSP, Talent MSP, Contak TR.TR2, Insync 8040, Insync III, Frontier, Vitatron, Tupos, Koronos, Renewal, Insync ICD, Insync Marquis, Sentry, Atlas, Epic	NR
Bilchick, 2010 ⁴⁷	NR	Retrospec tive cohort	CRT-D NR	Government
Bossard,2014 ⁴⁸	NR	Retrospec tive cohort	CRT-D NR	No Funding
Boven,2013 ⁴⁹	NR	Retrospec tive cohort	CRT-D NR	NR
Boven,2013 ⁵⁰	NR	Retrospec tive cohort	CRT-P and D Medtronic Inc.,Minneapolis, MN, USA or Boston Scientific Inc., Indianapolis, IN, USA	NR
Cock, 2003 ⁵¹	2-3	Prospectiv e cohort	CRT-P Medtronic LDS, Biotronik SCOUT	NR
Duray,2008 ⁵²	6	Prospectiv e cohort	CRT-D NR	Other-specify No external financial support
Gasparini,2009 ⁵³ RELEVANT Study	NR	Prospectiv e cohort	CRT-D Medtronic InSync III Protect device and InSync III Marquis, InSync Maximo, InSync Sentry, Medtronic Inc., Minneapolis, MN, USA	Industry
Gopalumurugan,2014 ⁵⁴	NA	Retrospec tive cohort	CRT-D NR	NR
Gras,2002 ⁵⁵	12	Prospectiv e cohort	CRT-P	Industry

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
			InSync model 8040	
Haugaa,2014 ⁵⁶	24	Prospectiv e cohort	CRT-D NR	NR
Hong-xia,2006 ⁵⁷	NR	Prospectiv e cohort	CRT-P Impulse generator: Insync 8040, Insync III 8042(Medtronic, USA). LV lead: 2188, 2187, 4189, 4191,4193 (Medtronic, USA)	NR
Killu,2011 ⁵⁸	NR	Retrospec tive cohort	CRT-P and D NR	NR
Knight,2004 ⁵⁹	9	Prospectiv e cohort	CRT-D NR	NR
Krahn,2002 ⁶⁰	NR	Prospectiv e cohort	CRT-P InSync model 8040, 7272, 8042	Non-profit
Kuhlkamp, 2002 ⁶¹	Median: 185 days	Prospectiv e cohort	CRT-D InSync 7272 ICD	Industry
Landolina,2011 ⁶²	NR	Prospectiv e cohort	CRT-D NR	Industry
Leong,2013 ⁶³	6	Prospectiv e cohort	CRT-P and D Contak Renewal,Contak TR or Contak CD (Guidant USA), Insync Marquis,Insync III, Insync Sentry or Protecta (Medtronic Inc. USA), AtlasHF (St Jude Medical USA) and Lumax (Biotronik, Germany)	Government
Mascioli,2012 ⁶⁴	NR	Prospectiv e cohort	CRT-D NR	NR
Masoudi,2014 ⁶⁵	NA	Retrospec tive cohort	CRT-D NR	Government
Mortensen,2004 ⁶⁶	6	Prospectiv e cohort	CRT-P InSync III® CRT-P	NR
Nian-Sang,2010 ⁶⁷	NR	Retrospec tive cohort	CRT-D NR	NR
Niebauer,2014 ⁶⁸	NA	Retrospec tive cohort	CRT-D NR	NR
Ricci,2014 ⁶⁹	NR	Prospectiv e cohort	CRT-D Medtronic CRT-ICD	Industry
Rickard,2013 ⁷⁰	NR	Retrospec	CRT-P and D	NR

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
		tive cohort	NR	
Romeyer- Bouchard,2010 ⁷¹	NR	Prospectiv e cohort	CRT-P and D NR	NR
Shanks,2011 ⁷²	6	Prospectiv e cohort	CRT-P Contak Renewal 4RF, TR, or CD [Boston Scientific, St Paul, MN]; InSync Sentry or III [Medtronic Inc, Minneapolis, MN]; or Lumax 340 HF- T [Biotronik, Berlin, Germany]	Industry
Shen,2009 ⁷³	NR	Retrospec tive cohort	CRT-D NR	NR
Shen,2009 ⁷⁴	NR	Retrospec tive cohort	CRT-P NR	NR
Shen,2011 ⁷⁵	NR	Retrospec tive cohort	CRT-P and D NR	NR
Stabile, 2009 ⁷⁶	Death	Prospectiv e cohort	CRT-P and D NR	NR
Stahlberg,2005 ⁷⁷	36	Prospectiv e cohort	CRT-P InSync,Thera,Kappa,Chorum,Talent, Frontier,Affinity	NR
Strimel, 2011 ⁷⁸	34 (mean)	Retrospec tive cohort	CRT-D NR	NR
Swindle,2010 ⁷⁹	NR	Retrospec tive cohort	CRT-P and D NR	Government
Takaya,2014 ⁸⁰	6	Prospectiv e Cohort	NR	None
Theuns,2005 ⁸¹	NR	Prospectiv e cohort	CRT-D InSync 7272 and 7279 (Medtronic Inc., Minneapolis, MN,USA), Contak CD, Renewal I, and Renewal II (GuidantInc., St. Paul, MN, USA), and Epic HF	NR
Vado,2014 ⁸²	NR	Prospectiv e cohort	CRT-D NR	NR
Verbrugge,2013 ⁸³	NA	Retrospec tive cohort	CRT-P and D NR	No Funding
Verbrugge,2013 ⁸⁴	NR	Prospectiv e cohort	CRT-P and D NR	Industry

Author,Year Trial	Planned length of follow-up (months)	Study design	Device type Device name	Funding source
Wollmann,2014 ⁸⁵	NR	Controlled trial, non- randomize d	CRT-D Protecta® CRT-D	Industry
Zhang, 2009 ⁸⁶	3	Prospectiv e cohort	CRT-P NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced,CRT-D= Cardiac Resynchronization Therapy with Defibrillator,NR=Not Reported

Table D2: Population characteristics –CRT P effectiveness

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Abraham,2002 ² MIRACLE	Arm 1(Control group):225	F: 72(32) W:205(91)	Mean: 64.7 Med: NR Range: NR SD: 11.2	131(58)	NR	Mean: 165 Med: NR Range: NR SD: 20	NR	III: 205(91)	Mean: 21.6 Med: NR Range: NR SD: 6.2	Creat: NR GFR: NR
	Arm 2(Cardiac Resynchroniza tion Group):228	F: 73(32) W:205(90)	Mean: 63.9 Med: NR Range: NR SD: 10.7	114(50)	NR	Mean: 167 Med: NR Range: NR SD: 21	NR	III: 205(90)	Mean: 21.8 Med: NR Range: NR SD: 6.3	Creat: NR GFR: NR
Cleland,2004 ¹ CARE-HF	Arm 1(Medical Therapy Alone):404	F: 111(27) NR	Mean: NR Med: 66 Range: NR SD: NR	144(36)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	IV: 27(7)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: 61ml/min/1 .73m ²
	Arm 2(Medical Therapy plus Cardiac Resynchroniza tion(CRT- P):409	F: 105(26) NR	Mean: NR Med: 67 Range: NR SD: NR	165(40)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	IV: 23(6)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: 60ml/min/1 .73m ²
Cleland,2006 ² CARE HF Sub Study	Arm 1(Medical Therapy Alone):404	F: 109(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	144(36)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	III: 377(93)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT):409	F: 106(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	165(40)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	III: 386(94)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Cleland,2007 ³ CARE HF Sub Study	Arm 1(Medical therapy alone):404	F: 111(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	142(35)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	IV: 27(7)	Mean: NR Med: 25 Range: 22- 29 SD: NR	Creat: NR GFR: 61ml/min
	Arm 2(CRT- P):409	F: 105(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	167(41)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	IV: 23(6)	Mean: NR Med: 25 Range: 21- 29 SD: NR	Creat: NR GFR: 60ml/min
Cleland,2012 ⁵ CARE HF Sub Study	Arm 1(No CRT):404	F: 109(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	144(36)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	III: 377(93)	Mean: Med: 25 Range: SD:	Creat: NR GFR: NR
	Arm 2(CRT):409	F: 106(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	165(40)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	III: 386(94)	Mean: Med: 25 Range: SD:	Creat: NR GFR: NR
Leclercq,2007 ⁴⁴	Arm 1(BiV First):25	F: 0(0) NR	Mean: 73 Med: NR Range: NR SD: 9.3	14(56)	14(56)	Mean: 212 Med: NR Range: NR SD: 28	NR	NR	Mean: 24 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Arm 1(RV First):19	F: 4(21.1) NR	Mean: 74 Med: NR Range: NR SD: 6	9(47.4)	7(36.8)	Mean: 199 Med: NR Range: NR SD: 21	NR	NR	Mean: 27 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Arm 1(BiV First):25	F: 0(0) NR	Mean: 73 Med: NR Range: NR SD: 9.3	14(56)	14(56)	Mean: 212 Med: NR Range: NR SD: 28	NR	NR	Mean: 24 Med: NR Range: NR SD:	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 1(RV First):19	F: 4(21.1) NR	Mean: 74 Med: NR Range: NR SD: 6	9(47.4)	7(36.8)	Mean: 199 Med: NR Range: NR SD: 21	NR	NR	Mean: 27 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Overall(All Patients):44	F: 4(9.1) NR	Mean: 73 Med: NR Range: NR SD: 8	23(52.3)	21(47.7)	Mean: 206 Med: NR Range: NR SD: 26	NR	NR	Mean: 25 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Overall(All Patients):44	F: 4(9.1) NR	Mean: 73 Med: NR Range: NR SD: 8	23(52.3)	21(47.7)	Mean: 206 Med: NR Range: NR SD: 26	NR	NR	Mean: 25 Med: NR Range: NR SD:	Creat: NR GFR: NR
Pokushalov,2010 ⁴³	Arm 1(All patients):178	F: 18(10) NR	Mean: 62.8 Med: NR Range: NR SD: 7	NR	NR	Mean: 139 Med: NR Range: NR SD: 28	NR	NR	Mean: 29 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Arm 1(CABG):87	F: 7(8) NR	Mean: 64 Med: NR Range: NR SD: 5	NR	NR	Mean: 144 Med: NR Range: NR SD: 28	NR	NR	Mean: 30 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Arm 2(CABG+CRT) :91	F: 8(9) NR	Mean: 62 Med: NR Range: NR SD: 4	NR	NR	Mean: 137 Med: NR Range: NR SD: 29	NR	NR	Mean: 28 Med: NR Range: NR SD:	Creat: NR GFR: NR
Sutton,2003 ²⁸ MIRACLE Sub Study	Arm 1(Control group):151	F: 47(31.1) W:136(90.1) AA:NR O:NR	Mean: 64.8 Med: NR Range: NR SD: 11.4	NR	NR	Mean: 164.7 Med: NR Range: NR SD: 20.6	NR	III: 143(94.7)	Mean: 24.3 Med: NR Range: NR SD: 6.8	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(CRT group(CRT- P)):172	F: 60(34.9) W:155(90.1) AA:NR O:NR	Mean: 63.9 Med: NR Range: NR SD: 11	NR	NR	Mean: 166.4 Med: NR Range: NR SD: 19.7	NR	III: 155(90.1)	Mean: 24.5 Med: NR Range: NR SD: 6.8	Creat: NR GFR: NR
Wikstrom,2009 ⁸ CARE HF Sub Study	Medical therapy alone	111(27)	Mean: 66 Med: NR Range: NR SD: NR	142(35)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	IV:27(7)	Mean: NR Med: 25 Range:22- 29 SD:NR	Creat: NR GFR: 61ml/min
	CRT-P	105(26)	Mean: 67 Med: NR Range: NR SD: NR	167(41)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	IV:(23(6)	Mean: NR Med: 25 Range:21- 29 SD:NR	Creat: NR GFR:60ml/ min
Ghio, 2009 ⁶ CARE HF Sub Study	CRT	90(NR)	Mean: 67 Med: NR Range:59- 73 SD: NR	168(46)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	IV:(23(6)	Mean: NR Med: NR Range:NR SD:NR	Creat: NR GFR: NR
	Medical Therapy	102(NR)	Mean: 66 Med: NR Range: 59- 73 SD: NR	135(36)	NR	Mean: 160 Med: NR Range: 152- 180 SD: NR	NR	IV:(23(6)	Mean: NR Med: NR Range:NR SD:NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Bristow,2004 ²⁹ COMPANION	Arm 1(Optimal Pharmacologic al Therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Anand, 2009 ³⁰ COMPANION Sub Study	Arm 1(OPT):308	F: 96(31) NR	Mean: NR Med: 68 Range: NR SD: NR	NR(59)	NR	Mean: NR Med: 158 Range: NR SD: NR	NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: NR Med: 67 Range: NR SD: NR	NR(54)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: NR Med: 66 Range: NR SD: NR	NR(55)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Carson,2005 ³¹ COMPANION Sub Study	Arm 1(Optimal Pharmacologic al therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range:NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 3(CRT-D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Cleland,2009 ⁴ CARE HF Sub Study	Overall(Medic al therapy alone):404	F: 111(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	142(35)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	IV: 27(7)	Mean: NR Med: 25 Range: 22- 29 SD: NR	Creat: NR GFR: 61ml/min
	Overall(CRT-P):409	F: 105(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	167(41)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	NR	III: NR IV: 23(6)	Mean: NR Med: 25 Range: 21- 29 SD: NR	Creat: NR GFR: 60ml/min
Cazeau,2001 ³² MUSTIC	All patients	F: 17(25.4) NR	Mean: 63 Med: NR Range: NR SD: 10	NR	NR	Mean: 176 Med: NR Range: NR SD: 19	LBBB:NR(87) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: 67(100)	Mean: 23 Med: NR Range: NR SD: 7	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	All patients	F: 8(17.8) NR	Mean: 66 Med: NR Range: NR SD: 9	NR	45(100)	Mean: 207 Med: NR Range: NR SD: 17	NR	III: 45(100)	Mean: 25 Med: NR Range: NR SD: 10	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D3: Population characteristics –CRT P harms

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Cleland,2004 ¹ CARE HF	Arm 1(Medical Therapy Alone):404	F: 111(27) NR	Mean: NR Med: 66 Range: NR SD: NR	144(36)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 27(7)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: 61ml/min/1 .73m ²
	Arm 2(Medical Therapy plus Cardiac Resynchroniza tion (CRT- P)):409	F: 105(26) NR	Mean: NR Med: 67 Range: NR SD: NR	165(40)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 23(6)	Mean: NR Med: 25 Range: NR SD: NR	Creat: NR GFR: 60ml/min/1 .73m ²

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Gras,2002 ⁵⁵	Overall(Overall):103	F: 22(21.4) NR	Mean: 67 Med: NR Range: NR SD: 10	49(47.6)	NR	Mean: 178 Med: NR Range: NR SD: 28	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	III: 70(68) IV: 33(32)	Mean: 22 Med: NR Range: NR SD: 6	Creat: NR GFR: NR
Krahn,2002 ⁶⁰	Overall(Overall):45	F: 8(18) NR	Mean: 65.3 Med: NR Range: NR SD: 10.3	31(69)	15(33)	Mean: 166 Med: NR Range: NR SD: 20	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	II: 3(7) III: 34(76) IV: 8(18)	Mean: 19 Med: NR Range: NR SD: 5	Creat: NR GFR: NR
Mortensen,200 4 ⁶⁶	Overall(Overall):189	F: 52(27.5) NR	Mean: 66.3 Med: NR Range: NR SD: 10.6	79(41.8)	NR	Mean: 176.3 Med: NR Range: NR SD: 27	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	II: 33(17.5) III: 129(68.3) IV: 27(14.3)	Mean: 24.4 Med: NR Range: NR SD: 6.9	Creat: NR GFR: NR
Stahlberg,2005 ⁷	Overall(Overall):40	F: 2(5) NR	Mean: 65 Med: NR Range: NR SD: 10	26(65)	12(30)	Mean: 173 Med: NR Range: NR SD: 22	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	III: 35(87.5) IV: 5(12.5)	Mean: 23 Med: NR Range: NR SD: 9	Creat: NR GFR: NR
Pokushalov,201 0 ⁴³	Arm 1(All patients):178	F: 18(10) NR	Mean: 62.8 Med: NR Range: NR SD: 7	NR	NR	Mean: 139 Med: NR Range: NR SD: 28	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR		Mean: 29 Med: NR Range: NR SD:	Creat: NR GFR: NR
	Arm 1(CABG):87	F: 7(8) NR	Mean: 64 Med: NR Range: NR SD: 5	NR	NR	Mean: 144 Med: NR Range: NR SD: 28	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: 30 Med: NR Range: NR SD:	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(CABG+CRT) :91	F: 8(9) NR	Mean: 62 Med: NR Range: NR SD: 4	NR	NR	Mean: 137 Med: NR Range: NR SD: 29	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: 28 Med: NR Range: NR SD:	Creat: NR GFR: NR
Hong- xia,2006 ⁵⁷	Overall(Overall):117	F: 31(26.5) NR	Mean: 53 Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: NR Med: NR Range: NR SD:	Creat: NR GFR: NR
Garikipati,2014 ³ ₉	Overall(Overall):21	F: NR NR	Mean: 68.3 Med: 67 Range: 52- 85 SD: NR	10(47.6)	NR	Mean: 159.5 Med: NR Range: 132- 184 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: NR Med: NR Range: NR SD:	Creat: NR GFR: NR
Cock, 2003 ⁵¹	Overall():7	F: 2(28.6) NR	Mean: 62 Med: Range: 43- 79 SD: 12	NR	NR	Mean: NR Med: NR Range: NR SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: NR Med: NR Range: NR SD:	Creat: NR GFR: NR
Cleland,2009 ⁴ CARE HF Sub Study	Overall(Medic al therapy alone):404	F: 111(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	142(35)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 27(7)	Mean: NR Med: 25 Range: 22- 29 SD:	Creat: NR GFR: 61ml/min
Cleland,2009 ⁴ CARE HF Sub Study	Overall(CRT- P):409	F: 105(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	167(41)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 23(6)	Mean: NR Med: 25 Range: 21- 29 SD:	Creat: NR GFR: 60ml/min

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Gras,2007 ⁷ CARE HF Sub Study	Overall(Medic al therapy alone):404	F: 111(27) NR	Mean: 66 Med: NR Range: 59- 72 SD: NR	142(35)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 27(7)	Mean: NR Med: 25 Range: 22- 29 SD:	Creat: NR GFR: 61ml/min
Gras,2007 ⁷ CARE HF Sub Study	Overall(CRT- P):409	F: 105(26) NR	Mean: 67 Med: NR Range: 60- 73 SD: NR	167(41)	NR	Mean: NR Med: 160 Range: 152- 180 SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	IV: 23(6)	Mean: NR Med: 25 Range: 21- 29 SD:	Creat: NR GFR: 60ml/min
Bristow,2004 ²⁹ COMPANION	Arm 1(Optimal Pharmacologic al Therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D4: Population characteristics –CRT D effectiveness

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Young,2003 ²⁶ MIRACLE ICD	Arm 1(Control):182	F: 41(22.5) NR	Mean: 67.6 Med: NR Range: NR SD: 9.2	138(75.8)	NR	Mean: 162 Med: NR Range: NR SD: 22	LBBB :NR RBBB: 24(13) IVCD: NR PBBBlock: NR	III: 163(89.6) IV: 19(10.4)	Mean: 23.9 Med: NR Range: NR SD: 6	Creat: NR GFR:NR
	Arm 2(CRT):187	F: 45(24.1) NR	Mean: 66.6 Med: NR Range: NR SD: 11.3	119(64)	NR	Mean: 165 Med: NR Range: NR SD: 22	LBBB :NR RBBB: 25(13) IVCD: NR PBBBlock: NR	III: 165(88.2) IV: 22(11.8)	Mean: 24.2 Med: NR Range: NR SD: 6.5	Creat: NR GFR: NR
Healey,2012 ²⁵ RAFT Sub Study	Arm 1(ICD):115	F: NR(14.8) NR	Mean: 71.6 Med: NR Range: NR SD: 7.3	NR	115(100)	Mean: 151 Med: NR Range: NR SD: 23.6	NR	II: NR(74.8)	Mean: 22.9 Med: NR Range: NR SD: 5.3	Creat: 117 µmol/L GFR: NR
	Arm 2(CRT- ICD):114	F: NR(9.6) NR	Mean: 70.4 Med: NR Range: NR SD: 7.7	NR	114(100)	Mean: 153.4 Med: NR Range: NR SD: 24.7	NR	II: NR(69.3)	Mean: 22.3 Med: NR Range: NR SD: 5.1	Creat: 132 µmol/L GFR: NR
Solomon,2010 ¹⁹ MADIT CRT Sub Study	Arm 1(ICD):623	F: 154(24.7) W:567(91) O:Non White 56(9)	Mean: 64.3 Med: NR Range: NR SD: 10.7	334(53.6)	NR	Mean: 159.3 Med: NR Range: NR SD: 20.4	LBBB :444(71.2) RBBB: 79(12.7) IVCD: NR PBBBlock: NR	II: 523(83.9)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: 68.8ml/min /1.73m ²
	Arm 2(CRT- D):749	F: 184(24.6) W:684(91.3) O:Non	Mean: 64.4 Med: NR Range: NR SD: 10.8	411(54.9)	NR	Mean: 158.6 Med: NR Range: NR SD: 19.5	LBBB :532(71) RBBB: 83(11.1) IVCD: NR	II: 640(85.4)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: 69.4ml/min /1.73m ²

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
		White 65(8.7)					PBBBlock: NR			
Tang,2010 ²² RAFT	Arm 1(ICD):904	F: 172(19) NR	Mean: 66.2 Med: NR Range: NR SD: 9.4	587(64.9)	115(12.7)	Mean: 158.3 Med: NR Range: NR SD: 24	LBBB :643(71.1) RBBB: 93(10.3) IVCD: 101(11.2) PBBBlock: 67(7.4)	II: 730(80.8) III: 174(19.2)	Mean: 22.6 Med: NR Range: NR SD: 5.1	Creat: NR GFR: NR
	Arm 2(ICD- CRT):894	F: 136(13.2) NR	Mean: 66.1 Med: NR Range: NR SD: 9.3	614(68.7)	114(12.8)	Mean: 157 Med: NR Range: NR SD: 23.6	LBBB :652(72.9) RBBB: 68(7.6) IVCD: 106(11.9) PBBBlock: 68(7.6)	II: 708(79.2) III: 186(20.8)	Mean: 22.6 Med: NR Range: NR SD: 5.4	Creat: NR GFR: NR
Abraham,2004 ³ ₄ MIRACLE ICD II	Arm 1(Control):101	F: 10(9.9) NR	Mean: 63.1 Med: NR Range: NR SD: 12.1	59(58.4)	NR	Mean: 165 Med: NR Range: NR SD: 23	LBBB :NR RBBB: 21(20.8) IVCD: NR PBBBlock: NR	II: 101(100)	Mean: 24.6 Med: NR Range: NR SD: 6.7	Creat: NR GFR: NR
	Arm 2(CRT):85	F: 10(11.8) NR	Mean: 63 Med: NR Range: NR SD: 12.8	47(56.3)	NR	Mean: 166 Med: NR Range: NR SD: 25	LBBB :NR RBBB: 10(11.8) IVCD: NR PBBBlock: NR	II: 85(100)	Mean: 24.4 Med: NR Range: NR SD: 6.6	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Higgins,2003 ⁴⁰	Arm 1(CRT):245	F: 37(15) NR	Mean: 66 Med: NR Range: NR SD: 11	NR(67)	NR	Mean: 160 Med: NR Range: NR SD: 27	LBBB :NR(54) RBBB: NR(14) IVCD: NR(32) PBBBlock: NR	II: NR(32) III: NR(60) IV: NR(8)	Mean: 21 Med: NR Range: NR SD: 6	Creat: NR GFR: NR
	Arm 2(No CRT):245	F: 42(17) NR	Mean: 66 Med: NR Range: NR SD: 11	NR(71)	NR	Mean: 156 Med: NR Range: NR SD: 26	LBBB :NR(55) RBBB: NR(12) IVCD: NR(33) PBBBlock: NR	II: NR(33) III: NR(57) IV: NR(10)	Mean: 21 Med: NR Range: NR SD: 6	Creat: NR GFR: NR
Moss,2009 ⁹ MADIT CRT	Arm 1(ICD):731	F: 178(24.4) W:657/724(90.7) AA:56/724(7.7) O:11/724(1 .5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: 5	Creat: 1.2mg/dl GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:979/108 3(90.4) AA:87/1083 (8) O:17/1083(1.6)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: 5	Creat: 1.2mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Diab, 2011 ³⁸	Arm 1(CRT-D):27	F: 6(22.2) NR	Mean: 65 Med: NR Range: NR SD: 8	15	NR	Mean: 159 Med: NR Range: NR SD: 17	NR	II: NR(25) III: 92.6	Mean: 22 Med: NR Range: NR SD: 7	Creat: NR GFR: NR
	Arm 2(Mechanical dyssynchrony absent based on echo/TDI criteria):46	F: 5(10.9) NR	Mean: 66 Med: NR Range: NR SD: 11	36	NR	Mean: 138 Med: NR Range: NR SD: 18	NR	II: NR(41) III: 89.1	Mean: 26 Med: NR Range: NR SD: 5	Creat: NR GFR: NR
	Arm 3(CRT-D from mechanical dyssynchrony absent based on echo/TDI criteria):24	F: 3(12.5) NR	Mean: 67 Med: NR Range: NR SD: 7	17	NR	Mean: 134 Med: NR Range: NR SD: 15	NR	II: NR(21) III: 87.5	Mean: 25 Med: NR Range: NR SD: 5	Creat: NR GFR:NR
	Arm 4(ICD from mechanical dyssynchrony absent based on echo/TDI criteria):22	F: 2(9.1) NR	Mean: 65 Med: NR Range: NR SD: 13	16	NR	Mean: 142 Med: NR Range: NR SD: 20	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	II: NR(17) III: 77.3	Mean: 27 Med: NR Range: NR SD: 6	Creat: NR GFR: NR
Tompkins, 2013 ²⁰ MADIT CRT Sub Study	Arm 1(ICD):87	F: 6(7) NR	Mean: 64.3 Med: NR Range: NR SD: 9.7	74(85)	NR	Mean: 150.5 Med: NR Range: NR SD: 13.8	LBBB :NA(NA) RBBB: 87(100) IVCD: NR PBBBlock: NR	I: 20(23)	Mean: 25 Med: NR Range: NR SD: 5	Creat: 1.3mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(CRT-D LAFB):80	F: 7(9) NR	Mean: 68.2 Med: NR Range: NR SD: 9.9	69(86)	NR	Mean: 155.2 Med: NR Range: NR SD: 15.7	LBBB :NA(NA) RBBB: 80(100) IVCD: NR PBBBlock: NR	I: 17(21)	Mean: 25 Med: NR Range: NR SD: 5	Creat: 1.25mg/dl GFR: NR
	Arm 3(CRT-D non-LAFB):52	F: 5(10) NR	Mean: 63.5 Med: NR Range: NR SD: 11.3	47(90)	NR	Mean: 152.5 Med: NR Range: NR SD: 14	LBBB :NA(NA) RBBB: 52(100) IVCD: NR PBBBlock: NR	I: 9(17)	Mean: 26 Med: NR Range: NR SD: 5	Creat: 1.29mg/dl GFR: NR
Pinter,2009 ⁴²	Arm 1(CRT ON):36	F: 8(22.2) NR	Mean: 66.3 Med: NR Range: NR SD: 8.6	NR	6(16.7)	Mean: NR Med: NR Range: NR SD: NR	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: 24.2 (MUGA) 21.2 (ECHO) Med: NR Range: NR SD: 7.5	Creat: 121numol/ L GFR: NR
	Arm 2(CRT OFF):36	F: 7(19.4) NR	Mean: 66.1 Med: NR Range: NR SD: 8.8	NR	2(5.6)	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: 26.8 (MUGA) 24 (ECHO) Med: NR Range: NR SD: 8.4	Creat: 114numol/ L GFR: NR
Birnie,2013 ²³ RAFT Sub Study	Arm 1(ICD):904	F: 172(19) NR	Mean: 66.2 Med: Range: SD: 9.4	587(64.9)	115(12.7)	Mean: 158.3 Med: NR Range: NR SD: 24	LBBB :643(71.1) RBBB: 93(10.3) IVCD: 101(11.2)	II: 730(80.8) III: 174(19.2)	Mean: 22.6 Med: NR Range: NR SD: 5.1	Creat: NR GFR: 60.8ML/MI N/1.73M2

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
							PBBBlock: 67(7.4)			
	Arm 2(ICD- CRT):894	F: 136(13.2) NR	Mean: 66.1 Med: Range: SD: 9.3	614(68.7)	114(12.8)	Mean: 157 Med: NR Range: NR SD: 23.6	LBBB :652(72.9) RBBB: 68(7.6) IVCD: 106(11.9) PBBBlock: 68(7.6)	II: 708(79.2) III: 186(20.8)	Mean: 22.6 Med: NR Range: NR SD: 5.4	Creat: NR GFR: 59.5ML/MI N/1.73M2
Arshad,2011 ¹⁰ MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:657/724(90.7) AA:56/724(7.7) O:11/724(1 .5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:979/108 3(90.4) AA:87/1083 (8) O:17/1083(1.6)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Zareba,2011 ²¹ MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:657/724(90.7) AA:56/724(7.7) O:11/724(1 .5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:979/108 3(90.4) AA:87/1083 (8) O:17/1083(1.6)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
Barsheshet,201 1 ¹¹ MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:657/724(90.7) AA:56/724(7.7) O:11/724(1 .5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:979/108 3(90.4) AA:87/1083	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock:	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
		(8) O:17/1083(1.6)					NR			
Lozano,2000 ⁴¹	Arm 1(BV Pacing):109	F: NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: Med: Range: SD:	Creat: NR GFR: NR
	Arm 2(No Pacing):113	F: NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: Med: Range: SD:	Creat: NR GFR: NR
	Overall(Total): 222	F: 38(17) NR	Mean: 65 Med: NR Range: NR SD: 10	71(32)	NR	Mean: NR Med: NR Range: NR SD: NR	NR	II: 78(35) III: 127(57) IV: 18(8)	Mean: 22 Med: Range: SD: 7	Creat: NR GFR: NR
Goldenberg, 2014 ¹³	Arm 1(ICD): 327	F: 72(23) NR	Mean: NR Med: NR Range: NR SD: NR	166(51)	NR	NR	NR	I: 51(16)	NR	Creat: NR GFR: NR
	Arm 2(CRTD): 327	F: 128(24) NR	Mean: NR Med: NR Range: NR SD: NR	279(53)	NR	NR	NR	I: 73(14)	NR	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D5: Population characteristics –CRT D harms

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Duray,2008 ⁵²	Overall(Overall):79	F: 16(20) NR	Mean: 79 Med: NR Range: 35- 83 SD: 11	38(48)	NR	Mean: NR Med: NR Range: NR SD: NR	NR	I: NR(22) II: 28(NR) IV: NR(23NR)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Abraham,2004 ³ 4	Arm 1(Control):101	F: 10(9.9) O:NR(59)	Mean: 63.1 Med: NR Range: NR SD: 12.1	59(58.4)	NR	Mean: 165 Med: NR Range: NR SD: 23	LBBB :NR RBBB: 21(20.8) IVCD: NR PBBBlock: NR	II: 101(100)	Mean: 24.6 Med: NR Range: NR SD: 6.7	Creat: NR GFR: NR
	Arm 2(CRT):85	F: 10(11.8) O:NR(47)	Mean: 63 Med: NR Range: NR SD: 12.8	47(56.3)	NR	Mean: 166 Med: NR Range: NR SD: 25	LBBB :NR RBBB: 10(11.8) IVCD: NR PBBBlock: NR	II: 85(100)	Mean: 24.4 Med: NR Range: NR SD: 6.6	Creat: NR GFR: NR
Auricchio,2014 ⁴ 5	Overall(All patients):521	F: 94(18) NR	Mean: 67.4 Med: NR Range: NR SD: 10.1	NR	107(20.5)	Mean: 155.3 Med: NR Range: NR SD: 26.6	LBBB :349(67) RBBB: 49(9.4) IVCD: 54(10.9) PBBBlock: 40(7.7)	I: 1(0.2) II: 31(6.1) III: 443(85) IV: 34(6.7)	Mean: 25.7 Med: NR Range: NR SD: 7.7	Creat: 1.4mg/dl GFR:
Bossard,2014 ⁴⁸	Overall(All patients):49	F: 11(22) O:NR(18)	Mean: 63 Med: NR Range: NR SD: 10	18(27)	NR	Mean: 161 Med: NR Range: NR SD: 26	LBBB :46(94) RBBB: NR IVCD: NR PBBBlock: NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Boven,2013 ⁴⁹	Overall(Total Study Population):54 3	F: 142(26) O:NR(294)	Mean: 64 Med: NR Range: NR SD: 11	294(54)	153(28)	Mean: NR Med: NR Range: NR SD: NR	LBBB :410(82) RBBB: 26(5.2) IVCD: 10(2) PBBBlock: 55(10)	I: 21(4.1) II: 178(35) III: 304(60) IV: 8(1.6)	Mean: 24 Med: NR Range: NR SD: 7.4	Creat: 115umol/L GFR: NRNR
Gasparini,2009 ⁵ ₃	Arm 1(Protect Group(Standar d CRT-D)):164	F: 38(23.2) NR	Mean: 64.2 Med: NR Range: NR SD: 11.7	NR	29(17.7)	Mean: 163 Med: NR Range: NR SD: NR	NR	NR	Mean: 24.6 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(Control CRT plus ICD)):160	F: 40(25) NR	Mean: 64.2 Med: NR Range: NR SD: 10.8	NR	23(14.4)	Mean: 160 Med: NR Range: NR SD: NR	NR	NR	Mean: 25.4 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Gillis,2014 ²⁴ RAFT Sub Study	Arm 1(ICD):904	F: 172(19) O:NR(587)	Mean: 66.2 Med: NR Range: NR SD: 9.4	587(64.9)	115(12.7)	Mean: 158.3 Med: NR Range: NR SD: 24	LBBB :643(71.1) RBBB: 93(10.3) IVCD: 101(11.2) PBBBlock: 67(7.4)	II: 730(80.8) III: 174(19.2)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(ICD- CRT):894	F: 136(15.2) O:NR(614)	Mean: 66.1 Med: NR Range: NR SD: 9.3	614(68.7)	114(12.8)	Mean: 157 Med: NR Range: NR SD: 23.6	LBBB :652(72.9) RBBB: 68(7.6) IVCD: 106(11.9) PBBBlock: 68(7.6)	II: 708(79.2) III: 186(20.8)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Higgins,2003 ⁴⁰	Arm 1(CRT):245	F: 37(15) NR	Mean: 66 Med: NR Range: NR SD: 11	NR(67)	NR	Mean: 160 Med: NR Range: NR SD: 27	LBBB :NR(54) RBBB: NR(14) IVCD: NR PBBBlock: NR	II: NR(32) III: NR(60) IV: NR(8)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(No CRT):245	F: 42(17) NR	Mean: 66 Med: NR Range: NR SD: 11	NR(71)	NR	Mean: 156 Med: NR Range: NR SD: 26	LBBB :NR(55) RBBB: NR(12) IVCD: NR PBBBlock: NR	II: NR(33) III: NR(57) IV: NR(10)	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Knight,2004 ⁵⁹	Overall(Overall):443	F: 75(17) NR	Mean: 66 Med: NR Range: NR SD: 11	NR	98(22)	Mean: 158 Med: NR Range: NR SD: 22	LBBB :253(57) RBBB: 58(13) IVCD: 133(30) PBBBlock: NR	II: 146(33) III: 257(58) IV: 40(9)	Mean: 21 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Landolina,2011 ⁶ ₂	Overall(Overall):3253	F: 650(20) O:NR(1364)	Mean: 67 Med: NR Range: NR SD: 10	1364(42)	383(12)	Mean: 148 Med: NR Range: NR SD: 30	NR	NR	Mean: 27 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Moss,2009 ⁹ MADIT CRT	Arm 1(ICD):731	F: 178(24.4) W:90.7(56/ 724) AA:7.7(11/ 724)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
		O:1.5(401)								
	Arm 2(CRT- D):1089	F: 275(25.3) W:90.4(87/ 1083) AA:8(17/10 83) O:1.6(598)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
Nian- Sang,2010 ⁶⁷	Overall(Overall (CRT_D)):54	F: 19(35) O:NR(14)	Mean: NR Med: NR Range: NR SD: NR	14(26)	NR	Mean: 125.2 Med: NR Range: NR SD: NR	NR	NR	Mean: 32.1 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Ouellet,2012 ¹⁶ MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:90.7(56/ 724) AA:7.7(11/ 724) O:1.5	Mean: 64 Med: NR Range: NR SD: 11	NR	NR	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:90.4(87/ 1083) AA:8(17/10 83) O:1.6	Mean: 65 Med: NR Range: NR SD: 11	NR	NR	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: 1.2mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Strimel, 2011 ⁷⁸	Overall():84	F: 21(25) O:(66)	Mean: 82.68 Med: NR Range: NR SD:	66(78.6)	NR	Mean: Med: Range: SD:	NR	I: 6(7.1) II: 33(39.3) III: 41(48.8) IV: 4(4.8)	Mean: 28.1 Med: NR Range: NR NR SD: 6.6	Creat: NR GFR: NR
Theuns,2005 ⁸¹	Arm 1(Primary prophylaxis):3 8	F: 12(32) NR	Mean: 60 Med: NR Range: NR SD: 9	NR	9(24)	Mean: NR Med: NR Range: NR SD: NR	NR	II: 4(11) III: 34(89)	Mean: 24 Med: NR Range: NR SD: 10	Creat: NR GFR: NR
	Arm 2(Secondary prophylaxis):4 8	F: 8(17) NR	Mean: 63 Med: NR Range: NR SD: 11	NR	14(29)	Mean: NR Med: NR Range: NR SD: NR	NR	II: 18(38) III: 30(62)	Mean: 23 Med: NR Range: NR SD: 8	Creat: NR GFR: NR
	Overall(Total): 86	F: 20(23) NR	Mean: 61 Med: NR Range: NR SD: 10	NR	23(27)	Mean: NR Med: NR Range: NR SD: NR	NR	II: 22(26) III: 64(74)	Mean: 23 Med: NR Range: NR SD: 8	Creat: NR GFR: NR
Boven,2013 ⁵⁰	Arm 1(Functional Nonresponder s):100	F: 26(25) NR	Mean: NR Med: 70 Range: NR SD: NR	59(59)	28(28)	Mean: NR Med: NR Range: NR SD: NR	LBBB :61(62) RBBB: 7(7.1) IVCD: 11(11) PBBBlock: 16(16)	I: 6(7.5) II: 30(38) III: 40(50) IV: 4(5)	Mean: 20 Med: NR Range: NR SD: NR	Creat: 110 GFR: NR
	Arm 2(Functional Responders):4 2	F: 16(38) NR	Mean: NR Med: 68 Range: NR SD: NR	16(38)	9(21)	Mean: NR Med: NR Range: NR SD: NR	LBBB :37(93) RBBB: 0(0) IVCD: 1(2.5) PBBBlock: 2(5)	I: 9(25) II: 15(42) III: 12(33) IV: 0(0)	Mean: 23 Med: NR Range: NR SD: NR	Creat: 92 GFR: NR
	Overall(Total): 142	F: 42(30) NR	Mean: NR Med: 69 Range: NR SD: NR	75(53)	37(26)	Mean: NR Med: NR Range: NR SD: NR	LBBB :98(71) RBBB: 7(5.1) IVCD: 12(8.7) PBBBlock:	I: 15(13) II: 45(39) III: 52(45) IV: 4(3.4)	Mean: 20 Med: NR Range: NR SD: NR	Creat: 105 GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
							18(13)			
Kuhlkamp, 2002 ⁶¹	Overall	F: 7(9) NR	Mean: 63.8 Med: Range:41- 79 SD: 8.8	NR	5(6)	Mean: NR Med: NR Range: NR SD: NR	NR	I: 26(32) II: 48(59) III: 7(9) IV: NR	Mean: 25 Med: NR Range: NR SD: 7	Creat: NR GFR: NR
Vado,2014 ⁸²	Overall(Overall):45	F: 11(45)	Mean: 70.3 Med: NR Range: NR SD: 9	15(33)	NR	Mean: 155 Med: NR Range: NR SD: 29.7	LBBB: 25(55) RBBB: NR IVCD: 17(38) PBBBlock: 3(7)	NR	Mean: 27.1 Med: NR Range: NR SD: 5.1	Creat: NR GFR: NR
Ruwald,2014 ¹⁸	Arm 1(LVEF </=35%):103	F: 19(103)	Mean: 63 Med: NR Range: NR SD: 12	63(61)	NR	Mean: 157 Med: NR Range: NR SD: 21	LBBB: 64(62) RBBB: 15(15) IVCD: 24(23) PBBBlock: NR(NR)	NR	Mean: 27.6 Med: NR Range: NR SD: 3.1	Creat: 1.24mg/dl GFR: NR
	Arm 2(LVEF 36-50%):594	F: 136(594)	Mean: 65 Med: NR Range: NR SD: 11	335(56)	NR	Mean: 159 Med: NR Range: NR SD: 20	LBBB: 421(71) RBBB: 65(11) IVCD: 107(18) PBBBlock: NR(NR)	NR	Mean: 29.5 Med: NR Range: NR SD: 3	Creat: 1.16mg/dl GFR: NR
	Arm 3(LVEF >50%):55	F: 30(55)	Mean: 64 Med: NR Range: NR SD: 9	14(25)	NR	Mean: 159 Med: NR Range: NR SD: 17	LBBB: 49(89) RBBB: 3(5) IVCD: 3(5) PBBBlock: NR(NR)	NR	Mean: 33.1 Med: NR Range: NR SD: 3.3	Creat: 1.09mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Haugaa,2014 ⁵⁶	Arm 1(Patients without arrhythmia):22 7	F: 62(227)	Mean: 65 Med: NR Range: NR SD: 12	133(59)	NR	Mean: 160 Med: NR Range: NR SD: 28	NR	NR	Mean: 25 Med: NR Range: NR SD: 6	Creat: NRNR GFR: NRNR
	Arm 2(Patients with arrhythmia):39	F: 6(39)	Mean: 66 Med: NR Range: NR SD: 9	26(67)	NR	Mean: 155 Med: NR Range: NR SD: 26	NR	NR	Mean: 23 Med: NR Range: NR SD: 6	Creat: NR GFR: NR
Masoudi,2014 ⁶⁵	Arm 1(ICD):3545	F: 990(3545)	Mean: 74.9 Med: NR Range: NR SD: 6	2513(70.9)	1164(32.8)	Mean: 149 Med: NR Range: NR SD: 23.1	LBBB: 1864(52.6) RBBB: 617(17.4) IVCD: 503(14.2) PBBBlock: NR(NR)	I: 103(2.9) II: 1041(29.4) III: 2321(65.5) IV: 80(2.3)	Mean: 25 Med: NR Range: NR SD: 6	Creat: 1.4mg/dl GFR: 59.6ML/MI N/1.73M2
	Arm 2(CRTD):3545	F: 993(3545)	Mean: 74.6 Med: NR Range: NR SD: 6	2419(68.2)	1101(31.1)	Mean: 149 Med: NR Range: NR SD: 19.6	LBBB: 1906(53.8) RBBB: 594(16.8) IVCD: 485(13.7) PBBBlock: NR(NR)	I: 97(2.7) II: 1056(29.8) III: 2283(64.4) IV: 109(3.1)	Mean: 25 Med: NR Range: NR SD: 6	Creat: 1.4mg/dl GFR: 59.5ML/MI N/1.73M2
Gopalamurugan ,2014 ⁵⁴	Arm 1(CRT- D):117	F: 37(117)	Mean: 66 Med: NR Range: NR SD: 11	49(42)	NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: 24.5 Med: NR Range: NR SD: 8.2	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(ICD):63	F: 10(63)	Mean: 65.3 Med: NR Range: NR SD: 13	38(60)	NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: 27.7 Med: NR Range: NR SD: 7.2	Creat: NR GFR: NR
Jamerson,2014 ¹⁵	Arm 1(Males):1346	F: 0(1346)	Mean: 64.6 Med: Range: SD: 10.7	NR(NR)	NR	Mean: 158.2 Med: NR Range: NR SD: 20.5	LBBB: 876(65) RBBB: NR(NR) IVCD: NR(NR) PBBBlock: NR(NR)	NR	Mean: 23.9 Med: NR Range: NR SD: 5.2	Creat: 1.22mg/dl GFR: NR
	Arm 2(Females):44 4	F: 444(444)	Mean: 63.9 Med: Range: SD: 10.7	NR(NR)	NR	Mean: 157.7 Med: NR Range: NR SD: 17.4	LBBB: 388(87) RBBB: NR(NR) IVCD: NR(NR) PBBBlock: NR(NR)	NR	Mean: 23.4 Med: NR Range: NR SD: 5.4	Creat: 1mg/dl GFR: NR
Wollmann,2014 ⁸⁵	Overall(All Patients):246	F: 54(246)	Mean: 63.5 Med: NR Range: NR SD: 13.3	92(37)	91(37)	Mean: 134.3 Med: NR Range: NR SD: 32.6	NR	I: 19(8) II: 92(37) III: 105(43) IV: 3(1)	Mean: 31.2 Med: NR Range: NR SD: 12.1	Creat: NR GFR: NR
	Arm 1(DR- ICD):114	F: 22(114)	Mean: 61.4 Med: NR Range: NR SD: 14	49(43)	36(32)	Mean: 112.8 Med: NR Range: NR SD: 24.3	NR	I: 15(13) II: 49(43) III: 25(22) IV: 0(0)	Mean: 35.4 Med: NR Range: NR SD: 14.8	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(CTR- D):132	F: 32(132)	Mean: 65.4 Med: NR Range: NR SD: 12.5	43(33)	55(42)	Mean: 154.4 Med: NR Range: NR SD: 25.8	NR	I: 4(3) II: 43(33) III: 80(61) IV: 3(2)	Mean: 27.3 Med: NR Range: NR SD: 7.1	Creat: NR GFR: NR
Ricci,2014 ⁶⁹	Overall(Overall):1404	F: 286(1404)	Mean: 67 Med: NR Range: NR SD: 10	741(53)	362(26)	Mean: 149 Med: NR Range: NR SD: 31	NR	I: NR(NR) II: 534(38) III: 842(60) IV: 28(2)	Mean: 27 Med: NR Range: NR SD: 6	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D6: Population characteristics –CRT P vs. D effectiveness

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Bristow,2004 ²⁹ COMPANION	Arm 1(Optimal Pharmacologic al Therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Anand, 2009 ³⁰ COMPANION Sub Study	Arm 1(OPT):308	F: 96(31) NR	Mean: NR Med: 68 Range: NR SD: NR	NR(59)	NR	Mean: NR Med: 158 Range: NR SD: NR	NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: NR Med: 67 Range: NR SD: NR	NR(54)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: NR Med: 66 Range: NR SD: NR	NR(55)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Carson,2005 ³¹ COMPANION Sub Study	Arm 1(Optimal Pharmacologic al therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range:NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D7: Population characteristics –CRT P vs. D harms

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Azizi, 2006 ⁴⁶	Overall():244	F: (18) NR	Mean: 64 Med: NR Range: 14- 90 SD: 12	NR	(0.29)	Mean: NR Med: NR Range: NR SD: NR	NR	II: (10) III: (68) IV: (22)	Mean: 0.24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Killu,20113 ⁵⁸	Arm 1(≤80):638	F: 147(23) NR	Mean: 66.5 Med: NR Range: NR SD: 10.3	349(54.7)	179(28.1)	Mean: 164.5 Med: NR Range: NR SD: 34.7	NR	NR	Mean: 23.5 Med: NR Range: NR SD: NR	Creat: 1.4 GFR: NR
	Arm 2(≥80):90	F: 19(21.1) NR	Mean: 83.7 Med: NR Range: NR SD: 2.3	63(70)	34(37.8)	Mean: 171.5 Med: NR Range: NR SD: 29.5	NR	NR	Mean: 24.3 Med: NR Range: NR SD: NR	Creat: 1.6 GFR: NR
Romeyer- Bouchard,2010 ⁷ ₁	(Overall):303	F: 56(18.5) NR	Mean: 70 Med: NR Range: NR SD: 10	101(33.3)	105(34.7)	Mean: 185 Med: NR Range: NR SD: 25	NR	NR	Mean: 26 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Schuchert,2013 ³⁷ MASCOT Sub Study	Arm 1(CRT- P):174	F: 53(31) NR	Mean: 68 Med: NR Range: NR SD: 10	NR	37(16)	Mean: 169 Med: NR Range: NR SD: 31	NR	III: 145(83)	Mean: 25 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- D):228	F: 30(24) NR	Mean: 68 Med: NR Range: NR SD: 9	NR	38(22)	Mean: 159 Med: NR Range: NR SD: 26	NR	III: 199(87)	Mean: 25 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Swindle,2010 ⁷⁹	Overall(Overall):26887	F: 7366(27.4) W:18457(6 8.6)	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
		AA:3481(1 2.9) O:4949()								
Takaya, 2013 ⁸⁰	Arm 1(Responders) :16	F: 5(31) NR	Mean: 63 Med: Range: SD: 8	3(19)	3(19)	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: 0.23 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(Non- responders):2 4	F: 5(21) NR	Mean: 58 Med: Range: SD: 16	7(29)	3(13)	Mean: NR Med: NR Range: NR SD: NR	LBBB :() RBBB: () IVCD: 24(100) PBBBlock: ()	NR	Mean: 0.28 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Verbrugge,2013 ⁸³	Arm 1(CRT- D):74	F: 12(16) NR	Mean: 68 Med: NR Range: NR SD: 9	47(64)	8(11)	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: 67ML/MIN/ 1.73M2
	Arm 2(CRT- P):98	F: 43(44) NR	Mean: 74 Med: NR Range: NR SD: 9	36(37)	40(41)	Mean: NR Med: NR Range: NR SD: NR	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: 63ML/MIN/ 1.73M2
Verbrugge,2013 ⁸⁴	Arm 1(<70 years):76	F: 25(33) NR	Mean: NR Med: NR Range: NR SD: NR	28(37)	16(21)	Mean: 147 Med: nr Range: NR SD: 29	LBBB :63(83) RBBB: NR IVCD: NR PBBBlock: NR	II: 27(36) III: 41(54) IV: 8(10)	Mean: 29 Med: NR Range: NR SD: NR	Creat: NR GFR: 72ml/min/1 .73m2
	Arm 2(70- 79years):95	F: 30(32) NR	Mean: NR Med: NR Range: NR SD: NR	51(54)	25(26)	Mean: 159 Med: NR Range: NR SD: 31	LBBB :80(84) RBBB: NR IVCD: NR PBBBlock:	II: 23(24) III: 63(66) IV: 9(10)	Mean: 29 Med: NR Range: NR SD: NR	Creat: NR GFR:

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
							NR			61ml/min/1 .73m2
	Arm 3(>=80 years):49	F: 17(35) NR	Mean: NR Med: NR Range: NR SD: NR	31(63)	16(33)	Mean: 163 Med: NR Range: NR SD: 30	LBBB :40(82) RBBB: NR IVCD: NR PBBBlock: NR	II: 13(27) III: 30(61) IV: 6(12)	Mean: 31 Med: NR Range: NR SD: NR	Creat: NR GFR: 52ml/min/1 .73m2
	Overall(Overall <td>F: 72(33) NR</td> <td>Mean: NR Med: NR Range: NR SD: NR</td> <td>110(50)</td> <td>57(26)</td> <td>Mean: 156 Med: NR Range: NR SD: 31</td> <td>LBBB :183(83) RBBB: NR IVCD: NR PBBBlock: NR</td> <td>II: 63(29) III: 134(61) IV: 23(10)</td> <td>Mean: 29 Med: NR Range: NR SD: NR</td> <td>Creat: NR GFR: 63ml/min/1 .73m2</td>	F: 72(33) NR	Mean: NR Med: NR Range: NR SD: NR	110(50)	57(26)	Mean: 156 Med: NR Range: NR SD: 31	LBBB :183(83) RBBB: NR IVCD: NR PBBBlock: NR	II: 63(29) III: 134(61) IV: 23(10)	Mean: 29 Med: NR Range: NR SD: NR	Creat: NR GFR: 63ml/min/1 .73m2
Bristow,2004 ²⁹ COMPANION	Arm 1(Optimal Pharmacologic al Therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT- D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Anand, 2009 ³⁰ COMPANION Sub Study	Arm 1(OPT):308	F: 96(31) NR	Mean: NR Med: 68 Range: NR SD: NR	NR(59)	NR	Mean: NR Med: 158 Range: NR SD: NR	NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT-P):617	F: 203(33) NR	Mean: NR Med: 67 Range: NR SD: NR	NR(54)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(87)	Mean: 20 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT-D):595	F: 196(33) NR	Mean: NR Med: 66 Range: NR SD: NR	NR(55)	NR	Mean: NR Med: 160 Range: NR SD: NR	NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Carson,2005 ³¹ COMPANION Sub Study	Arm 1(Optimal Pharmacologic al therapy):308	F: 96(31) NR	Mean: 68 Med: NR Range: NR SD: NR	NR(59)	NR	Mean: 158 Med: NR Range: NR SD: NR	LBBB:NR(70) RBBB: NR(9) IVCD: NR PBBBlock: NR	III: NR(82)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT-P):617	F: 203(33) NR	Mean: 67 Med: NR Range: NR SD: NR	NR(54)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(69) RBBB:NR(12)) IVCD: NR PBBBlock: NR	III: NR(87)	Mean: 20 Med: NR Range:NR SD: NR	Creat: NR GFR: NR
	Arm 3(CRT-D):595	F: 196(33) NR	Mean: 66 Med: NR Range: NR SD: NR	NR(55)	NR	Mean: 160 Med: NR Range: NR SD: NR	LBBB:NR(73) RBBB:NR(10)) IVCD: NR PBBBlock: NR	III: NR(86)	Mean: 22 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D8: Population characteristics –CRT P clinical predictors

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Zhang, 2009 ⁸⁶	Overall(Overall):239	F: 56(24) NR	Mean: 65 Med: NR Range: NR SD: 12	117(49)	NR	Mean: 148.5 Med: NR Range: NR SD: NR	NR	III: 208(87) IV: 31(13)	Mean: 24.5 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Stabile, 2009 ⁷⁶	Arm 1(CRT- PM):117	F: (26.5) NR	Mean: 69.3 Med: NR Range: NR SD: 7.7	(41)	26(22)	Mean: NR Med: NR Range: NR SD: NR	NR	III: (65) IV: (24)	Mean: 28.2 Med: NR Range: NR SD: 6.2	Creat: NR GFR: NR
	Arm 2(CRT- D):116	F: (19) NR	Mean: 68.2 Med: NR Range: NR SD: 9	(56)	18(15.5)	Mean: NR Med: NR Range: NR SD: NR	NR	III: (72) IV: (16)	Mean: 25 Med: NR Range: NR SD: 6.5	Creat: NR GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D9: Population characteristics –CRT D clinical predictors

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Gold,2011 ³⁶ SMART AV Sub Study	Overall(Overall):426	F: 145(34) NR	Mean: 66 Med: NR Range: NR SD: 11	251(59)	NR	Mean: 151 Med: NR Range: NR SD: 19	LBBB :320(75) RBBB: 55(13) IVCD: 51(12) PBBBlock: NR	II: 14(3) III: 400(94) IV: 14(3)	Mean: 26 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Goldenberg,201 1 ¹² MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:"657/724 "(90.7) AA:"56/724 "(7.7) O:"11/724(1.5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	"90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :"520/729(71. 3) RBBB: "92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT D):1089	F: 275(25.3) W:"979/108 3(90.4) AA:"87/108 3(8) O:"17/1083 (1.6)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	"118/1063(11.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :"761/1088(6 9.9) RBBB: "136/1088(12 .5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Mascioli,2012 ⁶⁴	Arm 1(Group 1):61	F: 18(30) NR	Mean: 68 Med: NR Range: NR SD: 10	31(51)	NR	Mean: 162 Med: NR Range: NR SD: 11	LBBB :NR(100) RBBB: NR IVCD: NR PBBBlock: NR	II: 14(23) III: 32(52) IV: 15(54)	Mean: 27 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(Group 2):50	F: 17(33) NR	Mean: 70 Med: NR Range: NR SD: 7	30(60)	NR	Mean: 159 Med: NR Range: NR SD: 16	LBBB :NR(100) RBBB: NR IVCD: NR PBBBlock: NR	II: 11(22) III: 26(52) IV: 13(26)	Mean: 27 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Penn, 2010 ¹⁷ MADIT CRT Sub Study	Arm 1(Age<60):548	F: (24) NR	Mean: Med: 53 Range: SD:	(38)	(8)	Mean: 160 Med: NR Range: NR SD: 20	LBBB :(73) RBBB: () IVCD: () PBBBlock: ()	I: 49(9) II: 499(91)	Mean: 23.1 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(Age 60- 74):941	F: (27) NR	Mean: Med: 67 Range: SD:	(59)	(12)	Mean: 158 Med: NR Range: NR SD: 20	LBBB :(69) RBBB: () IVCD: () PBBBlock: ()	I: 151(16) II: 790(84)	Mean: 23.9 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 3(Age >75):331	F: (22) NR	Mean: Med: 78 Range: SD:	(70)	(16)	Mean: 156 Med: NR Range: NR SD: 19	LBBB :(70) RBBB: () IVCD: () PBBBlock: ()	I: 63(19) II: 268(81)	Mean: 24.5 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Shen,2009 ⁷³	Arm 1(I- LBBB(CRT- D):67	F: 21(31.3) NR	Mean: 70 Med: NR Range: NR SD: 9	NR	NR	Mean: 160 Med: NR Range: NR SD: 26	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR(100)	NR	Mean: 20.6 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(RV- LBBB(CRT- D)):28	F: 6(21.4) NR	Mean: 70 Med: NR Range: NR SD: 10	NR	NR	Mean: 178 Med: NR Range: NR SD: 28	LBBB :NR RBBB: NR IVCD: NR PBBBlock: NR(100)	NR	Mean: 19.7 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Rickard,2013 ⁷⁰	Overall(Overall):112	F: 33(29.5) NR	Mean: 69.3 Med: NR Range: NR SD: 11.2	62(55.4)	79(70.5)	Mean: 187.8 Med: NR Range: NR SD: 23	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Shen,2011 ⁷⁵	Arm 1(Group A):100	F: 27(27) NR	Mean: 70 Med: NR Range: NR SD: 10	NR	NR	Mean: 165 Med: NR Range: NR SD: 28	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(Group B):36	F: 11(31) NR	Mean: 71 Med: NR Range: NR SD: 13	NR	NR	Mean: 163 Med: NR Range: NR SD: 27	NR	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Cheng, 2012 ³⁵ SMART AV Sub Study	Overall():846	F: 277(32.7) NR	Mean: Women: 65.2, Men: 66.5 Med: Range: SD: Women: 11.3, Men: 10.9	475(56.2)	122(14.4)	Mean: NR Med: NR Range: NR SD: NR	LBBB :651(76.9) RBBB: () IVCD: () PBBBlock: ()	II: Women=2,M en=3() III: Women=96, Men=94() IV: Women=2,m en=3()	Mean: Women: 24.8, Men: 24.3 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Shanks,2011 ⁷²	Overall(Overall):581	F: 130(22.4) NR	Mean: 66.4 Med: NR Range: NR SD: 10	351(60.4)	NR	Mean: 153.6 Med: NR Range: NR SD: 31.5	LBBB :405(69.7) RBBB: 39(6.7) IVCD: 137(23.6) PBBBlock: NR	IV: 36(6.2)	Mean: 26 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 1(Responders) :327	F: 78(23.7) NR	Mean: 66.2 Med: NR Range: NR SD: 10.3	174(53.2)	NR	Mean: 156 Med: NR Range: NR SD: 32.5	LBBB :233(71.2) RBBB: 18(5.5) IVCD: 76(23.3)	NR	Mean: 26.2 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
							PBBBlock: NR			
	Arm 2(Non Responders):2 54	F: 46(18.1) NR	Mean: 66.5 Med: NR Range: NR SD: 9.6	77(30.3)	NR	Mean: 150.6 Med: NR Range: NR SD: 29.9	LBBB :172(67.7) RBBB: 21(8.2) IVCD: 61(24.1) PBBBlock: NR	NR	Mean: 25.6 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Shen,2009 ⁷⁴	Overall(Overall):108	F: 30(28) NR	Mean: 70.3 Med: NR Range: NR SD: 10	69(63.8)	NR	Mean: 164.7 Med: NR Range: NR SD: NR	NR	NR	Mean: 20.7 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Hsu,2012 ¹⁴ MADIT CRT Sub Study	Arm 1(ICD):731	F: 178(24.4) W:657/724(90.7) AA:56/724(7.7) O:11/724(1 .5)	Mean: 64 Med: NR Range: NR SD: 11	401(54.9)	90/717(12. 6)	Mean: NR Med: NR Range: NR SD: NR	LBBB :520/729(71.3) RBBB: 92/729(12.6) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(CRT- D):1089	F: 275(25.3) W:979/108 3(90.4) AA:87/1083 (8) O:17/1083(1.6)	Mean: 65 Med: NR Range: NR SD: 11	598(55)	118/1063(1 1.1)	Mean: NR Med: NR Range: NR SD: NR	LBBB :761/1088(69. 9) RBBB: 136/1088(12. 5) IVCD: NR PBBBlock: NR	NR	Mean: 24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
Leong,2013 ⁶³	Overall(Entire Cohort):848	F: 184(22) NR	Mean: 67 Med: NR Range: NR SD: NR	509(60)	137(16)	Mean: 155 Med: NR Range: NR SD: 33	LBBB :NR RBBB: NR IVCD: NR PBBBlock: 42(5)	II: 196(23) III: 580(68) IV: 72(9)	Mean: 26 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 1(Impaired right ventricle function):286	F: 53(19) NR	Mean: 67 Med: NR Range: NR SD: NR	188(66)	74(26)	Mean: 154 Med: NR Range: NR SD: 32	LBBB :NR RBBB: NR IVCD: NR PBBBlock: 16(5)	II: 50(17) III: 200(70) IV: 36(13)	Mean: 24 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
	Arm 2(Preserved right ventricle function):562	F: 131(23) NR	Mean: 67 Med: NR Range: NR SD: NR	321(57)	63(11)	Mean: 156 Med: NR Range: NR SD: 33	LBBB :NR RBBB: NR IVCD: NR PBBBlock: 26(4)	II: 146(26) III: 380(68) IV: 36(6)	Mean: 27 Med: NR Range: NR SD: NR	Creat: NR GFR: NR
Bilchick ,2010 ⁴⁷	Overall	F: 4080(27.3) NR	Mean: 73.02 Med: NR Range: NR SD: 10.5	10340(69.18)	5190(34.73)	Mean: 156.3 Med: NR Range: NR SD: 25.03	LBBB :10356(69.3) RBBB: 1638(10.96) IVCD:2952(1 9.76) PBBBlock: NR	I:1.21% II:10.99% III:74.07%	Mean: 23.13 Med: NR Range: NR SD: 6.34	Creat: NR GFR: NR
Niebauer,2014 ⁶⁸	Arm 1(Responders) :94	F: 49(94) NR	Mean: 64.4 Med: NR Range: NR SD: 10.9	30(31.9)	NR	NR	LBBB: 94(100) RBBB: NR(NR) IVCD: NR(NR) PBBBlock: NR(NR)	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: 1.28mg/dl GFR: NR

Author,Year Trial	Arm (arm name): n(%)	Female, n (%) Race, n(%)	Age (years) Mean, median, range	Ischemic cardiomyopathy, n (%)	Atrial fibrillation, n (%)	QRS interval, Mean, median, range	QRS morphology - LBBB, n(%) RBBB, n(%) IVCD, n(%) PBBBlock, n(%)	NYHA class, n(%)	LVEF, Mean, median, range, SD	Creatinine GFR
	Arm 2(Non responders):7 6	F: 24(76)	Mean: 63.8 Med: NR Range: NR SD: 11	42(55.3)	NR	NR	LBBB: 76(100) RBBB: NR(NR) IVCD: NR(NR) PBBBlock: NR(NR)	NR	Mean: NR Med: NR Range: NR SD: NR	Creat: 1.44mg/dl GFR: NR

F-Female, W-White, AA-African American, O-Others, NR-Not Reported, SD-Standard Deviation, Med-Median, n-Number, LBBB-Left Bundle Branch Block, RBBB-Right, Bundle Branch Block, IVCD-Intra Ventricular Conduction Delay, PBBBlock-Paced Bundle Branch Block, NYHA-New York Heart Association, LVEF-Left Ventricular Ejection Fraction, GFR-Glomerular Filtration Rate

Table D10: Outcomes reported in the trials assessing effectiveness of CRT P

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
6 minute hall walk distance									
Pokushalov,2010 ⁴³	CABG	6 minute hall walk distance Unit:meters	87	Mean: 265 SD: 32	6months	73	379	NR	NR
	CABG+CRT	6 minute hall walk distance Unit:meters	91	Mean: 248 SD: 51	6months	86	432	NR	NR
	CABG	6 minute hall walk distance Unit:meters	87	Mean: 265 SD: 32	12months	65	317	NR	NR
	CABG+CRT	6 minute hall walk distance Unit:meters	91	Mean: 248 SD: 51	12months	83	448	NR	NR
	CABG	6 minute hall walk distance Unit:meters	87	Mean: 265 SD: 32	18months	64	289	NR	NR
	CABG+CRT	6 minute hall walk distance Unit:meters	91	Mean: 248 SD: 51	18months	82	452	NR	NR
Abraham,2002 ²⁷ MIRACLE	Control group	6 minute hall walk distance Unit:	225	Mean: 291 SD: 101	6 months	198	NR	10	NR
	Cardiac	6 minute hall	228	Mean:	6 months	214	NR	39	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	Resynchroni zation Group	walk distance Unit:		305 SD: 85					
Leclercq,2007 ⁴⁴ RD-CHF Study	All Patients	6 minute hall walk distance Unit:m	29	Mean: 324 SD: 149	3 months	29	386	NR	NR
	BiV First	6 minute hall walk distance Unit:m	17	Mean: 316 SD: 25	3 months	17	358	NR	NR
	RV Pacing First	6 minute hall walk distance Unit:m	12	Mean: 332 SD: 173	3 months	17	414	NR	NR
Minnesota Living with Heart Failure Inventory Score									
Pokushalov,2010 ⁴³	CABG	Minnesota Living with Heart Failure Inventory Score Unit:points	87	Mean: 63.2 SD: 19	6months	73	Mean: 51.9 SD: 22	NR	NR
	CABG+CRT	Minnesota Living with Heart Failure Inventory Score Unit:points	91	Mean: 64.9 SD: 20	6months	86	Mean: 39.8 SD: 16	NR	NR
	CABG	Minnesota Living with Heart Failure Inventory Score Unit:points	87	Mean: 63.2 SD: 19	12months	65	Mean: 41.7 SD: 8	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	CABG+CRT	Minnesota Living with Heart Failure Inventory Score Unit:points	91	Mean: 64.9 SD: 20	12months	83	Mean: 32.9 SD: 7	NR	NR
	CABG	Minnesota Living with Heart Failure Inventory Score Unit:points	87	Mean: 63.2 SD: 19	18months	64	Mean: 46.4 SD: 11	NR	NR
	CABG+CRT	Minnesota Living with Heart Failure Inventory Score Unit:points	91	Mean: 64.9 SD: 20	18months	82	Mean: 22.9 SD: 5	NR	NR
Cleland,2004 ¹ CARE HF	Medical Therapy Alone	Minnesota Living with Heart Failure Inventory Score Unit:	404	Mean: NR SD: NR	90 days	404	Mean: 40 SD: 22	NR	HR: -10 95%CI: -8 to - 12
	Medical therapy plus cardiac resynchroniz ation	Minnesota Living with Heart Failure Inventory Score Unit:	409	Mean: NR SD: NR	90 days	409	Mean: 31 SD: 22	NR	NA
Abraham,2002 ²⁷ MIRACLE	Control group	Minnesota Living with Heart	225	Mean: 59 SD: 21	6 months	193	Mean: NR SD: NR	-9	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Failure Inventory Score Unit:							
	Cardiac Resynchroni zation Group	Minnesota Living with Heart Failure Inventory Score Unit:	228	Mean: 59 SD: 20	6 months	213	Mean: NR SD: NR	-18	NR
Wikstrom,2009 ⁸ CARE HF Sub Study	CRT IHD	Minnesota Living with Heart Failure Inventory Score Unit:	186	Mean: NR SD: NR	3 months	NR	Mean: 31.29 SD: 19.74	NR	NR
	Medical therapy IHD	Minnesota Living with Heart Failure Inventory Score Unit:	153	Mean: NR SD: NR	3 months	NR	Mean: 35.56 SD: 21.68	NR	NR
	CRT Non IHD	Minnesota Living with Heart Failure Inventory Score Unit:	223	Mean: NR SD: NR	3 months	NR	Mean: 41.5 SD: 20.49	NR	NR
	Medical therapy Non IHD	Minnesota Living with Heart Failure Inventory Score	250	Mean: NR SD: NR	3 months	NR	Mean: 30.25 SD: 22	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:							
Left ventricular end systolic volume									
Pokushalov,2010 43	CABG	Left ventricular end systolic volume Unit:ml	87	Mean: 158 SD: 62.5	6months	73	Mean: 152 SD: 68.7	NR	NR
	CABG+CRT	Left ventricular end systolic volume Unit:ml	91	Mean: 166 SD: 68.9	6months	86	Mean: 122 SD: 57.5	NR	NR
	CABG	Left ventricular end systolic volume Unit:ml	87	Mean: 158 SD: 62.5	12months	65	Mean: 158 SD: 57.2	NR	NR
	CABG+CRT	Left ventricular end systolic volume Unit:ml	91	Mean: 166 SD: 68.9	12months	83	Mean: 119 SD: 64.4	NR	NR
	CABG	Left ventricular end systolic volume Unit:ml	87	Mean: 158 SD: 62.5	18months	64	Mean: 164 SD: 61.4	NR	NR
	CABG+CRT	Left ventricular end systolic volume Unit:ml	91	Mean: 166 SD: 68.9	18months	82	Mean: 120 SD: 57.5	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
Sutton,2003 ²⁸ MIRACLE Sub Study	Control group	Left ventricular end systolic volume Unit:ml	151	Mean: 227.5 SD: 98.6	3 months	151	Mean: NR SD: NR	0.6	NR
	CRT group	Left ventricular end systolic volume Unit:ml	172	Mean: 227.7 SD: 93.7	3 months	172	Mean: NR SD: NR	-21.8	NR
	Control group	Left ventricular end systolic volume Unit:ml	151	Mean: 227.5 SD: 98.6	6 months	151	Mean: NR SD: NR	0.3	NR
	CRT group	Left ventricular end systolic volume Unit:ml	172	Mean: 227.7 SD: 93.7	6 months	172	Mean: NR SD: NR	-25.6	NR
Wikstrom,2009 ⁸ CARE HF Sub Study	CRT IHD	Left ventricular end systolic volume Unit:ml	186	Mean: NR SD: NR	3 months	NR	Mean: 193.99 SD: 69.36	NR	NR
	Medical therapy IHD	Left ventricular end systolic volume Unit:ml	153	Mean: NR SD: NR	3 months	NR	Mean: 233.18 SD: 98.36	NR	NR
	CRT Non IHD	Left ventricular	223	Mean: NR SD: NR	3 months	NR	Mean: 194.01	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		end systolic volume Unit:ml					SD: 104.74		
	Medical therapy Non IHD	Left ventricular end systolic volume Unit:ml	250	Mean: NR SD: NR	3 months	NR	Mean: 231.54 SD: 86.05	NR	NR
Left ventricular end diastolic volume									
Pokushalov,2010 43	CABG	Left ventricular end diastolic volume Unit:ml	87	Mean: 227 SD: 51.4	6months	73	Mean: 225 SD: 46.8	NR	NR
	CABG+CRT	Left ventricular end diastolic volume Unit:ml	91	Mean: 231 SD: 48.9	6months	86	Mean: 207 SD: 38.4	NR	NR
	CABG	Left ventricular end diastolic volume Unit:ml	87	Mean: 227 SD: 51.4	12months	65	Mean: 225 SD: 48.7	NR	NR
	CABG+CRT	Left ventricular end diastolic volume Unit:ml	91	Mean: 231 SD: 48.9	12months	83	Mean: 206 SD: 39.2	NR	NR
	CABG	Left ventricular end diastolic	87	Mean: 227 SD: 51.4	18months	64	Mean: 228 SD: 45.2	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		volume Unit:ml							
	CABG+CRT	Left ventricular end diastolic volume Unit:ml	91	Mean: 231 SD: 48.9	18months	82	Mean: 209 SD: 36.7	NR	NR
Sutton,2003 ²⁸ MIRACLE Sub Study	Control group	Left ventricular end diastolic volume Unit:ml	151	Mean: 293.9 SD: 105.1	3 months	151	Mean: NR SD: NR	Mean Difference: 2.8	NR
	CRT group(CRT- P)	Left ventricular end diastolic volume Unit:ml	172	Mean: 295.6 SD: 102.6	3 months	172	Mean: NR SD: NR	Mean Difference: - 22.6	NR
	Control group	Left ventricular end diastolic volume Unit:ml	151	Mean: 293.9 SD: 105.1	6 months	151	Mean: NR SD: NR	Mean Difference: 4.7	NR
	CRT group(CRT- P)	Left ventricular end diastolic volume Unit:ml	172	Mean: 295.6 SD: 102.6	6 months	172	Mean: NR SD: NR	Mean Difference: - 27.2	NR
Left ventricular ejection fraction									
Pokushalov,2010 ⁴³ ,	CABG	Left ventricular ejection fraction	87	Mean: 30 SD: 2.2	6months	73	Mean: 32 SD: 3.4	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit: %							
	CABG+CRT	Left ventricular ejection fraction Unit: %	91	Mean: 28 SD: 2.7	6months	86	Mean: 41 SD: 2.5	NR	NR
	CABG	Left ventricular ejection fraction Unit: %	87	Mean: 30 SD: 2.2	12months	65	Mean: 29 SD: 2.6	NR	NR
	CABG+CRT	Left ventricular ejection fraction Unit: %	91	Mean: 28 SD: 2.7	12months	83	Mean: 42 SD: 1.4	NR	NR
	CABG	Left ventricular ejection fraction Unit: %	87	Mean: 30 SD: 2.2	18months	64	Mean: 28 SD: 2.7	NR	NR
	CABG+CRT	Left ventricular ejection fraction Unit: %	91	Mean: 28 SD: 2.7	18months	82	Mean: 42 SD: 1.9	NR	NR
Sutton,2003 ²⁸ MIRACLE Sub Study	Control group	Left ventricular ejection fraction Unit: %	151	Mean: 24.3 SD: 6.8	3 months	151	Mean: NR SD: NR	0.6	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	CRT group	Left ventricular ejection fraction Unit: %	172	Mean: 24.5 SD: 6.8	3 months	172	Mean: NR SD: NR	2.3	NR
	Control group	Left ventricular ejection fraction Unit: %	151	Mean: 24.3 SD: 6.8	6 months	151	Mean: NR SD: NR	0.4	NR
	CRT group	Left ventricular ejection fraction Unit: %	172	Mean: 24.5 SD: 6.8	6 months	172	Mean: NR SD: NR	3.6	NR
Abraham,2002 ²⁷ MIRACLE	Control group	Left ventricular ejection fraction Unit: %	225	Mean: 21.6 SD: 6.2	6 months	146	Mean: NR SD: NR	-0.2	NR
	Cardiac Resynchroni zation Group	Left ventricular ejection fraction Unit: %	228	Mean: 21.8 SD: 6.3	6 months	155	Mean: NR SD: NR	4.6	NR
Leclercq,2007 ⁴⁴ RD-CHF Study	All Patients	Left ventricular ejection fraction Unit: %	30	Mean: 29.5 SD: 11	3 months	30	Mean: 29 SD: 11	NR	NR
	BiV First	Left ventricular	18	Mean: 32 SD: 11	3 months	18	Mean: 34 SD: 12	NR	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ejection fraction Unit: %							
	RV Pacing First	Left ventricular ejection fraction Unit: %	12	Mean: 32 SD: 13	3 months	12	Mean: 37 SD: 11	NR	NR
Wikstrom,2009 ⁸ CARE HF Sub Study	CRT IHD	Left ventricular ejection fraction Unit: %	186	Mean: NR SD: NR	3 months	NR	Mean: 29.08 SD: 6.9	NR	NR
	Medical therapy IHD	Left ventricular ejection fraction Unit: %	153	Mean: NR SD: NR	3 months	NR	Mean: 26.56 SD: 6.92	NR	NR
	CRT Non IHD	Left ventricular ejection fraction Unit: %	223	Mean: NR SD: NR	3 months	NR	Mean: 30.59 SD: 8.19	NR	NR
	Medical therapy Non IHD	Left ventricular ejection fraction Unit: %	250	Mean: NR SD: NR	3 months	NR	Mean: 26.31 SD: 6.5	NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D11: Outcomes reported in the trials assessing effectiveness of CRT-P(Hospitalization for heart failure and All-cause mortality)

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Hospitalization for heart failure								
Cleland,2004 ¹ CARE HF	Medical Therapy Alone	Hospitalization for heart failure	404	18 months	184(46)	NR	NR	HR: 0.61 95%CI: 0.49 to 0.77
	Medical therapy plus cardiac resynchronization	Hospitalization for heart failure	409	18 months	125(31)	NR	NR	NA
Abraham,2002 ²⁷ MIRACLE	Control group	Hospitalization for heart failure	225	6 months	34(15.1)	NR	NR	HR: 0.5 95% CI: 0.28 to 0.88
	Cardiac Resynchronization Group	Hospitalization for heart failure	228	6 months	18(7.9)	NR	NR	NA
Leclercq,2007 ⁴⁴ RD-CHF Study	BiV First	Hospitalization for heart failure	NR	3 months	1(NR)	NR	NR	NR
	RV First	Hospitalization for heart failure	NR	3 months	9(NR)	NR	NR	NR
All-cause mortality								
Pokushalov,2010 ⁴³	CABG	All-cause mortality	87	6months	10(11.4)	NR	NR	NR
	CABG+CRT	All-cause mortality	91	6months	4(4.4)	NR	NR	NR
	CABG	All-cause mortality	87	12months	8(9.1)	NR	NR	NR
	CABG+CRT	All-cause mortality	91	12months	3(3.3)	NR	NR	NR
	CABG	All-cause mortality	87	18months	23(26.4)	NR	NR	NR
	CABG+CRT	All-cause mortality	91	18months	9(9.9)	NR	NR	NR
Cleland,2004 ¹	Medical Therapy	All-cause	404	18 months	120(30)	NR	NR	HR: 0.64

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
CARE HF	Alone	mortality						95% CI: 0.48 - 0.85
	Medical therapy plus cardiac resynchronization	All-cause mortality	409	18 months	82(20)	NR	NR	NR
Abraham,2002 ²⁷ MIRACLE	Control group	All-cause mortality	225	6 months	16(7.1)	NR	NR	HR: 0.73 95% CI: 0.34,1.54
	Cardiac Resynchronization Group	All-cause mortality	228	6 months	12(5.3)	NR	NR	NR
Cleland,2007 ³ CARE HF Sub Study	Medical Therapy	All-cause mortality	404	NR	154(38)	NR	NR	HR: 0.6 95% CI: 0.47-0.77
	CRT	All-cause mortality	409	NR	101(25)	NR	NR	NR
Cleland,2006 ² CARE HF Sub Study	Medical Therapy Alone	All-cause mortality	404	18 months	154(38.1)	NR	NR	HR: 0.6 95% CI: 0.47-0.77
	CRT	All-cause mortality	409	18 months	101(24.7)	NR	NR	NR
Cleland,2012 ⁵ CARE HF Sub Study	No CRT	All-cause mortality	404	18 months	154(38.1)	NR	NR	HR: 0.6 95% CI: 0.47-0.77
	CRT	All-cause mortality	409	18 months	101(24.7)	NR	NR	NR
Leclercq,2007 ⁴⁴ RD-CHF Study	Overall	All-cause mortality	NR	6 months	NR(13.5)	NR	NR	NR
Wikstrom,2009 ⁸ CARE HF Sub Study	Non IHD	All-cause mortality	NR	18 months	NR	NR	NR	HR: 0.56 95% CI: 0.37- 0.83
	IHD	All-cause mortality	NR	18 months	NR	NR	NR	HR: 0.54 95% CI: 0.39- 0.76

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D12: Harms reported in the studies assessing harms of CRT P

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Hong-xia,2006 ⁵⁷	Overall	Lead dislodgement	117	NR	2(1.71)	NR	NR	NR
Garikipati,2014 ³⁹	Overall	Procedure related complications -not specified	21	12 months	NR	NR	NR	NR
	Overall	Length of hospital stay 3Days	21	12 months	NR	NR	NR	NR
	Overall	Pocket hematoma	21	12 months	NR	NR	NR	NR
	Overall	Device Infection	21	12 months	1(4.8)	NR	NR	NR
Gras,2002 ⁵⁵	Overall	Device Infection	117	NR	1(0.85)	NR	NR	NR
	Overall	Cardiac perforation/ tamponade	117	During procedure	1(0.85)	NR	NR	NR
	Overall	Lead dislodgement	117	NR	16(13.7)	NR	NR	NR
Krahn,2002 ⁶⁰	Overall	Procedure related complications -not specified	45	NR	15(33.3)	NR	NR	NR
	Overall	Lead dislodgement	45	NR	3(6.7)	NR	NR	NR
	Overall	Death (within a week)	45	NR	1(2.2)	NR	NR	NR
Mortensen,2004 ⁶⁶	Overall	Pocket hematoma	189	NR	2(1.1)	NR	NR	NR
	Overall	Lead dislodgement	189	NR	12(6.4)	NR	NR	NR
Stahlberg,2005 ⁷⁷	Overall	Lead dislodgement	35	NR	6(17)	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Pokushalov,2010 ⁴³	CABG	Death (within a week)	87	4 days	4(4.6)	NR	NR	NR
	CABG+CRT	Death (within a week)	91	4 days	1(1.1)	NR	NR	NR
Cleland,2004 ¹ CARE HF	Medical Therapy plus CRT (CRT-P)	Pneumothorax	409	18 MONTHS	6(NR)	NR	NR	NR
	Medical Therapy plus CRT (CRT-P)	Device Infection	409	18 MONTHS	3(NR)	NR	NR	NR
	Medical Therapy plus CRT (CRT-P)	Lead dislodgement	409	18 MONTHS	24(NR)	NR	NR	NR
Cock,2003 ⁵¹		Cardiac perforation/ tamponade	7	2-3 months	0(0)	0(0)	NR	NR
Cleland,2009 ⁴ CARE HF Sub Study	Medical Therapy alone	Length of hospital stay 3.4Days	404	3 months	NR	NR	NR	NR
	CRT-P	Length of hospital stay 7.5Days	409	3 months	NR	NR	NR	NR
Gras,2007 ⁷ CARE HF Sub Study	CRT GROUP	Lead dislodgement	404	30 DAYS	11(2.7)	NR	NR	NR
	CRT GROUP	Pneumothorax	404	24 HRS	2(0.5)	NR	NR	NR
	CRT GROUP	Pocket hematoma	404	30 DAYS	0(0)	NR	NR	NR
	CRT GROUP	Device Infection	404	30 DAYS	3(0.74)	NR	NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D13: Outcomes reported in the trials assessing effectiveness of CRT-D

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
6 minute hall walk distance									
Abraham,2004 ³⁴ MIRACLE ICD II	Control	6 minute hall walk distance Unit:Meters	101	Mean: 383 SD: 108	6 months	93	Mean: 33 SD: 98	33	NR
	CRT	6 minute hall walk distance Unit:Meters	85	Mean: 355 SD: 125	6 months	78	Mean: 38 SD: 109	38	NR
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	CRT	6 minute hall walk distance Unit:Meters	245	Mean: 316 SD: 119	6 months	224	Mean: NR SD: NR	35	NR
	No CRT	6 minute hall walk distance Unit:Meters	245	Mean: 320 SD: 121	6 months	220	Mean: NR SD: NR	15	NR
Young,2003 ²⁶ MIRACLE ICD	Control	6 minute hall walk distance Unit:Meters	182	Mean: 243 SD: 117	6 months	153	Mean: NR SD: NR	53	NR
	CRT	6 minute hall walk distance Unit:Meters	187	Mean: 243 SD: 129	6 months	152	Mean: NR SD: NR	55	NR
Healey,2012 ²⁵	ICD	6 minute hall walk distance Unit:Meters	68	Mean: 343 SD: 108	12	68	Mean: 360 SD: 122	16 +/- 76	NR
	CRT-ICD	6 minute hall walk distance Unit:Meters	69	Mean: 334 SD: 92	12	69	Mean: 353 SD: 113	19 +/- 84	NR
Pinter,2009 ⁴²	CRT ON	6 minute hall walk distance	36	Mean: 314 SD: 114	6 months	36	Mean: NR SD: NR	Mean change from baseline	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:Meters						53.3	
	CRT OFF	6 minute hall walk distance Unit:Meters	36	Mean: 338 SD: 110	6 months	36	Mean: NR SD: NR	Mean change from baseline 27.3	NR
Minnesota Living with Heart Failure Inventory Score									
Healey,2012 ²⁵	ICD	Minnesota Living with Heart Failure Inventory Score Unit:NA	95	Mean: 33 SD: 20	12 months	95	Mean: 28 SD: 20	-5 +/- 21	NR
	CRT-ICD	Minnesota Living with Heart Failure Inventory Score Unit:NA	101	Mean: 41 SD: 21	12 months	101	Mean: 31 SD: 21	-11 +/- 18	NR
Pinter,2009 ⁴²	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 42.3 SD: 20.8	6 months	36	Mean: NR SD: NR	Mean change from baseline -7.8	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 42.8 SD: 24.9	6 months	36	Mean: NR SD: NR	Mean change from baseline -0.2	NR
	CRT ON	Minnesota Living with	36	Mean: 20.1 SD: 9.2	6 months	36	Mean: NR SD: NR	Mean change from baseline	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Heart Failure Inventory Score Unit:NA						-5	
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 17.7 SD: 9.8	6 months	36	Mean: NR SD: NR	Mean change from baseline -0.6	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 8.5 SD: 6.4	6 months	36	Mean: NR SD: NR	Mean change from baseline -1.3	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 9.1 SD: 7.6	6 months	36	Mean: NR SD: NR	Mean change from baseline 0.3	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 46.7 SD: 24.9	6 months	36	Mean: NR SD: NR	11.2	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 44.5 SD: 26.5	6 months	36	Mean: NR SD: NR	6.3	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Score Unit:NA							
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 14 SD: 26.9	6 months	36	Mean: NR SD: NR	19.6	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 12.4 SD: 23.9	6 months	36	Mean: NR SD: NR	21.6	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 93 SD: 11.4	6 months	36	Mean: NR SD: NR	-3.3	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 95.3 SD: 11	6 months	36	Mean: NR SD: NR	-2.3	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score	36	Mean: 59.4 SD: 12.7	6 months	36	Mean: NR SD: NR	-5.8	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:NA							
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 59 SD: 9.6	6 months	36	Mean: NR SD: NR	-5.8	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 43.9 SD: 19.4	6 months	36	Mean: NR SD: NR	1.4	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 42.8 SD: 25.2	6 months	36	Mean: NR SD: NR	1.3	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 59.4 SD: 27.1	6 months	36	Mean: NR SD: NR	4.7	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 61.7 SD: 29	6 months	36	Mean: NR SD: NR	2.6	NR
	CRT ON	Minnesota	36	Mean: 46.7	6 months	36	Mean: NR	12.5	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Living with Heart Failure Inventory Score Unit:NA		SD: 46			SD: NR		
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 54 SD: 47.5	6 months	36	Mean: NR SD: NR	5.4	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 65.3 SD: 20	6 months	36	Mean: NR SD: NR	29.5	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 69 SD: 22.9	6 months	36	Mean: NR SD: NR	3.3	NR
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 39.5 SD: 5.7	6 months	36	Mean: NR SD: NR	4.5	NR
	CRT OFF	Minnesota Living with Heart Failure	36	Mean: 39.1 SD: 5.7	6 months	36	Mean: NR SD: NR	0.1	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Inventory Score Unit:NA							
	CRT ON	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 43.7 SD: 11.6	6 months	36	Mean: NR SD: NR	5.1	NR
	CRT OFF	Minnesota Living with Heart Failure Inventory Score Unit:NA	36	Mean: 46 SD: 13.7	6 months	36	Mean: NR SD: NR	0.5	NR
Diab,2011 ³⁸	Arm 1	Minnesota Living with Heart Failure Inventory Score Unit:NA	27	Mean: 22 SD: 7	6 months	26	Mean: 26 SD: 9	NR	NR
	Arm 2	Minnesota Living with Heart Failure Inventory Score Unit:NA	46	Mean: SD:			Mean: SD:	NR	NR
	Arm 3	Minnesota Living with Heart Failure Inventory Score	24	Mean: 43 SD: 25	6 months	21	Mean: 27 SD: 21	NR	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:NA							
	Arm 4	Minnesota Living with Heart Failure Inventory Score Unit:NA	22	Mean: 42 SD: 21	6 months	UNCLEAR (19?)	Mean: 44 SD: 27	NR	NR
Abraham,2004 ³⁴ MIRACLE ICD II	Control	Minnesota Living with Heart Failure Inventory Score Unit:NA	101	Mean: 39.8 SD: 21.2	6 months	96	Mean: NR SD: NR	"-10.7(mean difference)	NR
	CRT	Minnesota Living with Heart Failure Inventory Score Unit:NA	85	Mean: 41.8 SD: 25.1	6 months	81	Mean: NR SD: NR	"-13.3(mean difference)	NR
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	CRT(Overall)	Minnesota Living with Heart Failure Inventory Score Unit:NA	245	Mean: 44 SD: 25	6 months	234	Mean: NR SD: NR	-7	NR
	No CRT(Overall)	Minnesota Living with Heart Failure Inventory Score Unit:NA	245	Mean: 40 SD: 23	6 months	220	Mean: NR SD: NR	5	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	CRT(Class III/IV)	Minnesota Living with Heart Failure Inventory Score Unit:NA	117	Mean: 56 SD: 22	6 months	107	Mean: NR SD: NR	-16	NR
	No CRT(Class III/IV)	Minnesota Living with Heart Failure Inventory Score Unit:NA	110	Mean: 49 SD: 21	6 months	96	Mean: NR SD: NR	-5	NR
	CRT(Class I/II)	Minnesota Living with Heart Failure Inventory Score Unit:NA	128	Mean: NR SD: NR	6 months	127	Mean: NR SD: NR	-1	NR
	No CRT(Class I/II)	Minnesota Living with Heart Failure Inventory Score Unit:NA	135	Mean: NR SD: NR	6 months	129	Mean: NR SD: NR	-4	NR
Young,2003 ²⁶ MIRACLE ICD	Control	Minnesota Living with Heart Failure Inventory Score Unit:NA	182	Mean: 55.2 SD: 22.6	6 months	153	Mean: NR SD: NR	-11	NR
	CRT	Minnesota Living with	187	Mean: 56.8 SD: 22.6	6 months	152	Mean: NR SD: NR	-17.5	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Heart Failure Inventory Score Unit:NA							
SF -36									
Pinter,2009 ⁴²	CRT ON	SF -36 Unit:NA	36	Mean: 46.7 SD: 24.9	6 months	36	Mean: NR SD: NR	11.2	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 44.5 SD: 26.5	6 months	36	Mean: NR SD: NR	6.3	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 14 SD: 26.9	6 months	36	Mean: NR SD: NR	19.6	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 12.4 SD: 23.9	6 months	36	Mean: NR SD: NR	21.6	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 93 SD: 11.4	6 months	36	Mean: NR SD: NR	-3.3	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 95.3 SD: 11	6 months	36	Mean: NR SD: NR	-2.3	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 59.4 SD: 12.7	6 months	36	Mean: NR SD: NR	-5.8	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 59 SD: 9.6	6 months	36	Mean: NR SD: NR	-5.8	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 43.9 SD: 19.4	6 months	36	Mean: NR SD: NR	1.4	NR
	CRT OFF	SF -36	36	Mean: 42.8 SD: 25.2	6 months	36	Mean: NR SD: NR	1.3	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:NA							
	CRT ON	SF -36 Unit:NA	36	Mean: 59.4 SD: 27.1	6 months	36	Mean: NR SD: NR	4.7	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 61.7 SD: 29	6 months	36	Mean: NR SD: NR	2.6	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 46.7 SD: 46	6 months	36	Mean: NR SD: NR	12.5	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 54 SD: 47.5	6 months	36	Mean: NR SD: NR	5.4	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 65.3 SD: 20	6 months	36	Mean: NR SD: NR	29.5	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 69 SD: 22.9	6 months	36	Mean: NR SD: NR	3.3	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 39.5 SD: 5.7	6 months	36	Mean: NR SD: NR	4.5	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 39.1 SD: 5.7	6 months	36	Mean: NR SD: NR	0.1	NR
	CRT ON	SF -36 Unit:NA	36	Mean: 43.7 SD: 11.6	6 months	36	Mean: NR SD: NR	5.1	NR
	CRT OFF	SF -36 Unit:NA	36	Mean: 46 SD: 13.7	6 months	36	Mean: NR SD: NR	0.5	NR
Left ventricular end systolic volume									
Abraham,2004 34	Control	Left ventricular end systolic	101	Mean: 252 SD: 98	6 months	85	Mean: NR SD: NR	-14	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
MIRACLE ICD II		volume Unit:ml							
	CRT	Left ventricular end systolic volume Unit:ml	85	Mean: 260 SD: 134	6 months	68	Mean: NR SD: NR	-42	NR
Moss,2009 ⁹ MADIT CRT	ICD	Left ventricular end systolic volume Unit:ml	731	Mean: 179 SD: 53	1 year	620	Mean: NR SD: NR	Mean change from baseline 18	NR
	CRT-D	Left ventricular end systolic volume Unit:ml	1098	Mean: 175 SD: 48	1 year	746	Mean: NR SD: NR	Mean change from baseline 57	NR
Young,2003 ²⁶ MIRACLE ICD	Control	Left ventricular end systolic volume Unit:ml	182	Mean: NR SD: NR	6 months	133	Mean: NR SD: NR	-8.2	NR
	CRT	Left ventricular end systolic volume Unit:ml	187	Mean: NR SD: NR	6 months	132	Mean: NR SD: NR	-22.2	NR
Hsu,2012 ¹⁴	hyporesponders	Left ventricular end systolic volume	187	Mean: 85.9 SD: 20.3	12 months	187	Mean: -12.6 SD: 10.7	NR	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	responders	Left ventricular end systolic volume Unit:ml	367	Mean: 90.2 SD: 21.9	12 months	367	Mean: -29.8 SD: 10	NR	NR
	super responders	Left ventricular end systolic volume Unit:ml	188	Mean: 87.6 SD: 20.6	12 months	188	Mean: 87.6 SD: 20.6	NR	NR
Pinter,2009 ⁴²	CRT ON	Left ventricular end systolic volume Unit:ml	36	Mean: 242 SD: 96	6 months	36	Mean: NR SD: NR	-7	NR
	CRT OFF	Left ventricular end systolic volume Unit:ml	36	Mean: 251 SD: 147	6 months	36	Mean: NR SD: NR	-30	NR
	CRT ON	Left ventricular end systolic volume Unit:ml	36	Mean: 217 SD: 72	6 months	36	Mean: NR SD: NR	-21	NR
	CRT OFF	Left ventricular end systolic volume	36	Mean: 213 SD: 101	6 months	36	Mean: NR SD: NR	-5	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
Solomon,2010 ¹⁹ MADIT CRT Sub Study	ICD	Left ventricular end systolic volume Unit:ml	623	Mean: 179.2 SD: 51.9	12 months	623	Mean: 161.2 SD: 49.8	-18.1	NR
	CRT-D	Left ventricular end systolic volume Unit:ml	749	Mean: 177.2 SD: 44.9	12 months	749	Mean: 119.8 SD: 41.6	-57.3	NR
Tompkins,2013 ²⁰ MADIT CRT Sub Study	ICD	Left ventricular end systolic volume Unit:ml	87	Mean: 80 SD: 17.6	12 months	74	Mean: NR SD: NR	NR	NR
	CRT-D LAFB	Left ventricular end systolic volume Unit:ml	80	Mean: 77.5 SD: 17.7	12 months	48	Mean: NR SD: NR	NR	Mean change (nonLFAB- LFAB): -7
	CRT-D non-LAFB	Left ventricular end systolic volume Unit:ml	52	Mean: 76.4 SD: 15.7	12 months	31	Mean: NR SD: NR	NR	Mean change (nonLFAB- ICD): -17
Diab,2011 ³⁸	Arm 3	Left ventricular end systolic volume Unit:ml	24	Mean: 175 SD: 48	6 months	21	Mean: 158.4 SD: 56	NR	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	Arm 4	Left ventricular end systolic volume Unit:ml	22	Mean: 188 SD: 71	6 months	UNCLEAR (19?)	Mean: 169 SD: 46	NR	NR
	Arm 1	Left ventricular end systolic volume Unit:ml	27	Mean: 210 SD: 89	6 months	26	Mean: SD:	NR	NR
Arshad,2011 ¹⁰	ICD,Women	Left ventricular end systolic volume Unit:ml	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	Median change from baseline -10	NR
	ICD, Men	Left ventricular end systolic volume Unit:ml	469	Mean: NR SD: NR	6 months	469	Mean: NR SD: NR	Median change from baseline -8	NR
	CRT D Women	Left ventricular end systolic volume Unit:ml	184	Mean: NR SD: NR	6 months	184	Mean: NR SD: NR	Median change from baseline -31	NR
	CRT D Men	Left ventricular end systolic volume Unit:ml	565	Mean: NR SD: NR	6 months	565	Mean: NR SD: NR	Median change from baseline -27	NR
	ICD,Women,	Left	40	Mean: NR	6 months	40	Mean: NR	Median	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	Ischemic heart disease	ventricular end systolic volume Unit:ml		SD: NR			SD: NR	change from baseline -11	
	ICD,men, Ischemic heart disease	Left ventricular end systolic volume Unit:ml	294	Mean: NR SD: NR	6 months	294	Mean: NR SD: NR	Median change from baseline -8	NR
	CRT D,Women, Ischemic heart disease	Left ventricular end systolic volume Unit:ml	52	Mean: NR SD: NR	6 months	52	Mean: NR SD: NR	Median change from baseline -28	NR
	CRT D,men, Ischemic heart disease	Left ventricular end systolic volume Unit:ml	359	Mean: NR SD: NR	6 months	359	Mean: NR SD: NR	Median change from baseline -25	NR
	ICD,Women, Non Ischemic heart disease	Left ventricular end systolic volume Unit:ml	114	Mean: NR SD: NR	6 months	114	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD,men, Non Ischemic heart disease	Left ventricular end systolic volume Unit:ml	175	Mean: NR SD: NR	6 months	175	Mean: NR SD: NR	Median change from baseline -10	NR
	CRT D,Women, Non Ischemic heart	Left ventricular	132	Mean: NR SD: NR	6 months	132	Mean: NR SD: NR	Median change from	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	disease	end systolic volume Unit:ml						baseline -33	
	CRT D,men, Non Ischemic heart disease	Left ventricular end systolic volume Unit:ml	206	Mean: NR SD: NR	6 months	206	Mean: NR SD: NR	Median change from baseline -31	NR
	ICD,Women, QRS <150ms	Left ventricular end systolic volume Unit:ml	45	Mean: NR SD: NR	6 months	45	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD, Men,QRS <150ms	Left ventricular end systolic volume Unit:ml	166	Mean: NR SD: NR	6 months	166	Mean: NR SD: NR	Median change from baseline -8	NR
	CRT D Women,QRS <150ms	Left ventricular end systolic volume Unit:ml	58	Mean: NR SD: NR	6 months	58	Mean: NR SD: NR	Median change from baseline -27	NR
	CRT D Men,QRS <150ms	Left ventricular end systolic volume Unit:ml	200	Mean: NR SD: NR	6 months	200	Mean: NR SD: NR	Median change from baseline -23	NR
	ICD,Women, QRS ≥150ms	Left ventricular end systolic	109	Mean: NR SD: NR	6 months	109	Mean: NR SD: NR	Median change from baseline -10	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		volume Unit:ml							
	ICD, Men,QRS ≥150ms	Left ventricular end systolic volume Unit:ml	303	Mean: NR SD: NR	6 months	303	Mean: NR SD: NR	Median change from baseline -8	NR
	CRT D Women,QRS ≥150ms	Left ventricular end systolic volume Unit:ml	126	Mean: NR SD: NR	6 months	126	Mean: NR SD: NR	Median change from baseline -36	NR
	CRT D Men,QRS ≥150ms	Left ventricular end systolic volume Unit:ml	365	Mean: NR SD: NR	6 months	365	Mean: NR SD: NR	Median change from baseline -29	NR
	ICD,Women,Non LBBB	Left ventricular end systolic volume Unit:ml	20	Mean: NR SD: NR	6 months	20	Mean: NR SD: NR	Median change from baseline -10	NR
	ICD, Men,Non LBBB	Left ventricular end systolic volume Unit:ml	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline -9	NR
	CRT D Women,Non LBBB	Left ventricular end systolic volume	25	Mean: NR SD: NR	6 months	25	Mean: NR SD: NR	Median change from baseline -25	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	CRT D Men,Non LBBB	Left ventricular end systolic volume Unit:ml	192	Mean: NR SD: NR	6 months	192	Mean: NR SD: NR	Median change from baseline -22	NR
	ICD,Women,LBBB	Left ventricular end systolic volume Unit:ml	134	Mean: NR SD: NR	6 months	134	Mean: NR SD: NR	Median change from baseline -10	NR
	ICD, Men,LBBB	Left ventricular end systolic volume Unit:ml	309	Mean: NR SD: NR	6 months	309	Mean: NR SD: NR	Median change from baseline -8	NR
	CRT D Women,LBBB	Left ventricular end systolic volume Unit:ml	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline -33	NR
	CRT D Men,LBBB	Left ventricular end systolic volume Unit:ml	373	Mean: NR SD: NR	6 months	373	Mean: NR SD: NR	Median change from baseline -29	NR
Zareba,2011 ²¹ MADIT CRT Sub Study	ICD LBBB	Left ventricular end systolic volume	443	Mean: NR SD: NR	6 months	443	Mean: NR SD: NR	Mean change from baseline -18.3	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	ICD Non LBBB	Left ventricular end systolic volume Unit:ml	179	Mean: NR SD: NR	6 months	179	Mean: NR SD: NR	Mean change from baseline -17.5	NR
	CRT D LBBB	Left ventricular end systolic volume Unit:ml	532	Mean: NR SD: NR	6 months	532	Mean: NR SD: NR	Mean change from baseline -62.1	NR
	CRTD Non LBBB	Left ventricular end systolic volume Unit:ml	216	Mean: NR SD: NR	6 months	216	Mean: NR SD: NR	Mean change from baseline -45.7	NR
	ICD LBBB	Left ventricular end systolic volume Unit:ml	443	Mean: NR SD: NR	6 months	443	Mean: NR SD: NR	% change from baseline -10.1	NR
	ICD Non LBBB	Left ventricular end systolic volume Unit:ml	179	Mean: NR SD: NR	6 months	179	Mean: NR SD: NR	% change from baseline -10.2	NR
	CRT D LBBB	Left ventricular end systolic volume Unit:ml	532	Mean: NR SD: NR	6 months	532	Mean: NR SD: NR	% change from baseline -34.8	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	CRTD Non LBBB	Left ventricular end systolic volume Unit:ml	216	Mean: NR SD: NR	6 months	216	Mean: NR SD: NR	% change from baseline -26.3	NR
Barsheshet,20 11 ¹¹ MADIT CRT Sub Study	CRTD Ischemic Cardiomyopathy	Left ventricular end systolic volume Unit:ml	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	% change from baseline -29	NR
	CRTD Non Ischemic Cardiomyopathy	Left ventricular end systolic volume Unit:ml	477	Mean: NR SD: NR	6 months	477	Mean: NR SD: NR	% change from baseline -37	NR
	ICD Ischemic Cardiomyopathy	Left ventricular end systolic volume Unit:ml	194	Mean: NR SD: NR	6 months	194	Mean: NR SD: NR	% change from baseline -10	NR
	ICD Non Ischemic Cardiomyopathy	Left ventricular end systolic volume Unit:ml	592	Mean: NR SD: NR	6 months	592	Mean: NR SD: NR	% change from baseline -11	NR
Left ventricular end diastolic volume/ volume index									
Abraham,2004 ³⁴ MIRACLE ICD II	Control	Left ventricular end diastolic volume/ volume index	101	Mean: 329 SD: 108	6 months	85	Mean: NR SD: NR	-16	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	CRT	Left ventricular end diastolic volume/ volume index Unit:ml	85	Mean: 337 SD: 147	6 months	69	Mean: NR SD: NR	-41	NR
Moss,2009 ⁹	ICD	Left ventricular end diastolic volume/ volume index Unit:ml	731	Mean: 251 SD: 65	1 year	620	Mean: NR SD: NR	Mean change from baseline 15	NR
	CRT-D	Left ventricular end diastolic volume/ volume index Unit:ml	1098	Mean: 245 SD: 60	1 year	746	Mean: NR SD: NR	Mean change from baseline 52	NR
Young,2003 ²⁶ MIRACLE ICD	Control	Left ventricular end diastolic volume/ volume index Unit:ml	188	Mean: 311 SD: 96	6 months	133	Mean: NR SD: NR	-5.7	NR
	CRT	Left ventricular end diastolic volume/ volume index Unit:ml	187	Mean: 322 SD: 100	6 months	132	Mean: NR SD: NR	-19.9	NR
Hsu,2012 ¹⁴	hyporesponders	Left	187	Mean:	12 months	187	Mean: -11.2	NR	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ventricular end diastolic volume/ volume index Unit:ml		122.5 SD: 25.5			SD: 10.1		
	responders	Left ventricular end diastolic volume/ volume index Unit:ml	367	Mean: 126.4 SD: 27	12 months	371	Mean: -26.5 SD: 11.8	NR	NR
	super responders	Left ventricular end diastolic volume/ volume index Unit:ml	188	Mean: 124 SD: 24.7	12 months	191	Mean: -40.8 SD: 16.8	NR	NR
Pinter,2009 ⁴²	CRT ON	Left ventricular end diastolic volume/ volume index Unit:ml	36	Mean: 314 SD: 108	6 months	36	Mean: NR SD: NR	-7	NR
	CRT OFF	Left ventricular end diastolic volume/ volume index Unit:ml	36	Mean: 335 SD: 156	6 months	36	Mean: NR SD: NR	-34	NR
	CRT ON	Left ventricular end diastolic	36	Mean: 270 SD: 74	6 months	36	Mean: NR SD: NR	-16	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		volume/ volume index Unit:ml							
	CRT OFF	Left ventricular end diastolic volume/ volume index Unit:ml	36	Mean: 272 SD: 106	6 months	36	Mean: NR SD: NR	-13	NR
Solomom,2010 ¹⁹ MADIT CRT Sub Study	ICD	Left ventricular end diastolic volume/ volume index Unit:ml	623	Mean: 250.9 SD: 64.4	12 months	623	Mean: 236.2 SD: 63.5	-14.7	NR
	CRT-D	Left ventricular end diastolic volume/ volume index Unit:ml	749	Mean: 249.9 SD: 55.6	12 months	749	Mean: 197.8 SD: 52.7	-52.2	NR
Tompkins,2013 ²⁰	ICD	Left ventricular end diastolic volume/ volume index Unit:ml	87	Mean: 113.5 SD: 22.4	12 months	74	Mean: NR SD: NR	NR	NR
	CRT-D LAFB	Left ventricular end diastolic volume/ volume index	80	Mean: 110.5 SD: 22.8	12 months	48	Mean: NR SD: NR	NR	Mean change (nonLFAB- LFAB): -5

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	CRT-D non-LAFB	Left ventricular end diastolic volume/ volume index Unit:ml	52	Mean: 108.6 SD: 20.4	12 months	31	Mean: NR SD: NR	NR	Mean change (nonLFAB- ICD): -11
Arshad,2011 ¹⁰	ICD,Women	Left ventricular end diastolic volume/ volume index Unit:ml	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD, Men	Left ventricular end diastolic volume/ volume index Unit:ml	469	Mean: NR SD: NR	6 months	469	Mean: NR SD: NR	Median change from baseline -7	NR
	CRT D Women	Left ventricular end diastolic volume/ volume index Unit:ml	184	Mean: NR SD: NR	6 months	184	Mean: NR SD: NR	Median change from baseline -29	NR
	CRT D Men	Left ventricular end diastolic volume/ volume index Unit:ml	565	Mean: NR SD: NR	6 months	565	Mean: NR SD: NR	Median change from baseline -22	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	ICD,Women, Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	40	Mean: NR SD: NR	6 months	40	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD,men, Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	294	Mean: NR SD: NR	6 months	294	Mean: NR SD: NR	Median change from baseline 6	NR
	CRT D,Women, Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	52	Mean: NR SD: NR	6 months	52	Mean: NR SD: NR	Median change from baseline -22	NR
	CRT D,men, Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	359	Mean: NR SD: NR	6 months	359	Mean: NR SD: NR	Median change from baseline -21	NR
	ICD,Women, Non Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	114	Mean: NR SD: NR	6 months	114	Mean: NR SD: NR	Median change from baseline -8	NR
	ICD,men, Non Ischemic heart	Left ventricular	175	Mean: NR SD: NR	6 months	175	Mean: NR SD: NR	Median change from	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	disease	end diastolic volume/ volume index Unit:ml						baseline -7	
	CRT D,Women, Non Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	132	Mean: NR SD: NR	6 months	132	Mean: NR SD: NR	Median change from baseline -30	NR
	CRT D,men, Non Ischemic heart disease	Left ventricular end diastolic volume/ volume index Unit:ml	206	Mean: NR SD: NR	6 months	206	Mean: NR SD: NR	Median change from baseline -28	NR
	ICD,Women, QRS <150ms	Left ventricular end diastolic volume/ volume index Unit:ml	45	Mean: NR SD: NR	6 months	45	Mean: NR SD: NR	Median change from baseline -7	NR
	ICD, Men,QRS <150ms	Left ventricular end diastolic volume/ volume index Unit:ml	166	Mean: NR SD: NR	6 months	166	Mean: NR SD: NR	Median change from baseline -7	NR
	CRT D Women,QRS <150ms	Left ventricular end diastolic volume/ volume index	58	Mean: NR SD: NR	6 months	58	Mean: NR SD: NR	Median change from baseline -23	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		volume index Unit:ml							
	CRT D Men,QRS <150ms	Left ventricular end diastolic volume/ volume index Unit:ml	200	Mean: NR SD: NR	6 months	200	Mean: NR SD: NR	Median change from baseline -19	NR
	ICD,Women, QRS ≥150ms	Left ventricular end diastolic volume/ volume index Unit:ml	109	Mean: NR SD: NR	6 months	109	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD, Men,QRS ≥150ms	Left ventricular end diastolic volume/ volume index Unit:ml	303	Mean: NR SD: NR	6 months	303	Mean: NR SD: NR	Median change from baseline -7	NR
	CRT D Women,QRS ≥150ms	Left ventricular end diastolic volume/ volume index Unit:ml	126	Mean: NR SD: NR	6 months	126	Mean: NR SD: NR	Median change from baseline -32	NR
	CRT D Men,QRS ≥150ms	Left ventricular end diastolic volume/ volume index	365	Mean: NR SD: NR	6 months	365	Mean: NR SD: NR	Median change from baseline -25	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
	ICD,Women,Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	20	Mean: NR SD: NR	6 months	20	Mean: NR SD: NR	Median change from baseline -9	NR
	ICD, Men,Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline -7	NR
	CRT D Women,Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	25	Mean: NR SD: NR	6 months	25	Mean: NR SD: NR	Median change from baseline -20	NR
	CRT D Men,Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	192	Mean: NR SD: NR	6 months	192	Mean: NR SD: NR	Median change from baseline -19	NR
	ICD,Women,LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	134	Mean: NR SD: NR	6 months	134	Mean: NR SD: NR	Median change from baseline -8	NR
	ICD, Men,LBBB	Left	309	Mean: NR	6 months	309	Mean: NR	Median	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ventricular end diastolic volume/ volume index Unit:ml		SD: NR			SD: NR	change from baseline -6	
	CRT D Women,LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline -30	NR
	CRT D Men,LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	373	Mean: NR SD: NR	6 months	373	Mean: NR SD: NR	Median change from baseline -25	NR
Zareba,2011 ²¹ MADIT CRT Sub Study	ICD LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	443	Mean: NR SD: NR	6 months	443	Mean: NR SD: NR	Mean change from baseline -14.8	NR
	ICD Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	179	Mean: NR SD: NR	6 months	179	Mean: NR SD: NR	Mean change from baseline -14.4	NR
	CRT D LBBB	Left ventricular end diastolic	532	Mean: NR SD: NR	6 months	532	Mean: NR SD: NR	Mean change from baseline -56.7	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		volume/ volume index Unit:ml							
	CRTD Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	216	Mean: NR SD: NR	6 months	216	Mean: NR SD: NR	Mean change from baseline -41	NR
	ICD LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	443	Mean: NR SD: NR	6 months	443	Mean: NR SD: NR	% change from baseline -5.9	NR
	ICD Non LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	179	Mean: NR SD: NR	6 months	179	Mean: NR SD: NR	% change from baseline -5.9	NR
	CRT D LBBB	Left ventricular end diastolic volume/ volume index Unit:ml	532	Mean: NR SD: NR	6 months	532	Mean: NR SD: NR	% change from baseline -22.5	NR
	CRTD Non LBBB	Left ventricular end diastolic volume/ volume index	216	Mean: NR SD: NR	6 months	216	Mean: NR SD: NR	% change from baseline -16.4	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit:ml							
Barsheshet,20 11 ¹¹	CRTD Ischemic Cardiomyopathy	Left ventricular end diastolic volume/ volume index Unit:ml	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	% change from baseline -18	NR
	CRTD Non Ischemic Cardiomyopathy	Left ventricular end diastolic volume/ volume index Unit:ml	477	Mean: NR SD: NR	6 months	477	Mean: NR SD: NR	% change from baseline -24	NR
	ICD Ischemic Cardiomyopathy	Left ventricular end diastolic volume/ volume index Unit:ml	194	Mean: NR SD: NR	6 months	194	Mean: NR SD: NR	% change from baseline -5	NR
	ICD Non Ischemic Cardiomyopathy	Left ventricular end diastolic volume/ volume index Unit:ml	592	Mean: NR SD: NR	6 months	592	Mean: NR SD: NR	% change from baseline -7	NR
Left ventricular ejection fraction									
Abraham,2004 ³⁴ MIRACLE ICD II	Control	Left ventricular ejection fraction Unit:%	101	Mean: 24.6 SD: 6.7	6 months	85	Mean: NR SD: NR	0.8	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	CRT	Left ventricular ejection fraction Unit: %	85	Mean: 24.4 SD: 6.6	6 months	68	Mean: NR SD: NR	3.8	NR
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	CRT	Left ventricular ejection fraction Unit: %	245	Mean: 21 SD: 7	6 months	222	Mean: NR SD: NR	5.1	NR
	No CRT	Left ventricular ejection fraction Unit: %	245	Mean: 22 SD: 7	6 months	216	Mean: NR SD: NR	2.8	NR
Moss,2009 ⁹	ICD	Left ventricular ejection fraction Unit: %	731	Mean: 24 SD: 5	1 year	620	Mean: NR SD: NR	Mean change from baseline 3	NR
	CRT-D	Left ventricular ejection fraction Unit: %	1098	Mean: 24 SD: 5	1 year	746	Mean: NR SD: NR	Mean change from baseline 11	NR
Young,2003 ²⁶ MIRACLE ICD	Control	Left ventricular ejection fraction Unit: %	182	Mean: 23.9 SD: 6	6 months	133	Mean: NR SD: NR	1.7	NR
	CRT	Left	187	Mean: 24.2	6 months	132	Mean: NR	2.1	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ventricular ejection fraction Unit: %		SD: 6.5			SD: NR		
Solomon, 2010 ¹⁹ MADIT CRT Sub Study	ICD	Left ventricular ejection fraction Unit: %	623	Mean: 0.29 SD: 0.03	12 months	623	Mean: 0.32 SD: 0.04	0.03	NR
	CRT-D	Left ventricular ejection fraction Unit: %	749	Mean: 0.29 SD: 0.03	12 months	749	Mean: 0.41 SD: 0.06	0.11	NR
Diab, 2011, ³⁸	Arm 3	Left ventricular ejection fraction Unit: %	24	Mean: 25 SD: 5	6 months	21	Mean: 29 SD: 9	NR	NR
	Arm 4	Left ventricular ejection fraction Unit: %	22	Mean: 26 SD: 6	6 months	UNCLEAR (19?)	Mean: 27 SD: 8	NR	NR
	Arm 1	Left ventricular ejection fraction Unit: %	27	Mean: 210 SD: 89	6 months	27	Mean: 198 SD: 72	NR	NR
Pinter, 2009 ⁴²	CRT ON	Left ventricular	36	Mean: 24.2 SD: 7.5	6 months	36	Mean: NR SD: NR	1.7	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ejection fraction Unit: %							
	CRT OFF	Left ventricular ejection fraction Unit: %	36	Mean: 26.8 SD: 8.4	6 months	36	Mean: NR SD: NR	0.6	NR
	CRT ON	Left ventricular ejection fraction Unit: %	36	Mean: 21.2 SD: 7.9	6 months	36	Mean: NR SD: NR	3.9	NR
	CRT OFF	Left ventricular ejection fraction Unit: %	36	Mean: 24 SD: 8.3	6 months	36	Mean: NR SD: NR	1.9	NR
Arshad,2011 ¹⁰	ICD,Women	Left ventricular ejection fraction Unit: %	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	Median change from baseline 0.03	NR
	ICD, Men	Left ventricular ejection fraction Unit: %	469	Mean: NR SD: NR	6 months	469	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D Women	Left ventricular ejection	184	Mean: NR SD: NR	6 months	184	Mean: NR SD: NR	Median change from baseline 0.13	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		fraction Unit: %							
	CRT D Men	Left ventricular ejection fraction Unit: %	565	Mean: NR SD: NR	6 months	565	Mean: NR SD: NR	Median change from baseline 0.1	NR
	ICD,Women, Ischemic heart disease	Left ventricular ejection fraction Unit: %	40	Mean: NR SD: NR	6 months	40	Mean: NR SD: NR	Median change from baseline 0.04	NR
	ICD,men, Ischemic heart disease	Left ventricular ejection fraction Unit: %	294	Mean: NR SD: NR	6 months	294	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D,Women, Ischemic heart disease	Left ventricular ejection fraction Unit: %	52	Mean: NR SD: NR	6 months	52	Mean: NR SD: NR	Median change from baseline 0.13	NR
	CRT D,men, Ischemic heart disease	Left ventricular ejection fraction Unit: %	359	Mean: NR SD: NR	6 months	359	Mean: NR SD: NR	Median change from baseline 0.1	NR
	ICD,Women, Non Ischemic heart disease	Left ventricular ejection fraction	114	Mean: NR SD: NR	6 months	114	Mean: NR SD: NR	Median change from baseline 0.03	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit: %							
	ICD,men, Non Ischemic heart disease	Left ventricular ejection fraction Unit: %	175	Mean: NR SD: NR	6 months	175	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D,Women, Non Ischemic heart disease	Left ventricular ejection fraction Unit: %	132	Mean: NR SD: NR	6 months	132	Mean: NR SD: NR	Median change from baseline 0.13	NR
	CRT D,men, Non Ischemic heart disease	Left ventricular ejection fraction Unit: %	206	Mean: NR SD: NR	6 months	206	Mean: NR SD: NR	Median change from baseline 0.12	NR
	ICD,Women, QRS <150ms	Left ventricular ejection fraction Unit: %	45	Mean: NR SD: NR	6 months	45	Mean: NR SD: NR	Median change from baseline 0.04	NR
	ICD, Men,QRS <150ms	Left ventricular ejection fraction Unit: %	166	Mean: NR SD: NR	6 months	166	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D Women,QRS <150ms	Left ventricular ejection fraction	58	Mean: NR SD: NR	6 months	58	Mean: NR SD: NR	Median change from baseline 0.12	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		Unit: %							
	CRT D Men, QRS <150ms	Left ventricular ejection fraction Unit: %	200	Mean: NR SD: NR	6 months	200	Mean: NR SD: NR	Median change from baseline 0.1	NR
	ICD, Women, QRS ≥150ms	Left ventricular ejection fraction Unit: %	109	Mean: NR SD: NR	6 months	109	Mean: NR SD: NR	Median change from baseline 0.03	NR
	ICD, Men, QRS ≥150ms	Left ventricular ejection fraction Unit: %	303	Mean: NR SD: NR	6 months	303	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D Women, QRS ≥150ms	Left ventricular ejection fraction Unit: %	126	Mean: NR SD: NR	6 months	126	Mean: NR SD: NR	Median change from baseline 0.13	NR
	CRT D Men, QRS ≥150ms	Left ventricular ejection fraction Unit: %	365	Mean: NR SD: NR	6 months	365	Mean: NR SD: NR	Median change from baseline 0.11	NR
	ICD, Women, Non LBBB	Left ventricular ejection fraction Unit: %	20	Mean: NR SD: NR	6 months	20	Mean: NR SD: NR	Median change from baseline 0.03	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	ICD, Men,Non LBBB	Left ventricular ejection fraction Unit: %	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D Women,Non LBBB	Left ventricular ejection fraction Unit: %	25	Mean: NR SD: NR	6 months	25	Mean: NR SD: NR	Median change from baseline 0.1	NR
	CRT D Men,Non LBBB	Left ventricular ejection fraction Unit: %	192	Mean: NR SD: NR	6 months	192	Mean: NR SD: NR	Median change from baseline 0.09	NR
	ICD,Women,LBBB	Left ventricular ejection fraction Unit: %	134	Mean: NR SD: NR	6 months	134	Mean: NR SD: NR	Median change from baseline 0.03	NR
	ICD, Men,LBBB	Left ventricular ejection fraction Unit: %	309	Mean: NR SD: NR	6 months	309	Mean: NR SD: NR	Median change from baseline 0.03	NR
	CRT D Women,LBBB	Left ventricular ejection fraction Unit: %	159	Mean: NR SD: NR	6 months	159	Mean: NR SD: NR	Median change from baseline 0.13	NR
	CRT D Men,LBBB	Left	373	Mean: NR	6 months	373	Mean: NR	Median	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		ventricular ejection fraction Unit: %		SD: NR			SD: NR	change from baseline 0.11	
Zareba,2011 ²¹ MADIT CRT Sub Study	ICD LBBB	Left ventricular ejection fraction Unit: %	443	Mean: NR SD: NR	6 months	443	Mean: NR SD: NR	Mean change from baseline 3.4	NR
	ICD Non LBBB	Left ventricular ejection fraction Unit: %	179	Mean: NR SD: NR	6 months	179	Mean: NR SD: NR	Mean change from baseline 3.4	NR
	CRT D LBBB	Left ventricular ejection fraction Unit: %	532	Mean: NR SD: NR	6 months	532	Mean: NR SD: NR	Mean change from baseline 11.9	NR
	CRTD Non LBBB	Left ventricular ejection fraction Unit: %	216	Mean: NR SD: NR	6 months	216	Mean: NR SD: NR	Mean change from baseline 8.8	NR
Barsheshet,20 11 ¹¹	CRTD Ischemic Cardiomyopathy	Left ventricular ejection fraction Unit: %	154	Mean: NR SD: NR	6 months	154	Mean: NR SD: NR	% change from baseline 10	NR
	CRTD Non Ischemic	Left ventricular	477	Mean: NR SD: NR	6 months	477	Mean: NR SD: NR	% change from baseline	NR

Author,Year Trial	Arm	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
	Cardiomyopathy	ejection fraction Unit: %						12	
	ICD Ischemic Cardiomyopathy	Left ventricular ejection fraction Unit: %	194	Mean: NR SD: NR	6 months	194	Mean: NR SD: NR	% change from baseline 3	NR
	ICD Non Ischemic Cardiomyopathy	Left ventricular ejection fraction Unit: %	592	Mean: NR SD: NR	6 months	592	Mean: NR SD: NR	% change from baseline 3	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D14: Outcomes reported in the trials assessing effectiveness of CRT-D (Hospitalization for heart failure and All-cause mortality)

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Hospitalization for heart failure								
Tang,2010 ²² RAFT	ICD	Hospitalization for heart failure	904	NR	236(26.1)	NR	NR	HR: 0.68 95% CI: 0.56- 0.83
	ICD-CRT	Hospitalization for heart failure	894	NR	174(19.5)	NR	NR	NA
Healey-2012- ²⁵	ICD	Hospitalization for heart failure	115	12 months	NR(27.8)	NR	NR	HR: 0.58 95% CI: 0.38- 1.01
	CRT-ICD	Hospitalization for heart failure	114	12 months	NR(19.3)	NR	NR	NA
Diab, 2011, ³⁸	Arm 1	Hospitalization for heart failure	27	6 months	27()	2()	NR	NR
	Arm 2a	Hospitalization for heart failure	21	6 months	21()	1()	NR	NR
	Arm 2b	Hospitalization for heart failure	19 (unclear)	6 months	19 (unclear)()	2()	NR	NR
Birnie,2013 ²³ RAFT Sub Study	ICD-CRT (LBBB)	Hospitalization for heart failure	594	NR	104(17.5)	NR	NR	HR: 0.603 95% CI: 0.469- 0.774
	ICD-CRT (Non- LBBB)	Hospitalization for heart failure	143	NR	39(27.3)	NR	NR	HR: 1.085 95% CI: 0.702- 1.680
	ICD-CRT (RBBB)	Hospitalization for heart failure	60	NR	15(25)	NR	NR	HR: 1.142 95% CI: 0.580- 2.249
	ICD-CRT (NIVCD)	Hospitalization for heart failure	83	NR	24(28.9)	NR	NR	HR: 1.021 95% CI: 0.574- 1.815

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	ICD(LBBB)	Hospitalization for heart failure	581	NR	151(26)	NR	NR	NR
	ICD(Non-LBBB)	Hospitalization for heart failure	165	NR	42(25.5)	NR	NR	NR
	ICD(RBBB)	Hospitalization for heart failure	81	NR	19(23.5)	NR	NR	NR
	ICD(NIVCD)	Hospitalization for heart failure	84	NR	23(27.4)	NR	NR	NR
Moss,2009 ⁹	ICD	Hospitalization for heart failure	731	NR	167(22.8)	NR	NR	HR: 0.59 95% CI: 0.47- 0.74
	CRT-D	Hospitalization for heart failure	1089	NR	151(13.9)	NR	NR	NA
Arshad,2011 ¹⁰	Women	Hospitalization for heart failure	453	6 months	73(NR)	NR	NR	HR: 0.3 95% CI: 0.18-0.5
	Men	Hospitalization for heart failure	1365	6 months	249(NR)	NR	NR	HR: 0.65 95% CI: 0.5- 0.84
	Women, Ischemic heart disease	Hospitalization for heart failure	125	6 months	23(NR)	NR	NR	HR: 0.31 95% CI: 0.12- 0.76
	men, Ischemic heart disease	Hospitalization for heart failure	874	6 months	180(NR)	NR	NR	HR: 0.58 95% CI: 0.43- 0.79
	Women, Non Ischemic heart disease	Hospitalization for heart failure	328	6 months	50(NR)	NR	NR	HR: 0.31 95% CI: 0.17- 0.56
	men, Non Ischemic heart	Hospitalization for heart	493	6 months	69(NR)	NR	NR	HR: 0.88 95% CI: 0.54-

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	disease	failure						1.45
	Women, QRS <150ms	Hospitalization for heart failure	148	6 months	23(NR)	NR	NR	HR: 0.26 95% CI: 0.1- 0.65
	Men, QRS <150ms	Hospitalization for heart failure	497	6 months	107(NR)	NR	NR	HR: 1.08 95% CI: 0.71- 1.6
	Women, QRS >=150ms	Hospitalization for heart failure	305	6 months	50(NR)	NR	NR	HR: 0.31 95% CI: 0.17- 0.58
	Men, QRS >=150ms	Hospitalization for heart failure	870	6 months	142(NR)	NR	NR	HR: 0.45 95% CI: 0.32- 0.64
	Women, Non LBBB	Hospitalization for heart failure	59	6 months	10(NR)	NR	NR	HR: 1.95 95% CI: 0.4- 9.53
	Men, Non LBBB	Hospitalization for heart failure	478	6 months	96(NR)	NR	NR	HR: 1.04 95% CI: 0.67- 1.61
	Women, LBBB	Hospitalization for heart failure	394	6 months	63(NR)	NR	NR	HR: 0.22 95% CI: 0.12- 0.4
	Men, LBBB	Hospitalization for heart failure	887	6 months	153(NR)	NR	NR	HR: 0.47 95% CI: 0.34- 0.66
Barsheshet, 2011 ¹¹	All Ischemia	Hospitalization for heart failure	1046	6 months	NR	NR	NR	HR: 0.58 95% CI: 0.45- 0.77
	Ischemia NYHA II	Hospitalization for heart failure	781	6 months	NR	NR	NR	HR: 0.57 95% CI: 0.41- 0.77
	Non Ischemia	Hospitalization for heart failure	774	6 months	NR	NR	NR	HR: 0.5 95% CI: 0.35-0.75
Zareba, 2011 ²¹	LBBB	Hospitalization	1281	6 months	NR	NR	NR	HR: 0.41

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
MADIT CRT Sub Study		for heart failure						95% CI: 0.31- 0.54
	Non LBBB	Hospitalization for heart failure	536	6 months	NR	NR	NR	HR: 1.23 95% CI: 0.76-1.68
	RBBB	Hospitalization for heart failure	228	6 months	NR	NR	NR	HR: 0.88 95% CI: 0.46-1.67
	IVCD	Hospitalization for heart failure	308	6 months	NR	NR	NR	HR: 1.31 95% CI: 0.78-2.18
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	CRT	Hospitalization for heart failure	245	6 months	32(13.1)	NR	NR	NR
	No CRT	Hospitalization for heart failure	245	6 months	39(16)	NR	NR	NR
All-cause mortality								
Tang,2010 ²² RAFT	ICD	All-cause mortality	904	NR	236(26.1)	NR	NR	HR: 0.75 95% CI: 0.62-0.91
	ICD-CRT	All-cause mortality	894	NR	186(20.8)	NR	NR	NA
Higgins,2003 ⁴⁰ VENTAK CHF/CONTAK CD	CRT	All-cause mortality	245	6 months	11(4.5)	NR	NR	NR
	No CRT	All-cause mortality	245	6 months	16(6.5)	NR	NR	NR
Moss,2009 ⁹	ICD	All-cause mortality	731	NR	53(7.3)	NR	NR	HR: 1 95% CI: 0.69- 1.44
	CRT-D	All-cause mortality	1089	NR	74(6.8)	NR	NR	NA
Healey,2012 ²⁵	ICD	All-cause	115	12 months	NR(30.4)	NR	NR	HR: 1.04

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
RAFT Sub Study		mortality						95% CI: 0.66-1.62
	CRT-ICD	All-cause mortality	114	12 months	NR(36.8)	NR	NR	NA
Solomom,2010 ¹⁹ MADIT CRT Sub Study	ICD	All-cause mortality	623	12 months	98(16.8)	NR	NR	NR
	CRT-D	All-cause mortality	749	12 months	55(7.8)	NR	NR	NR
Tompkins, 2013, ²⁰	ICD	All-cause mortality	81	12 months	see Figure 3b(2)	see Figure 3b(2)	NR	NR
	CRT-D LAFB	All-cause mortality	75	12 months	see Figure 3b(4)	see Figure 3b(4)	NR	NR
	CRT-D non-LAFB	All-cause mortality	49	12 months	see Figure 3b(2)	see Figure 3b(2)	NR	NR
	ICD	All-cause mortality	68	24 months	see Figure 3b(6)	see Figure 3b(6)	NR	NR
	CRT-D LAFB	All-cause mortality	66	24 months	see Figure 3b(8)	see Figure 3b(8)	NR	NR
	CRT-D non-LAFB	All-cause mortality	43	24 months	see Figure 3b(2)	see Figure 3b(2)	NR	NR
Diab, 2011 ³⁸	Arm 1	All-cause mortality		6 months	0()	()	NR	NR
	Arm 2	All-cause mortality		6 months	0()	()	NR	NR
	Arm 3	All-cause mortality		6 months	1()	()	NR	NR
Birnie,2013 ²³ RAFT Sub Study	ICD-CRT (LBBB)	All-cause mortality	594	NR	105(17.7)	NR	NR	HR: 0.664 95% CI: 0.516-0.853
	ICD-CRT (Non-LBBB)	All-cause mortality	143	NR	29(20.3)	NR	NR	HR: 0.705 95% CI: 0.444-1.121
	ICD-CRT (RBBB)	All-cause mortality	60	NR	10(16.7)	NR	NR	HR: 0.544 95% CI: 0.264-

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
								1.121
	ICD-CRT (NIVCD)	All-cause mortality	83	NR	19(22.9)	NR	NR	HR: 0.93 95% CI: 0.491- 1.761
	ICD(LBBB)	All-cause mortality	581	NR	145(25)	NR	NR	NR
	ICD(Non-LBBB)	All-cause mortality	165	NR	47(28.5)	NR	NR	NR
	ICD(RBBB)	All-cause mortality	81	NR	28(34.6)	NR	NR	NR
	ICD(NIVCD)	All-cause mortality	84	NR	19(22.6)	NR	NR	NR
Barsheshet,2011 ¹¹	All Ischemia	All-cause mortality	1046	6 months	NR	NR	NR	HR: 0.99 95% CI: 0.65- 1.52
	Ischemia NYHA II	All-cause mortality	781	6 months	NR	NR	NR	HR: 0.96 95% CI: 0.59- 1.55
	Non Ischemia	All-cause mortality	774	6 months	NR	NR	NR	HR: 0.87 95% CI: 0.45- 1.67
Arshad,2011 ¹⁰ MADIT CRT Sub Study	Women	All-cause mortality	453	6 months	20(NR)	NR	NR	HR: 0.28 95% CI: 0.1- 0.79
	Men	All-cause mortality	1365	6 months	107(NR)	NR	NR	HR: 1.05 95% CI: 0.7- 1.57
	Women, Ischemic heart disease	All-cause mortality	125	6 months	5(NR)	NR	NR	HR: 0.17 95% CI: 0.02- 1.66
	men, Ischemic heart disease	All-cause mortality	874	6 months	83(NR)	NR	NR	HR: 0.99 95% CI: 0.62- 1.57
	Women, Non Ischemic heart	All-cause mortality	328	6 months	15(NR)	NR	NR	HR: 0.33 95% CI: 0.1-

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	disease							1.1
	men, Non Ischemic heart disease	All-cause mortality	493	6 months	24(NR)	NR	NR	HR: 1.34 95% CI: 0.55- 3.31
	Women, QRS <150ms	All-cause mortality	148	6 months	8(NR)	NR	NR	HR: 0.4 95% CI: 0.09- 1.8
	Men,QRS <150ms	All-cause mortality	497	6 months	42(NR)	NR	NR	HR: 1.2 95% CI: 0.62- 2.34
	Women, QRS >=150ms	All-cause mortality	305	6 months	12(NR)	NR	NR	HR: 0.18 95% CI: 0.04- 0.89
	Men,QRS >=150ms	All-cause mortality	870	6 months	65(NR)	NR	NR	HR: 1.03 95% CI: 0.61- 1.75
	Women,Non LBBB	All-cause mortality	59	6 months	0(NR)	NR	NR	NR
	Men,Non LBBB	All-cause mortality	478	6 months	0(NR)	NR	NR	NR
	Women,LBBB	All-cause mortality	394	6 months	17(NR)	NR	NR	HR: 0.22 95% CI: 0.07- 0.7
	Men,LBBB	All-cause mortality	887	6 months	68(NR)	NR	NR	HR: 0.84 95% CI: 0.67- 1.61
Zareba,2011 ²¹ MADIT CRT Sub Study	LBBB	All-cause mortality	1281	6 months	NR	NR	NR	HR: 0.75 95% CI: 0.49- 1.16
	Non LBBB	All-cause mortality	536	6 months	NR	NR	NR	HR: 1.79 95% CI: 0.9- 3.57
	RBBB	All-cause mortality	228	6 months	NR	NR	NR	HR: 1.53 95% CI: 0.54- 4.37

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	IVCD	All-cause mortality	308	6 months	NR	NR	NR	HR: 2 95% CI: 0.8-5.02
Abraham,2004 ³⁴ MIRACLE ICD II	Control	All-cause mortality	101	6 months	2(NR)	NR	NR	NR
	CRT	All-cause mortality	85	6 months	2(NR)	NR	NR	NR
Young,2003 ²⁶ MIRACLE ICD	Control	All-cause mortality	182	6 months	15(NR)	NR	NR	NR
	CRT	All-cause mortality	187	6 months	14(NR)	NR	NR	NR
Lozano,2000 ⁴¹	BV Pacing	All-cause mortality	109	3 months	5(4.6)	NR	NR	NR
	No Pacing	All-cause mortality	113	3 months	10(8.8)	NR	NR	NR
Goldenberg, 2014 ¹³	CRTD(LBBB)	All-cause mortality	NR	NR	NR	NR	NR	HR: 0.59 95% CI: 0.43- 0.80 P<0.001
	ICD(LBBB)	All-cause mortality	NR	NR	NR	NR	NR	NA
	CRTD(Non- LBBB)	All-cause mortality	NR	NR	NR	NR	NR	HR: 1.57 95% CI: 1.03- 2.39 P: 0.04
	ICD(Non-LBBB)	All-cause mortality	NR	NR	NR	NR	NR	NA

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D15: Harms reported in the studies assessing effectiveness of CRT-D

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Strimel, 2011 ⁷⁸	CRT-D	Cardiac perforation/tamponade	42	34 months (mean)	1	1	NR	NR
	Dual ICD	Cardiac perforation/tamponade	37	34 months (mean)	0	0	NR	NR
	CRT-D	Pocket hematoma	42	34 months (mean)	2	2	NR	NR
	Dual ICD	Pocket hematoma	37	34 months (mean)	2	2	NR	NR
	CRT-D	Device Infection	42	34 months (mean)	0	1	NR	NR
	Dual ICD	Device Infection	37	34 months (mean)	1	0	NR	NR
	CRT-D	Lead dislodgement	42	34 months (mean)	1	1	NR	NR
	Dual ICD	Lead dislodgement	37	34 months (mean)	1	1	NR	NR
	CRT-D	Pneumothorax	42	34 months (mean)	0	0	NR	NR
	Dual ICD	Pneumothorax	37	34 months (mean)	0	0	NR	NR
Gasparini, 2009 ⁵³	Protect	Ventricular arrhythmias	164	NR	NR	311(NR)	NR	NR
	Control	Ventricular arrhythmias	160	NR	NR	310(NR)	NR	NR
Ouellet, 2012 ¹⁶	ICD	Ventricular arrhythmias	731	NR	161(22)	NR	NR	NR
MADIT CRT Sub Study	CRT-D	Ventricular arrhythmias	1089	NR	166(15.2)	NR	NR	NR
Boven, 2013 ⁴⁹	Total study population	Inappropriate ICD shocks (CRT-D only)	543	NR	33(6.1)	NR	NR	NR
Theuns, 2005 ⁸¹	Overall	Ventricular	86	NR	36(42)	724(NR)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
		arrhythmias						
	Primary prophylaxis	Ventricular arrhythmias	38	NR	7(18.4)	NR	NR	NR
	Secondary prophylaxis	Ventricular arrhythmias	48	NR	29(60.4)	NR	NR	NR
Landolina,2011 ⁶²	Overall	Device Infection	3253	NR	30(0.92)	NR	NR	NR
Knight,2004 ⁵⁹	Overall	Device Infection	443	NR	5(1.1)	NR	NR	NR
Auricchio,2014 ⁴⁵	All patients	Pneumothorax	521	13 months	NR	(0.8)	NR	NR
	All patients	Pocket hematoma	521	13 months	NR	(2.8)	NR	NR
	All patients	Device Infection	521	13 months	NR	(1.8)	NR	NR
	All patients	Lead dislodgement	521	13 months	NR	(9.8)	NR	NR
Bossard,2014 ⁴⁸	All patients	Device Infection	49	NR	NR	2(NR)	NR	NR
	All patients	Lead dislodgement	49	NR	NR	4(NR)	NR	NR
	All patients	Ventricular arrhythmias	49	NR	14(28.6)	NR	NR	NR
	All patients	Inappropriate ICD shocks (CRT-D only)	49	NR	7(14.3)	NR	NR	NR
Duray,2008 ⁵²	Overall	Pneumothorax	79	6 months	1(1.3)	NR	NR	NR
	Overall	Pocket hematoma	79	6 months	1(1.3)	NR	NR	NR
	Overall	Device Infection	79	6 months	0(0)	NR	NR	NR
	Overall	Cardiac perforation/ tamponade	79	6 months	0(0)	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Overall	Death (within a week)	79	6 months	0(0)	NR	NR	NR
Gillis,2014 ²⁴ RAFT Sub Study	ICD	Procedure related complications -not specified	904	NR	147(16.4)	159(NR)	NR	NR
	ICD-CRT	Procedure related complications -not specified	894	NR	126(13.9)	246(NR)	NR	NR
	ICD	Length of hospital stay 14896Days	904	NR	NR	NR	NR	NR
	ICD-CRT	Length of hospital stay 12783Days	894	NR	NR	NR	NR	NR
	ICD	Pocket hematoma	904	NR	NR	3(NR)	NR	NR
	ICD-CRT	Pocket hematoma	894	NR	NR	8(NR)	NR	NR
	ICD	Device Infection	904	NR	NR	20(NR)	NR	NR
	ICD-CRT	Device Infection	894	NR	NR	25(NR)	NR	NR
	ICD	Inappropriate ICD shocks (CRT-D only)	904	NR	NR	30(NR)	NR	NR
	ICD-CRT	Inappropriate ICD shocks (CRT-D only)	894	NR	NR	20(NR)	NR	NR
	ICD	Cardiac perforation/ tamponade	904	NR	NR	1(NR)	NR	NR
	ICD-CRT	Cardiac	894	NR	NR	1(NR)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
		perforation/ tamponade						
Nian-Sang,2010 ⁶⁷	Overall(CRT-D)	Ventricular arrhythmias	54	3 days	4(7.4)	NR	NR	NR
Moss,2009 ⁹	ICD	Pneumothorax	NR	30 days	NR(0.8)	NR	NR	NR
	CRT-D	Pneumothorax	NR	30 days	NR(1.7)	NR	NR	NR
	ICD	Pocket hematoma	NR	30 days	NR(2.5)	NR	NR	NR
	CRT-D	Pocket hematoma	NR	30 days	NR(3.3)	NR	NR	NR
	ICD	Device Infection	NR	30 days	NR(0.7)	NR	NR	NR
	CRT-D	Device Infection	NR	30 days	NR(1.1)	NR	NR	NR
Higgins,2003 ⁴⁰	CRT	Ventricular arrhythmias	117	6 months	36(30.8)	NR	NR	NR
VENTAK CHF/CONTAK CD	No CRT	Ventricular arrhythmias	110	6 months	39(35.5)	NR	NR	NR
Abraham,2004 ³⁴	Control	Ventricular arrhythmias	101	6 months	26(26)	NR	NR	NR
	CRT	Ventricular arrhythmias	85	6 months	19(22)	NR	NR	NR
	Overall	Cardiac perforation/ tamponade	210	From time of procedure to hospital discharge	3(1.4)	NR	NR	NR
	Overall	Lead dislodgement	210	From time of procedure to hospital discharge	5(2.4)	NR	NR	NR
	Overall	Cardiac perforation/ tamponade	191	6 months	1(0.5)	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Overall	Lead dislodgement	191	6 months	11(5.8)	NR	NR	NR
Kuhlkamp, 2002 ⁶¹	Overall	Pneumothorax	81	Median: 185 days	2(NR)	2(NR)	NR	NR
	Overall	Lead dislodgement	81	Median: 185 days	1(NR)	1(NR)	NR	NR
	Overall	Lead dislodgement	81	Median: 185 days	2(NR)	2(NR)	NR	NR
	Overall	Lead dislodgement	81	Median: 185 days	4(NR)	4(NR)	NR	NR
	Overall	Lead dislodgement	81	Median: 185 days	1(NR)	1(NR)	NR	NR
	Overall	Device Infection	81	Median: 185 days	2(NR)	2(NR)	NR	NR
Pinter,2009 ⁴²	CRT ON	Ventricular arrhythmias	36	6 months	7(19.4)	NR	NR	NR
	CRT OFF	Ventricular arrhythmias	36	6 months	6(16.7)	NR	NR	NR
Boven,2013 ⁵⁰	Functional Nonresponders	Inappropriate ICD shocks (CRT-D only)	100	NR	3(7.1)	NR	NR	NR
	Functional Responders	Inappropriate ICD shocks (CRT-D only)	42	NR	9(9)	NR	NR	NR
Gopalumurugan,2014 ⁵⁴	CRT-D	Procedure related complications -not specified	117	NA	41(35)	NR(NR)	NR	HR: NR 95%CI: NR p: 0.74
	ICD	Procedure related complications -not specified	63	NA	24(38.1)	NR(NR)	NR	NR
Jamerson,2014 ¹⁵	Males-ICD	Procedure related complications -not specified	NR	<=30 days	14(2.5)	NR(NR)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Males-CRTD	Ventricular arrhythmias	NR	</=30 days	23(2.9)	NR(NR)	NR	HR: NR 95%CI: NR p: <0.001
	Females ICD	Ventricular arrhythmias	NR	</=30 days	5(2.9)	NR(NR)	NR	HR: NR 95%CI: NR p: 0.018
	Females CRTD	Ventricular arrhythmias	NR	</=30 days	23(7.7)	NR(NR)	NR	NR
	Males-ICD	Ventricular arrhythmias	NR	</=30 days	3(0.5)	NR(NR)	NR	NR
	Males-CRTD	Cardiac perforation/ tamponade	NR	</=30 days	3(0.3)	NR(NR)	NR	NR
	Females ICD	Cardiac perforation/ tamponade	NR	</=30 days	0(0)	NR(NR)	NR	NR
	Females CRTD	Cardiac perforation/ tamponade	NR	</=30 days	1(0.3)	NR(NR)	NR	NR
	Males-ICD	Cardiac perforation/ tamponade	NR	</=30 days	2(0.3)	NR(NR)	NR	NR
	Males-CRTD	Device Infection	NR	</=30 days	5(0.6)	NR(NR)	NR	NR
	Females ICD	Device Infection	NR	</=30 days	0(0)	NR(NR)	NR	HR: NR 95%CI: NR p: 0.05
	Females CRTD	Device Infection	NR	</=30 days	2(0.7)	NR(NR)	NR	NR
	Males-ICD	Device Infection	NR	</=30 days	3(0.5)	NR(NR)	NR	NR
	Males-CRTD	Ventricular arrhythmias	NR	</=30 days	5(0.6)	NR(NR)	NR	NR
	Females ICD	Device Infection	NR	</=30 days	2(1.1)	NR(NR)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Females CRTD	Device Infection	NR	<=30 days	7(2.5)	NR(NR)	NR	NR
Haugaa,2014 ⁵⁶	Overall	Device Infection	266	24 months	39(15)	NR(NR)	NR	NR
Masoudi,2014 ⁶⁵	ICD	Device Infection	NR	12 months	24(0.7)	NR(NR)	NR	HR: NR 95%CI: NR p: 0.012
	CRTD	Lead dislodgement	NR	12 months	45(1.3)	NR(NR)	NR	NR
	ICD	Ventricular arrythmias	NR	36 months	32(1)	NR(NR)	NR	NR
	CRTD	Pneumothorax	NR	36 months	62(1.9)	NR(NR)	NR	HR: 1.9 95%CI: 1.07- 3.37 p: 0.004
Vado,2014 ⁸²	Overall	Pneumothorax	45	>9 months	3(6.7)	NR(NR)	NR	NR
Ruwald,2014 ¹⁸	Overall	Pneumothorax	752	>12 months	109(14.5)	NR(NR)	NR	NR
Wollmann,2014 ⁸⁵	All Patients	Device Infection	246	1 Month	2(6)	NR(NR)	NR	NR
	DR-ICD	Device Infection	114	1 Month	1(8)	NR(NR)	NR	NR
	CRT-D	Device Infection	132	1 Month	1(5)	NR(NR)	NR	NR
	All Patients	Cardiac perforation/ tamponade	246	1 Month	2(6)	NR(NR)	NR	NR
	DR-ICD	Cardiac perforation/ tamponade	114	1 Month	2(15)	NR(NR)	NR	NR
	CRT-D	Cardiac perforation/ tamponade	132	1 Month	0(0)	NR(NR)	NR	NR
	All Patients	Lead	246	1 Month	1(3)	NR(NR)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
		dislodgement						
	DR-ICD	Lead dislodgement	114	1 Month	0(0)	NR(NR)	NR	NR
	CRT-D	Lead dislodgement	132	1 Month	1(5)	NR(NR)	NR	NR
	All Patients	Ventricular arrhythmias	246	1 Month	7(21)	NR(NR)	NR	NR
	DR-ICD	Ventricular arrhythmias	114	1 Month	2(15)	NR(NR)	NR	NR
	CRT-D	Ventricular arrhythmias	132	1 Month	5(25)	NR(NR)	NR	NR
	All Patients	Inappropriate ICD shocks (CRT-D only)	246	1 Month	NR(NR)	196(NR)	NR	NR
	DR-ICD		114	1 Month	NR(NR)	94(NR)	NR	NR
	CRT-D		132	1 Month	NR(NR)	102(NR)	NR	NR
Ricci,2014 ⁶⁹	Overall		1404	NR	102(7.3)	272(NR)	NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D16: Outcomes reported in the trials assessing effectiveness of CRT P vs. D

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
6 minute hall walk distance									
Bristow,2004 ²⁹ COMPANION	Optimal Pharmacologica I Therapy	6 minute hall walk distance Unit:Meter s	308	Mean: NR SD: NR	3 months	170	Mean: NR SD: NR	9	NR
	Optimal Pharmacologica I Therapy	6 minute hall walk distance Unit:Meter s	308	Mean: NR SD: NR	6 months	142	Mean: NR SD: NR	1	NR
	CRT-P	6 minute hall walk distance Unit:Meter s	617	Mean: NR SD: NR	3 months	422	Mean: NR SD: NR	33	NR
	CRT-P	6 minute hall walk distance Unit:Meter s	617	Mean: NR SD: NR	6 months	373	Mean: NR SD: NR	40	NR
	CRT-D	6 minute hall walk distance Unit:Meter s	595	Mean: NR SD: NR	3 months	420	Mean: NR SD: NR	44	NR
	CRT-D	6 minute hall walk distance Unit:Meter	595	Mean: NR SD: NR	3 months	378	Mean: NR SD: NR	46	NR

Author,Year Trial	Arm(name)	Outcome Units	Baseline N	Baseline Outcome	Timepoint	N at Timepoint	Outcome at Timepoint	Within Arm Comparisons	Between Arm Comparisons
		s							
Minnesota Living with Heart Failure Inventory Score									
Cleland,2009 ⁴ CARE HF Sub Study	Medical Therapy alone	Minnesota Living with Heart Failure Inventory Score Unit:NA	404	Mean: 43.7 SD: NR	3 months	404	Mean: 38.9 SD: nr	NR	HR: -10.6 95% CI: - 8.1to-13.1
	CRT-P	Minnesota Living with Heart Failure Inventory Score Unit:NA	409	Mean: 44.6 SD: NR	3 months	409	Mean: 30.1 SD: nr	NR	NA
	Medical Therapy alone	Minnesota Living with Heart Failure Inventory Score Unit:NA	404	Mean: 43.7 SD: NR	18 months	404	Mean: 36 SD: nr	NR	HR: -10.7 95% CI: -7.6 to-13.8
	CRT-P	Minnesota Living with Heart Failure Inventory Score Unit:NA	409	Mean: 44.6 SD: NR	18 months	409	Mean: 28.4 SD: nr	NR	NA

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular

Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D17: Outcomes reported in the trials assessing effectiveness of CRT P vs. D (Hospitalization for heart failure and All-cause mortality)

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Anand, 2009 ³⁰	Arm 1	Hospitalization for heart failure	516	Median: 11.9 months	235(46)	NR	NR	NR
	Arm 2	Hospitalization for heart failure	993	Median: 16.2 months	329(33)	NR	NR	NR
	Arm 3	Hospitalization for heart failure	919	Median: 15.7 months	333(36)	NR	NR	NR
Carson,2005 ³¹	Total	All-cause mortality	1510	NR	313(20.6)	NR	NR	NR
	Optimal Pharmacological therapy	All-cause mortality	308	NR	77(25)	NR	NR	NR
	CRT-P	All-cause mortality	617	NR	131(21.2)	NR	NR	NR
	CRT-D	All-cause mortality	595	NR	105(17.6)	NR	NR	NR
Bristow,2004 ²⁹	Optimal Pharmacological Therapy	All-cause mortality	308	12 months	77(25)	NR	NR	HR: 0.76 95% CI: 0.58- 1.01
	CRT-P	All-cause mortality	617	12 months	NR	NR	NR	HR: 0.64 95% CI: 0.48- 0.86
	CRT-D	All-cause mortality	595	12 months	NR	NR	NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D18: Harms reported in the studies assessing harms of CRT P vs. D

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
Killu,2011 ⁵⁸	Overall	Pneumothorax	722	30 DAYS	10(1.4)	NR	NR	NR
	≤80	Pneumothorax	632	30 DAYS	8(1.3)	NR	NR	NR
	≥80	Pneumothorax	90	30 DAYS	2(2.2)	NR	NR	NR
	Overall	Pocket hematoma	722	30 DAYS	4(0.6)	NR	NR	NR
	≤80	Pocket hematoma	632	30 DAYS	3(0.5)	NR	NR	NR
	≥80	Pocket hematoma	90	30 DAYS	1(1.1)	NR	NR	NR
	Overall	Device Infection	722	30 DAYS	2(0.3)	NR	NR	NR
	≤80	Device Infection	632	30 DAYS	0.3(2)	NR	NR	NR
	≥80	Device Infection	90	30 DAYS	0(0)	NR	NR	NR
	Overall	Cardiac perforation/ tamponade	722	30 DAYS	1(0.1)	NR	NR	NR
	≤80	Cardiac perforation/ tamponade	632	30 DAYS	1(0.2)	NR	NR	NR
	≥80	Cardiac perforation/ tamponade	90	30 DAYS	0(0)	NR	NR	NR
Schuchert,2013 ³⁷	CRT-P	Device Infection	174	12 months	2(1.3)	NR	NR	NR
MASCOT Sub Study	CRT-D	Device Infection	228	12 months	3(1.2)	NR	NR	NR
Takaya,2013 ⁸⁰	Overall	Death (within a week)	40	6 months	0(0)	0(0)	NR	NR
Azizi,2006 ⁴⁶	Overall	Cardiac	285	Mean 1.7	NR	1(0.3)	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
		perforation/ tamponade		years (SD 1.3)				
	Overall	Pneumothorax	285	Mean 1.7 years (SD 1.3)	NR	2(0.6)	NR	NR
	Overall	Death (within a week)	285	Mean 1.7 years (SD 1.3)	NR	0(0)	NR	NR
	Overall	Device Infection	285	Mean 1.7 years (SD 1.3)	NR	2(0.6)	NR	NR
Swindle,2010 ⁷⁹	CRT-D (19-79yrs, Co-Morbidity score 0)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	CRT-D (80-85yrs, Co-Morbidity score 0)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	CRT-D (>85yrs, Co-Morbidity score 0)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-D (19-79yrs, Co-Morbidity score 1-2)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-D (80-85yrs, Co-Morbidity score 1-2)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-D (>85yrs, Co-Morbidity score 1-2)	Length of hospital stay 5Days	NR	NR	NR	NR	NR	NR
	CRT-D (19-79yrs, Co-Morbidity score >1=3)	Length of hospital stay 6Days	NR	NR	NR	NR	NR	NR
	CRT-D (80-85yrs, Co-Morbidity score >1=3)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	CRT-D (>85yrs, Co-Morbidity score >1=3)	Length of	NR	NR	NR	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Co-Morbidity score >=3)	hospital stay 10Days						
	CRT-D (19-79yrs, 0 complication)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	CRT-D (80-85yrs, 0 complication)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-D (>85yrs, 0 complication)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-D (19-79yrs, >= complication)	Length of hospital stay 9Days	NR	NR	NR	NR	NR	NR
	CRT-D (80-85yrs, >= complication)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	CRT-D (>85yrs, >= complication)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	ICD (19-79yrs, Co-Morbidity score 0)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	ICD (80-85yrs, Co-Morbidity score 0)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	ICD (>85yrs, Co-Morbidity score 0)	Length of hospital stay 4Days	NR	NR	NR	NR	NR	NR
	ICD (19-79yrs, Co-Morbidity score 1-2)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	ICD (80-85yrs, Co-Morbidity score 1-2)	Length of hospital stay 4Days	NR	NR	NR	NR	NR	NR
	ICD (>85yrs, Co-	Length of	NR	NR	NR	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Morbidity score 1-2)	hospital stay 6Days						
	ICD (19-79yrs, Co-Morbidity score >/=3)	Length of hospital stay 6Days	NR	NR	NR	NR	NR	NR
	ICD (80-85yrs, Co-Morbidity score >/=3)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	ICD (>85yrs, Co- Morbidity score >/=3)	Length of hospital stay 10Days	NR	NR	NR	NR	NR	NR
	ICD (19-79yrs, 0 complication)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	ICD (80-85yrs, 0 complication)	Length of hospital stay 4Days	NR	NR	NR	NR	NR	NR
	ICD (>85yrs, 0 complication)	Length of hospital stay 6Days	NR	NR	NR	NR	NR	NR
	ICD (19-79yrs,>/= complication)	Length of hospital stay 9Days	NR	NR	NR	NR	NR	NR
	ICD (80-85yrs, >/= complication)	Length of hospital stay 9Days	NR	NR	NR	NR	NR	NR
	ICD (>85yrs, >/= complication)	Length of hospital stay 11Days	NR	NR	NR	NR	NR	NR
	CRT-P (19-79yrs, Co-Morbidity score 0)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	CRT-P (80-85yrs, Co-Morbidity score 0)	Length of hospital stay 2Days	NR	NR	NR	NR	NR	NR
	CRT-P (>85yrs,	Length of	NR	NR	NR	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	Co-Morbidity score 0)	hospital stay 3Days						
	CRT-P (19-79yrs, Co-Morbidity score 1-2)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-P (80-85yrs, Co-Morbidity score 1-2)	Length of hospital stay 4Days	NR	NR	NR	NR	NR	NR
	CRT-P (>85yrs, Co-Morbidity score 1-2)	Length of hospital stay 7Days	NR	NR	NR	NR	NR	NR
	CRT-P (19-79yrs, Co-Morbidity score >/=3)	Length of hospital stay 7Days	NR	NR	NR	NR	NR	NR
	CRT-P (80-85yrs, Co-Morbidity score >/=3)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	CRT-P (>85yrs, Co-Morbidity score >/=3)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	CRT-P (19-79yrs, 0 complication)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-P (80-85yrs, 0 complication)	Length of hospital stay 3Days	NR	NR	NR	NR	NR	NR
	CRT-P (>85yrs, 0 complication)	Length of hospital stay 5Days	NR	NR	NR	NR	NR	NR
	CRT-P (19- 79yrs,>/= complication)	Length of hospital stay 9Days	NR	NR	NR	NR	NR	NR
	CRT-P (80-85yrs, >/= complication)	Length of hospital stay 8Days	NR	NR	NR	NR	NR	NR
	CRT-P (>85yrs,	Length of	NR	NR	NR	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
	>= complication)	hospital stay 13Days						
Verbrugge,2013 ⁸³	CRT-D	Inappropriate ICD shocks (CRT-D only)	74	NR	3(4.1)	NR	NR	NR
Verbrugge,2013 ⁸⁴	<70 years	Pneumothorax	76	NR	0(0)	NR	NR	NR
	70-79years	Pneumothorax	95	NR	1(1)	NR	NR	NR
	>=80 years	Pneumothorax	49	NR	0(0)	NR	NR	NR
	<70 years	Cardiac perforation/ tamponade	76	NR	0(0)	NR	NR	NR
	70-79years	Cardiac perforation/ tamponade	95	NR	1(1)	NR	NR	NR
	>=80 years	Cardiac perforation/ tamponade	49	NR	0(0)	NR	NR	NR
	<70 years	Lead dislodgement	76	NR	2(3)	NR	NR	NR
	70-79years	Lead dislodgement	95	NR	1(1)	NR	NR	NR
	>=80 years	Lead dislodgement	49	NR	1(2)	NR	NR	NR
Romeyer- Bouchard,2010 ⁷¹	Overall	Pneumothorax	303	NR	1(0.3)	NR	NR	NR
	Overall	Pocket hematoma	303	NR	29(9.5)	NR	NR	NR
	Overall	Device Infection	303	NR	13(4.3)	NR	NR	NR
	Overall	Lead dislodgement	303	NR	21(6.9)	NR	NR	NR
Bristow,2004 ²⁹	Optimal	Cardiac	308	NR	NR	NR	NR	NR

Author,Year Trial	Arm(name)	Harms Units	N for analysis	Timepoint(s)	n (%) patients with outcomes	n (%) events with outcomes	Within Arm Comparisons	Between Arm Comparisons
COMPANION	Pharmacological Therapy	Perforation/ Tamponade						
	CRT-P	Cardiac Perforation/ Tamponade	617	NR	(0.5)	NR	NR	NR
	CRT-D	Cardiac Perforation/ Tamponade	595	NR	(0.3)	NR	NR	NR
Carson,2005 ³¹ COMPANION Sub Study	Optimal Pharmacological Therapy	Death within a week	308	NR	77 (25.0)	NR	NR	NR
	CRT-P	Death within a week	617	NR	131 (21.2)	NR	NR	NR
	CRT-D	Death within a week	595	NR	105 (17.6)	NR	NR	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block, LVEF=Left Ventricular Ejection Fraction, CABG=Coronary Artery Bypass Graft, CRT=Cardiac Resynchronization Therapy, Biv=Bi-Ventricular, RV=Right Ventricular, IHD=Ischemic Heart Disease, NR=Not Reported, SD=Standard Deviation, NA=Not Applicable

Table D19: Clinical predictors reported in the studies assessing response of CRT P

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
Zhang, 2009 ⁸⁶	CRT	Predictor: Age (Model I) Definition: NA Unit: years	239	Mean 37 months (SD 20)	NR	Cox regression multivariate analysis	NR	HR: 1.019 (95% CI: 0.993 to 1.045)
	CRT	Predictor: Age (Model I) Definition: NA Unit: years	239	Mean 37 months (SD 20)	NR	Cox regression multivariate analysis	NR	HR: 1.021 (95% CI: 0.994 to 1.048)
	CRT	Predictor: QRS duration (Model II) Definition: NA Unit: ms	239	Mean 37 months (SD 20)	NR	Cox regression multivariate analysis	NR	HR: 0.997 (95% CI: 0.987 to 1.007)
	CRT	Predictor: QRS duration (Model II) Definition: NA Unit: ms	239	Mean 37 months (SD 20)	NR	Cox regression multivariate analysis	NR	HR: 0.998 (95% CI: 0.987 to 1.008)
Stabile, 2009 ⁷⁶	Overall	Predictor: Age Definition: Age > 70 years Unit: years	NR	NR	NR	Single variable analysis	HR: 1.53 95% CI: 0.90 to 2.58	NR
	Overall	Predictor: LVEF Definition: LVEF </= 25%	NR	NR	NR	Single variable analysis	HR: 1.64 95% CI: 0.93 to 2.90	NR

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Unit: %						
	Overall	Predictor: Gender Definition: Male Gender Unit: NA	NR	NR	NR	Single variable analysis	HR: 3.62 95% CI: 1.88 to 6.99	NR
	Overall	Predictor: QRS Duration Definition: QRS Duration >= 160 ms Unit: ms	NR	NR	NR	Single variable analysis	HR: 1.66 95% CI: 0.84 to 3.29	NR

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, NR=Not Reported, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block LVEF=Left Ventricular Ejection Fraction

Table D20: Clinical predictors reported in the studies assessing response of CRT D

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
Gold,2011 ³⁶ SMART AV Sub Study	Overall	Predictor: Age Definition: Per 1 year increase Unit: years	426	6 months	NR	Cox regression	NR	HR: NR OR: 1 RD: NR 95% CI: 0.98- 1.02 p: 0.81
	Overall	Predictor: Gender Definition: Male vs. Female Unit: NA	426	6 months	NR	Cox regression	NR	HR: NR OR: 0.53 RD: NR 95% CI: 0.33- 0.85 p: 0.008
	Overall	Predictor: Cardiomyopathy subtype - DEFINE Definition: Ischemic vs. Non Ischemic Unit: NA	426	6 months	NR	Cox regression	NR	HR: NR OR: 0.58 RD: NR 95% CI: 0.37- 0.91 p: 0.019
	Overall	Predictor: QRS duration Definition: >150ms vs. <=150ms Unit: ms	426	6 months	NR	Cox regression	NR	HR: NR OR: 0.86 RD: NR 95% CI: 0.53- 1.40 p: 0.543
	Overall	Predictor: QRS morphology - DEFINE Definition: LBBB	426	6 months	NR	Cox regression	NR	HR: NR OR: 1.2 RD: NR 95% CI: 0.72- 2.01

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		vs. Non LBBB Unit: NA						p: 0.48
	Overall	Predictor: Left ventricular ejection fraction Definition: Per 1% increase Unit: %	426	6 months	NR	Cox regression	NR	HR: NR OR: 0.98 RD: NR 95% CI: 0.94- 1.01 p: 0.186
Goldenberg,2011 ¹² MADIT CRT Sub Study	CRT D (High Response Group)	Predictor: Gender Definition: Women Unit: NA	275	12 months	94	Other: RCT	NR	HR: NR OR: NR RD: -4.4 95% CI: p: 0.01
	CRT D (Low Response Group)	Predictor: Gender Definition: Men Unit: NA	814	12 months	88	Other: RCT	NR	HR: NR OR: NR RD: 95% CI: p:
	CRT D (High Response Group)	Predictor: Cardiomyopathy subtype - DEFINE Definition: Non Ischemic Unit: NA	491	12 months	93	Other: RCT	NR	HR: NR OR: NR RD: -4.6 95% CI: p: <0.001
	CRT D (Low Response Group)	Predictor: Cardiomyopathy subtype - DEFINE	598	12 months	87	Other: RCT	NR	HR: NR OR: NR RD: 95% CI:

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Definition: Ischemic Unit: NA						p:
	CRT D (High Response Group)	Predictor: QRS duration Definition: >=150 Unit: ms	688	12 months	92	Other: RCT	NR	HR: NR OR: NR RD: -3.6 95% CI: p: 0.004
	CRT D (Low Response Group)	Predictor: QRS duration Definition: <150 Unit: ms	383	12 months	85	Other: RCT	NR	HR: NR OR: NR RD: 95% CI: p:
	CRT D (High Response Group)	Predictor: QRS morphology - DEFINE Definition: LBBB Unit: NA	750	12 months	92	Other: RCT	NR	HR: NR OR: NR RD: -5.3 95% CI: p: <0.001
	CRT D (Low Response Group)	Predictor: QRS morphology - DEFINE Definition: Non- LBBB Unit: NA	321	12 months	85	Other: RCT	NR	HR: NR OR: NR RD: 95% CI: p:
Shen,2009 ⁷³	Overall	Predictor: Gender Definition: NS	95	NR	NR	Cox regression	NR	HR: NR OR: NR RD: NR 95% CI: 0.03-

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Unit: NS						2.97 p: NR
	Overall	Predictor: Age Definition: NS Unit: NA	95	NR	NR	Cox regression	NR	HR: NR OR: NR RD: NR 95% CI: 0.91- 1.11 p: NR
	Overall	Predictor: QRS duration Definition: NS Unit: ms	95	NR	NR	Cox regression	NR	HR: NR OR: NR RD: NR 95% CI: 1- 1.08 p: NR
	Overall	Predictor: Left ventricular ejection fraction Definition: NS Unit: %	95	NR	NR	Cox regression	NR	HR: NR OR: NR RD: NR 95% CI: 0.96- 1.30 p: NR
	Overall	Predictor: QRS morphology - DEFINE Definition: RV- LBBB Unit: NS	95	NR	NR	Cox regression	NR	HR: NR OR: NR RD: NR 95% CI: 2- 111.85 p: NR
Mascioli,2012 ⁶⁴	Overall	Predictor: QRS morphology - DEFINE Definition: True LBBB Unit: NA	111	NR	NR	Cox regression	NR	HR: 4.5 OR: NR RD: NR 95% CI: 1.36- 8.28 p: 0.002

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
	Overall	Predictor: Gender Definition: Female Unit: NA	111	NR	NR	Cox regression	NR	HR: 1.22 OR: NR RD: NR 95% CI: 0.54-2.67 p: NS
Penn, 2010 ¹⁷ MADIT CRT Sub Study	CRT-D	Predictor: Age Definition: Age >75 Unit: years	331	3 years	NR	Cox regression	NR	HR: 1.14 OR: NR RD: NR 95% CI: 0.55-2.33 p: 0.728
	CRT-D	Predictor: Age Definition: Age 60-74 Unit: years	941	3 years	NR	Cox regression	NR	HR: 0.73 OR: NR RD: NR 95% CI: 0.45-1.17 p: 0.191
	CRT-D	Predictor: Age Definition: Age <60 Unit: years	548	3 years	NR	Cox regression	NR	HR: 1.3 OR: NR RD: NR 95% CI: 0.56-3.04 p: 0.547
Shen,2011 ⁷⁵	Overall	Predictor: Gender Definition: NA Unit: NA	136	NR	NR	Cox regression	NR	HR: NR OR: 0.26 RD: NR 95% CI: 0.04-1.65 p: 0.15
	Overall	Predictor: Age Definition: NA Unit: NA	136	NR	NR	Cox regression	NR	HR: NR OR: 0.97 RD: NR 95% CI: 0.88-1.08 p: 0.6

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
	Overall	Predictor: QRS duration Definition: NA Unit: ms	136	NR	NR	Cox regression	NR	HR: NR OR: 1.03 RD: NR 95% CI: 0.995-1.07 p: 0.09
	Overall	Predictor: Cardiomyopathy subtype - DEFINE Definition: Ischemic Unit: NA	136	NR	NR	Cox regression	NR	HR: NR OR: 0.74 RD: NR 95% CI: 0.04- 12.87 p: 0.84
Bristow,2004 ²⁹ COMPANION	Pace maker defibrillator v Pharmacological therapy	Predictor: Cardiomyopathy subtype - DEFINE Definition: Non ischemic cardiomyopathy Unit: NA	903	NR	NR	Other: RCT	NR	HR: 0.5 OR: NR RD: NR 95% CI: 0.29- 0.88 p: 0.015
	Pace maker defibrillator v Pharmacological therapy	Predictor: Cardiomyopathy subtype - DEFINE Definition: Ischemic cardiomyopathy Unit: NA	903	NR	NR	Other: RCT	NR	HR: 0.73 OR: NR RD: NR 95% CI: 0.52- 1.04 p: 0.082
	Pace maker v Pharmacological therapy	Predictor: Cardiomyopathy subtype -	925	NR	NR	Other: RCT	NR	HR: 0.91 OR: NR RD: NR

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		DEFINE Definition: Non ischemic cardiomyopathy Unit: NA						95% CI: 0.55- 1.49 p: 0.7
	Pace maker v Pharmacological therapy	Predictor: Cardiomyopathy subtype - DEFINE Definition: Ischemic cardiomyopathy Unit: NA	925	NR	NR	Other: RCT	NR	HR: 0.72 OR: NR RD: NR 95% CI: 0.51- 1.01 p: 0.058
Rickard,2013 ⁷⁰	Overall	Predictor: QRS duration Definition: NA Unit: NA	112	NR	64.3	Cox regression	NR	HR: NR OR: 0.02 RD: NR 95% CI: 0.001-0.42 p: 0.01
Shanks,2011 ⁷²	Non Responders	Predictor: Gender Definition: Male Unit: NA	254	6 months	NR	Cox regression	NR	HR: NR OR: 1.504 RD: NR 95% CI: 0.814-2.777 p: 0.192
	Non Responders	Predictor: QRS duration Definition: NA Unit: ms	254	6 months	NR	Cox regression	NR	HR: NR OR: 0.994 RD: NR 95% CI: 0.986-1.002 p: 0.119
Cheng, 2012 ³⁵	Overall	Predictor: Gender	846	6 months	NR	Linear regression	NR	HR: NR OR: NR

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
SMART AV Sub Study		Definition: NA Unit: NA						RD: 4.66 95% CI: NR p: 0.002
	Overall	Predictor: Age Definition: per 5 year increase Unit: years	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: -1.03 95% CI: NR p: 0.002
	Overall	Predictor: Left ventricular ejection fraction Definition: NA Unit: %	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: 0.07 95% CI: NR p: 0.559
	Overall	Predictor: QRS duration Definition: per 10 ms increase Unit: ms	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: -1.08 95% CI: NR p: 0.002
	Overall	Predictor: QRS morphology - DEFINE Definition: LBBB vs non-LBBB Unit: NA	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: -4.77 95% CI: NR p: 0.004
	Overall	Predictor: Cardiomyopathy subtype - DEFINE	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: 5.3 95% CI: NR p: 0.002

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Definition: Ischemic cardiomyopathy Unit: NA						
	Overall	Predictor: History of atrial fibrillation Definition: NA Unit: NA	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: 0.14 95% CI: NR p: 0.945
	Overall	Predictor: Chronic kidney disease Definition: NA Unit: NA	846	6 months	NR	Linear regression	NR	HR: NR OR: NR RD: 3.65 95% CI: NR p: 0.058
Shen,2009 ⁷⁴	Overall	Predictor: Age Definition: NA Unit: Years	108	NR	NR	Cox regression	NR	HR: NR OR: 0.99 RD: NR 95% CI: 0.93- 2.34 p: 0.71
	Overall	Predictor: Gender Definition: NA Unit: NA	108	NR	NR	Cox regression	NR	HR: NR OR: 0.51 RD: NR 95% CI: 0.11- 2.34 p: 0.38
	Overall	Predictor: QRS duration Definition: NA Unit: ms	108	NR	NR	Cox regression	NR	HR: NR OR: 1.02 RD: NR 95% CI: 1- 1.04 p: 1

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
	Overall	Predictor: QRS morphology - DEFINE Definition: LBBB Unit: NA	108	NR	NR	Cox regression	NR	HR: NR OR: 0.58 RD: NR 95% CI: 0.06- 4.89 p: 0.06
	Overall	Predictor: Left ventricular ejection fraction Definition: NA Unit: %	108	NR	NR	Cox regression	NR	HR: NR OR: 1.03 RD: NR 95% CI: 0.93- 1.14 p: 0.93
Hsu,2012 ¹⁴ MADIT CRT Sub Study	CRTD	Predictor: Gender Definition: Female Unit: NA	752	6 months	NR	Cox regression	NR	HR: NR OR: 1.96 RD: 95% CI: 1.32- 2.90 p: 0.001
	CRTD	Predictor: QRS duration Definition: >/=150 Unit: ms	752	7 months	NR	Cox regression	NR	HR: NR OR: 1.79 RD: 95% CI: 1.17- 2.73 p: 0.007
	CRTD	Predictor: QRS morphology - DEFINE Definition: LBBB Unit: NA	752	8 months	NR	Cox regression	NR	HR: NR OR: 2.05 RD: 95% CI: 1.24- 3.40 p: 0.006
	CRTD	Predictor: Body mass index	752	9 months	NR	Cox regression	NR	HR: NR OR: 1.51

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Definition: <30 Unit: kg/m2						RD: 95% CI: 1.03- 2.20 p: 0.035
	CRTD	Predictor: Left atrial volume Definition: NA Unit: ml	752	9 months	NR	Cox regression	NR	HR: NR OR: 1.47 RD: 95% CI: 1.21- 1.79 p: <0.001
Leong,2013 ⁶³	Overall	Predictor: Age Definition: NA Unit: years	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 0.991 OR: NR RD: NR 95% CI: 0.973-1.01 p: 0.3
	Overall	Predictor: Gender Definition: NA Unit: NA	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 0.82 OR: NR RD: NR 95% CI: 0.53- 1.3 p: 0.4
	Overall	Predictor: Cardiomyopathy subtype - DEFINE Definition: Non Ischemic Unit: NA	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 0.73 OR: NR RD: NR 95% CI: 0.535-0.996 p: 0.047
	Overall	Predictor: History of atrial fibrillation Definition: NA	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 1.4 OR: NR RD: NR 95% CI: 1.0- 2.0 p: 0.045

Author,Year Trial	Arm(name)	Predictors Definition Unit	N for analysis	Timepoint(s)	Proportion of responders	Model	Unadjusted result	Fully adjusted result
		Unit: NA						
	Overall	Predictor: QRS duration Definition: NA Unit: ms	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 0.997 OR: NR RD: NR 95% CI: 0.991-1.0 p: 0.4
	Overall	Predictor: Left ventricular ejection fraction Definition: Per 5% increase) Unit: %	848	44 months (median f/u time; IQR = 29-65 mos)	NA	Cox regression	NR	HR: 0.95 OR: NR RD: NR 95% CI: 0.84- 1.1 p: 0.4
Niebauer,2014 ⁶⁸	Responders	Predictor: Cardiomyopathy subtype - DEFINE Definition: Non Ischemic Unit: NA	94	NA	NR	Logistic regression	NR	OR: 1.71 95%CI: 0.82- 3.57 p: 0.152
	Responders	Predictor: QRS duration Definition: NA Unit: ms	94	NA	NR	Logistic regression	NR	OR: 0.98 95%CI: 0.96- 1.01 p: 0.123

CRT-P=Cardiac Resynchronization Therapy Paced, CRT-D=Cardiac Resynchronization Therapy with Defibrillator, ICD=Implantable Cardioverter Defibrillator, NR=Not Reported, N=Number, HR=Hazard Ratio, CI=Confidence Interval, OR=Odds Ratio, RD=Risk Difference, P=P value, NA=Not Applicable, LBBB=Left Bundle Branch Block LVEF=Left Ventricular Ejection Fraction

Reference List

1. Cleland JG, Daubert JC, Erdmann E *et al.* The effect of cardiac resynchronization on morbidity and mortality in heart failure. *N Engl J Med* 2005; 352(15):1539-49. PMID: 15753115
2. Cleland JG, Daubert JC, Erdmann E *et al.* Longer-term effects of cardiac resynchronization therapy on mortality in heart failure. *Eur Heart J* 2006; 27(16):1928-32. PMID: 16782715
3. Cleland JG, Freemantle N, Daubert JC, Toff WD, Leisch F, Tavazzi L. Long-term effect of cardiac resynchronisation in patients reporting mild symptoms of heart failure: a report from the CARE-HF study. *Heart* 2008; 94(3):278-83. PMID: 17984215
4. Cleland JG, Calvert MJ, Verboven Y, Freemantle N. Effects of cardiac resynchronization therapy on long-term quality of life: an analysis from the Cardiac Resynchronisation-Heart Failure (CARE-HF) study. *Am Heart J* 2009; 157(3):457-66. PMID: 19249415
5. Cleland JG, Freemantle N, Erdmann E *et al.* Long-term mortality with cardiac resynchronization therapy in the Cardiac Resynchronization-Heart Failure (CARE-HF) trial. *Eur J Heart Fail* 2012; 14(6):628-34. PMID: 22552183
6. Ghio S, Freemantle N, Scelsi L *et al.* Long-term left ventricular reverse remodelling with cardiac resynchronization therapy: results from the CARE-HF trial. *Eur J Heart Fail* 2009; 11(5):480-8. PMID: 19287017
7. Gras D, Bocker D, Lunati M *et al.* Implantation of cardiac resynchronization therapy systems in the CARE-HF trial: procedural success rate and safety. *Europace* 2007; 9(7):516-22. PMID: 17540662
8. Wikstrom G, Blomstrom-Lundqvist C, Andren B *et al.* The effects of aetiology on outcome in patients treated with cardiac resynchronization therapy in the CARE-HF trial. *Eur Heart J* 2009; 30(7):782-8. PMID: 19168870
9. Moss AJ, Hall WJ, Cannom DS *et al.* Cardiac-resynchronization therapy for the prevention of heart-failure events. *N Engl J Med* 2009; 361(14):1329-38. PMID: 19723701
10. Arshad A, Moss AJ, Foster E *et al.* Cardiac resynchronization therapy is more effective in women than in men: the MADIT-CRT (Multicenter Automatic Defibrillator Implantation Trial with Cardiac Resynchronization Therapy) trial. *J Am Coll Cardiol* 2011; 57(7):813-20. PMID: 21310317
11. Barsheshet A, Goldenberg I, Moss AJ *et al.* Response to preventive cardiac resynchronization therapy in patients with ischaemic and nonischaemic cardiomyopathy in MADIT-CRT. *Eur Heart J* 2011; 32(13):1622-30. PMID: 21075774
12. Goldenberg I, Moss AJ, Hall WJ *et al.* Predictors of response to cardiac resynchronization therapy in the Multicenter Automatic Defibrillator Implantation Trial with Cardiac Resynchronization Therapy (MADIT-CRT). *Circulation* 2011; 124(14):1527-36. PMID: 21900084
13. Goldenberg I, Kutiyafa V, Klein HU *et al.* Survival with cardiac-resynchronization therapy in mild heart failure. *N Engl J Med* 2014; 370(18):1694-701.

PMID: 24678999

14. Hsu JC, Solomon SD, Bourgoun M *et al.* Predictors of super-response to cardiac resynchronization therapy and associated improvement in clinical outcome: the MADIT-CRT (multicenter automatic defibrillator implantation trial with cardiac resynchronization therapy) study. *J Am Coll Cardiol* 2012; 59(25):2366-73. PMID: 22698490
15. Jamerson D, McNitt S, Polonsky S, Zareba W, Moss A, Tompkins C. Early Procedure-Related Adverse Events by Gender in MADIT-CRT. *J Cardiovasc Electrophysiol* 2014; 25(9):985-9. PMID: 24758374
16. Ouellet G, Huang DT, Moss AJ *et al.* Effect of cardiac resynchronization therapy on the risk of first and recurrent ventricular tachyarrhythmic events in MADIT-CRT. *J Am Coll Cardiol* 2012; 60(18):1809-16. PMID: 23040580
17. Penn J, Goldenberg I, Moss AJ *et al.* Improved outcome with preventive cardiac resynchronization therapy in the elderly: a MADIT-CRT substudy. *J Cardiovasc Electrophysiol* 2011; 22(8):892-7. PMID: 21831163
18. Ruwald MH, Solomon SD, Foster E *et al.* Left Ventricular Ejection Fraction Normalization in Cardiac Resynchronization Therapy and Risk of Ventricular Arrhythmias and Clinical Outcomes: Results from the MADIT-CRT Trial. *Circulation* 2014. PMID: 25301831
19. Solomon SD, Foster E, Bourgoun M *et al.* Effect of cardiac resynchronization therapy on reverse remodeling and relation to outcome: multicenter automatic defibrillator implantation trial: cardiac resynchronization therapy. *Circulation* 2010; 122(10):985-92. PMID: 20733097
20. Tompkins C, Kutiyifa V, McNitt S *et al.* Effect on cardiac function of cardiac resynchronization therapy in patients with right bundle branch block (from the Multicenter Automatic Defibrillator Implantation Trial With Cardiac Resynchronization Therapy. *Am J Cardiol* 2013; 112(4):525-9. PMID: 23725995
21. Zareba W, Klein H, Cygankiewicz I *et al.* Effectiveness of Cardiac Resynchronization Therapy by QRS Morphology in the Multicenter Automatic Defibrillator Implantation Trial-Cardiac Resynchronization Therapy (MADIT-CRT). *Circulation* 2011; 123(10):1061-72. PMID: 21357819
22. Tang AS, Wells GA, Talajic M *et al.* Cardiac-resynchronization therapy for mild-to-moderate heart failure. *N Engl J Med* 2010; 363(25):2385-95. PMID: 21073365
23. Birnie DH, Ha A, Higginson L *et al.* Impact of QRS morphology and duration on outcomes after cardiac resynchronization therapy: Results from the Resynchronization-Defibrillation for Ambulatory Heart Failure Trial (RAFT). *Circ Heart Fail* 2013; 6(6):1190-8. PMID: 23995437
24. Gillis AM, Kerr CR, Philippon F *et al.* Impact of Cardiac Resynchronization Therapy on Hospitalizations in the Resynchronization-Defibrillation for Ambulatory Heart Failure Trial. *Circulation* 2014. PMID: 24610807
25. Healey JS, Hohnloser SH, Exner DV *et al.* Cardiac resynchronization therapy in patients with permanent atrial fibrillation: results from the Resynchronization for Ambulatory Heart Failure Trial (RAFT). *Circ Heart Fail* 2012; 5(5):566-70. PMID: 22896584

26. Young JB, Abraham WT, Smith AL *et al.* Combined cardiac resynchronization and implantable cardioversion defibrillation in advanced chronic heart failure: the MIRACLE ICD Trial. *JAMA* 2003; 289(20):2685-94. PMID: 12771115
27. Abraham WT, Fisher WG, Smith AL *et al.* Cardiac resynchronization in chronic heart failure. *N Engl J Med* 2002; 346(24):1845-53. PMID: 12063368
28. St John Sutton MG, Plappert T, Abraham WT *et al.* Effect of cardiac resynchronization therapy on left ventricular size and function in chronic heart failure. *Circulation* 2003; 107(15):1985-90. PMID: 12668512
29. Bristow MR, Saxon LA, Boehmer J *et al.* Cardiac-resynchronization therapy with or without an implantable defibrillator in advanced chronic heart failure. *N Engl J Med* 2004; 350(21):2140-50. PMID: 15152059
30. Anand IS, Carson P, Galle E *et al.* Cardiac resynchronization therapy reduces the risk of hospitalizations in patients with advanced heart failure: results from the Comparison of Medical Therapy, Pacing and Defibrillation in Heart Failure (COMPANION) trial. *Circulation* 2009; 119(7):969-77. PMID: 19204305
31. Carson P, Anand I, O'Connor C *et al.* Mode of death in advanced heart failure: the Comparison of Medical, Pacing, and Defibrillation Therapies in Heart Failure (COMPANION) trial. *J Am Coll Cardiol* 2005; 46(12):2329-34. PMID: 16360067
32. Cazeau S, Leclercq C, Lavergne T *et al.* Effects of multisite biventricular pacing in patients with heart failure and intraventricular conduction delay. *N Engl J Med* 2001; 344(12):873-80. PMID: 11259720
33. Leclercq C, Walker S, Linde C *et al.* Comparative effects of permanent biventricular and right-univentricular pacing in heart failure patients with chronic atrial fibrillation. *Eur Heart J* 2002; 23(22):1780-7. PMID: 12419298
34. Abraham WT, Young JB, Leon AR *et al.* Effects of cardiac resynchronization on disease progression in patients with left ventricular systolic dysfunction, an indication for an implantable cardioverter-defibrillator, and mildly symptomatic chronic heart failure. *Circulation* 2004; 110(18):2864-8. PMID: 15505095
35. Cheng A, Gold MR, Waggoner AD *et al.* Potential mechanisms underlying the effect of gender on response to cardiac resynchronization therapy: insights from the SMART-AV multicenter trial. *Heart Rhythm* 2012; 9(5):736-41. PMID: 22182496
36. Gold MR, Birgersdotter-Green U, Singh JP *et al.* The relationship between ventricular electrical delay and left ventricular remodelling with cardiac resynchronization therapy. *Eur Heart J* 2011; 32(20):2516-24. PMID: 21875862
37. Schuchert A, Muto C, Maounis T *et al.* Lead complications, device infections, and clinical outcomes in the first year after implantation of cardiac resynchronization therapy-defibrillator and cardiac resynchronization therapy-pacemaker. *Europace* 2013; 15(1):71-6. PMID: 22927665
38. Diab IG, Hunter RJ, Kamdar R *et al.* Does ventricular dyssynchrony on echocardiography predict response to cardiac resynchronisation therapy? A randomised controlled study. *Heart* 2011; 97(17):1410-6. PMID: 21700757

39. Garikipati NV, Mittal S, Chaudhry F *et al.* Comparison of endovascular versus epicardial lead placement for resynchronization therapy. *Am J Cardiol* 2014; 113(5):840-4. PMID: 24406108
40. Higgins SL, Hummel JD, Niazi IK *et al.* Cardiac resynchronization therapy for the treatment of heart failure in patients with intraventricular conduction delay and malignant ventricular tachyarrhythmias. *J Am Coll Cardiol* 2003; 42(8):1454-9. PMID: 14563591
41. Lozano I, Bocchiardo M, Achtelek M *et al.* Impact of biventricular pacing on mortality in a randomized crossover study of patients with heart failure and ventricular arrhythmias. *Pacing Clin Electrophysiol* 2000; 23(11 Pt 2):1711-2. PMID: 11139906
42. Pinter A, Mangat I, Korley V *et al.* Assessment of resynchronization therapy on functional status and quality of life in patients requiring an implantable defibrillator. *Pacing Clin Electrophysiol* 2009; 32(12):1509-19. PMID: 19765233
43. Pokushalov E, Romanov A, Prohorova D *et al.* Coronary artery bypass grafting with concomitant cardiac resynchronisation therapy in patients with ischaemic heart failure and left ventricular dyssynchrony. *Eur J Cardiothorac Surg* 2010; 38(6):773-80. PMID: 20447832
44. Leclercq C, Cazeau S, Lellouche D *et al.* Upgrading from single chamber right ventricular to biventricular pacing in permanently paced patients with worsening heart failure: The RD-CHF Study. *Pacing Clin Electrophysiol* 2007; 30 Suppl 1:S23-30. PMID: 17302711
45. Auricchio A, Gold MR, Brugada J *et al.* Long-term effectiveness of the combined minute ventilation and patient activity sensors as predictor of heart failure events in patients treated with cardiac resynchronization therapy: Results of the Clinical Evaluation of the Physiological Diagnosis Function in the PARADYM CRT device Trial (CLEPSYDRA) study. *Eur J Heart Fail* 2014. PMID: 24639140
46. Azizi M, Castel MA, Behrens S, Rodiger W, Nagele H. Experience with coronary sinus lead implantations for cardiac resynchronization therapy in 244 patients. *Herzschrittmacherther Elektrophysiol* 2006; 17(1):13-8. PMID: 16547655
47. Bilchick KC, Kamath S, DiMarco JP, Stukenborg GJ. Bundle-branch block morphology and other predictors of outcome after cardiac resynchronization therapy in Medicare patients. *Circulation* 2010; 122(20):2022-30. PMID: 21041691
48. Bossard M, Sticherling C, Kuhne M, Frey S, Osswald S, Schaer B. Outcome of patients with cardiac resynchronisation defibrillator therapy and a follow-up of at least five years after implant. *Swiss Med Wkly* 2014; 144:w13938. PMID: 24573612
49. Boven NV, Theuns D, Bogaard K *et al.* Atrial Fibrillation in Cardiac Resynchronization Therapy with a Defibrillator: A Risk Factor for Mortality, Appropriate and Inappropriate Shocks. *J Cardiovasc Electrophysiol* 2013. PMID: 23889733
50. Van Boven N, Bogaard K, Ruiter J *et al.* Functional response to cardiac resynchronization therapy is associated with improved clinical outcome and absence of appropriate shocks. *J Cardiovasc Electrophysiol* 2013; 24(3):316-22. PMID: 23210664
51. de Cock CC, van Campen CM, Visser CA. Major dissection of the coronary sinus and its tributaries during lead implantation for biventricular stimulation: angiographic follow-up. *Europace* 2004; 6(1):43-7. PMID: 14697725

52. Duray GZ, Israel CW, Pajitnev D, Hohnloser SH. Upgrading to biventricular pacing/defibrillation systems in right ventricular paced congestive heart failure patients: prospective assessment of procedural parameters and response rate. *Europace* 2008; 10(1):48-52. PMID: 18077483
53. Gasparini M, Menozzi C, Proclemer A *et al.* A simplified biventricular defibrillator with fixed long detection intervals reduces implantable cardioverter defibrillator (ICD) interventions and heart failure hospitalizations in patients with non-ischaemic cardiomyopathy implanted for primary prevention: the RELEVANT. *Eur Heart J* 2009; 30(22):2758-67. PMID: 19567380
54. Gopalamurugan AB, Ganesha Babu G, Rogers DP *et al.* Is CRT pro-arrhythmic? A comparative analysis of the occurrence of ventricular arrhythmias between patients implanted with CRTs and ICDs. *Front Physiol* 2014; 5:334. PMID: 25278901
55. Gras D, Leclercq C, Tang AS, Bucknall C, Luttikhuis HO, Kirstein-Pedersen A. Cardiac resynchronization therapy in advanced heart failure the multicenter InSync clinical study. *Eur J Heart Fail* 2002; 4(3):311-20. PMID: 12034157
56. Haugaa KH, Marek JJ, Ahmed M *et al.* Mechanical dyssynchrony after cardiac resynchronization therapy for severely symptomatic heart failure is associated with risk for ventricular arrhythmias. *J Am Soc Echocardiogr* 2014; 27 (8):872-9. PMID: 24798865
57. Niu HX, Hua W, Wang FZ, Zhang S, Chen KP, Chen X. Complications of cardiac resynchronization therapy in patients with congestive heart failure. *Chin Med J (Engl)* 2006; 119(6):449-53. PMID: 16584641
58. Killu AM, Wu JH, Friedman PA *et al.* Outcomes of cardiac resynchronization therapy in the elderly. *Pacing Clin Electrophysiol* 2013; 36(6):664-72. PMID: 23252710
59. Knight BP, Desai A, Coman J, Faddis M, Yong P. Long-term retention of cardiac resynchronization therapy. *J Am Coll Cardiol* 2004; 44(1):72-7. PMID: 15234410
60. Krahn AD, Snell L, Yee R, Finan J, Skanes AC, Klein GJ. Biventricular pacing improves quality of life and exercise tolerance in patients with heart failure and intraventricular conduction delay. *Can J Cardiol* 2002; 18(4):380-7. PMID: 11992131
61. Kuhlkamp V. Initial experience with an implantable cardioverter-defibrillator incorporating cardiac resynchronization therapy. *J Am Coll Cardiol* 2002; 39(5):790-7. PMID: 11869843
62. Landolina M, Gasparini M, Lunati M *et al.* Long-term complications related to biventricular defibrillator implantation: rate of surgical revisions and impact on survival: insights from the Italian Clinical Service Database. *Circulation* 2011; 123(22):2526-35. PMID: 21576653
63. Leong DP, Hoke U, Delgado V *et al.* Right ventricular function and survival following cardiac resynchronisation therapy. *Heart* 2013; 99(10):722-8. PMID: 23315608
64. Mascioli G, Padeletti L, Sassone B *et al.* Electrocardiographic criteria of true left bundle branch block: a simple sign to predict a better clinical and instrumental response to CRT. *Pacing Clin Electrophysiol* 2012; 35(8):927-34. PMID: 22651702

65. Masoudi FA, Mi X, Curtis LH *et al.* Comparative effectiveness of cardiac resynchronization therapy with an implantable cardioverter-defibrillator versus defibrillator therapy alone: a cohort study. *Ann Intern Med* 2014; 160(9):603-11. PMID: 24798523
66. Mortensen PT, Sogaard P, Mansour H *et al.* Sequential biventricular pacing: evaluation of safety and efficacy . *Pacing Clin Electrophysiol* 2004; 27 (3):339-45. PMID: 15009860
67. Luo NS, Yuan WL, Lin YQ *et al.* Potential proarrhythmic effect of cardiac resynchronization therapy during perioperative period: data from a single cardiac center. *Chin Med J (Engl)* 2010; 123(17):2295-8. PMID: 21034537
68. Niebauer MJ, Rickard J, Polakof L, Tchou PJ, Varma N. QRS frequency characteristics help predict response to cardiac resynchronization in left bundle branch block less than 150 milliseconds. *Heart Rhythm* 2014. PMID: 25068573
69. Ricci RP, Pignalberi C, Landolina M *et al.* Ventricular rate monitoring as a tool to predict and prevent atrial fibrillation-related inappropriate shocks in heart failure patients treated with cardiac resynchronisation therapy defibrillators. *Heart* 2014; 100(11):848-54. PMID: 24682569
70. Rickard J, Cheng A, Spragg D *et al.* QRS narrowing is associated with reverse remodeling in patients with chronic right ventricular pacing upgraded to cardiac resynchronization therapy. *Heart Rhythm* 2013; 10(1):55-60. PMID: 23000040
71. Romeyer-Bouchard C, Da Costa A, Dauphinot V *et al.* Prevalence and risk factors related to infections of cardiac resynchronization therapy devices. *Eur Heart J* 2010; 31(2):203-10. PMID: 19875388
72. Shanks M, Delgado V, Ng AC *et al.* Clinical and echocardiographic predictors of nonresponse to cardiac resynchronization therapy. *Am Heart J* 2011; 161(3):552-7. PMID: 21392611
73. Shen X, Aronow WS, Holmberg MJ *et al.* Cardiac resynchronization therapy in patients with intrinsic and right ventricular pacing-induced left bundle branch block pattern. *Am J Ther* 2009 ; 16(6):e44-50. PMID: 19940605
74. Shen X, Aronow WS, Nair CK *et al.* Are the extent, location, and score of segmental wall motion abnormalities related to cardiac resynchronization therapy response? *Echocardiography* 2009; 26(10):1136-45. PMID: 19725853
75. Shen X, Nair CK, Aronow WS *et al.* A patient selection score for cardiac resynchronization therapy. *Echocardiography* 2011; 28(2):188-95. PMID: 21276075
76. Stabile G, Solimene F, Bertaglia E *et al.* Long-term outcomes of CRT-PM versus CRT-D recipients. *Pacing Clin Electrophysiol* 2009; 32 Suppl 1:S141-5. PMID: 19250079
77. Stahlberg M, Braunschweig F, Gadler F, Karlsson H, Linde C. Three year outcome of cardiac resynchronization therapy: a single center evaluation. *Pacing Clin Electrophysiol* 2005; 28(10):1013-7. PMID: 16221256
78. Strimel W, Koplik S, Chen HR, Song J, Huang SK. Safety and effectiveness of primary prevention cardioverter defibrillators in octogenarians. *Pacing*

Clin Electrophysiol 2011; 34(7):900-6. PMID: 21438896

79. Swindle JP, Rich MW, McCann P, Burroughs TE, Hauptman PJ. Implantable cardiac device procedures in older patients: use and in-hospital outcomes. Arch Intern Med 2010; 170(7):631-7. PMID: 20386008
80. Takaya Y, Noda T, Nakajima I *et al.* Electrocardiographic predictors of response to cardiac resynchronization therapy in patients with intraventricular conduction delay. Circ. J. 2014; 78(1):71-7.
81. Theuns DA, Thornton AS, Klootwijk AP *et al.* Outcome in patients with an ICD incorporating cardiac resynchronisation therapy: differences between primary and secondary prophylaxis. Eur J Heart Fail 2005; 7(6):1027-32. PMID: 16109500
82. Vado A, Menardi E, Rossetti G, Ballari G, Feola M, Bobbio M. Single-center experience of a quadripolar pacing lead for cardiac resynchronization therapy. J Interv Card Electrophysiol 2014; 39(2):161-5. PMID: 24293178
83. Verbrugge FH, De Vusser P, Rivero-Ayerza M *et al.* Cardiac resynchronization therapy with or without defibrillator: experience from a high-volume Belgian implantation centre. Acta Cardiol 2013; 68(1):37-45. PMID: 23457908
84. Verbrugge FH, Dupont M, De Vusser P *et al.* Response to cardiac resynchronization therapy in elderly patients (≥ 70 years) and octogenarians. Eur J Heart Fail 2013; 15(2):203-10. PMID: 23002114
85. Wollmann CG, Lawo T, Kuhlkamp V *et al.* Implantable defibrillators with enhanced detection algorithms: detection performance and safety results from the PainFree SST study. Pacing Clin Electrophysiol 2014; 37(9):1198-209. PMID: 24665992
86. Zhang Q, van Bommel RJ, Fung JW *et al.* Tissue Doppler velocity is superior to strain imaging in predicting long-term cardiovascular events after cardiac resynchronisation therapy. Heart 2009; 95(13):1085-90. PMID: 19363024

Appendix E: List of Ongoing and Completed Studies in CRT Sponsored by Medtronic

Table E1: Ongoing Studies

Ongoing Study Title	NCT #	Study Status	Results:	JHU Database (Included, Exclude, Not Captured)
4195 Chronic Performance Study	NCT00869921	Recruiting	No Results Available	NA
4195 Chronic Performance Study	NCT00869921	Recruiting	No Results Available	NA
4196 Chronic Performance Study	NCT00930904	Recruiting	No Results Available	NA
4296 Chronic Performance Study	NCT01361672	Recruiting	No Results Available	NA
4396 Chronic Performance Study	NCT01361685	Recruiting	No Results Available	NA
AdaptResponse Clinical Trial	NCT02205359	Recruiting	No Results Available	NA
Assessment of Efficacies of Cardiac Resynchronization Therapies (CRT-P/D) for Heart Failure Patients in China	NCT01018667	Recruiting	No Results Available	NA
Attain Performa(TM) Quadripolar Lead Study	NCT01751022	Active, not recruiting	Abstract submitted to AHA 2014, not yet published, appended	NA
CARE-HF LTFU: CArdiac RESynchronization in Heart Failure Long-Term Follow-up	NCT00318357	Active, not recruiting	Cleland JGF , Freemantle, N, Erdmann , E (2012). Long-term mortality with cardiac resynchronization therapy in the Cardiac Resynchronization-Heart Failure (CARE-HF) trial. <i>European Journal of Heart Failure</i> , 14, 628–634. doi:10.1093/eurjhf/hfs055	Yes-Included
Improve Sudden Cardiac Arrest Study	NCT02099721	Recruiting	No Results Available	NA
Integrated Diagnostic for Heart Failure	NCT01798797	Recruiting	No Results Available	NA

Ongoing Study Title	NCT #	Study Status	Results:	JHU Database (Included, Exclude, Not Captured)
Italian ClinicalService Project	NCT01007474	Recruiting	1. Santini, M, Gasparini, M, Landolina, M, (2011). Device-Detected Atrial Tachyarrhythmias Predict Adverse Outcome in Real-World Patients With Implantable Biventricular Defibrillators. <i>Journal of the American College of Cardiology</i>, 57(2), 167–72. doi:10.1016/j.jacc.2010.08.624 2. Landolina, M, Gasparini, M, Lunati, M et al. (2011). Long-Term Complications Related to Biventricular Defibrillator Implantation: Rate of Surical Revisions and Impact on Survival: Insights From the Italian ClinicalService Database. <i>Circulation</i>. 123, 2526-2535. DOI: 10.1161/CIRCULATIONAHA.110.015024 3. Ricci RP, Pignalberi C, Landolina M, et al. (2014). Ventricular rate monitoring as a tool to predict and prevent atrial fibrillation-related inappropriate shocks in heart failure patients treated with cardiac resynchronisation therapy defibrillators. <i>Heart</i>; 100:848–854. doi:10.1136	1. Yes-Excluded (This study did not address any of our Key Questions) 2. Yes-Included 3. will be included in the final report
Latin America Cardiac Resynchronization Therapy Study	NCT01238874	Enrolling by invitation	No Results Available	NA
Medtronic South Asian Systolic Heart Failure Registry	NCT01434615	Active, not recruiting	No Results Available	NA

Ongoing Study Title	NCT #	Study Status	Results:	JHU Database (Included, Exclude, Not Captured)
MOonitoring REsynchronization deviCes and cARdiac patiEnts	NCT00885677	Recruiting	Boriani, G, Antoine Da Costa, A, Ricci, RP, (2013) The MOonitoring Resynchronization dEviCes and CARdiac patiEnts (MORECARE) Randomized Controlled Trial: Phase 1 Results on Dynamics of Early Intervention With Remote Monitoring. <i>J Med Internet Res</i> , 15(8): e167. doi:10.2196/jmir.2608	Yes-Excluded(Did not address any of our Key Questions)
OptiLink HF Study: Optimization of Heart Failure Management Using Medtronic OptiVol Fluid Status Monitoring and CareLink Network	NCT00769457	Recruiting	No Results Available	NA
PANORAMA 2 Observational Study	NCT01723566	Recruiting	No Results Available	NA
Post-Myocardial Infarction Remodeling Prevention Therapy	NCT01213251	Active, not recruiting	No Results Available	NA
The Product Surveillance Registry REVERSE Post Approval Study	NCT01660035	Recruiting	No Results Available	NA

NA-Not applicable, ICD- Implantable Cardiac Defibrillator, KQ- Key question, CRT- Cardiac resynchronization, CRT-D- Cardiac resynchronization defibrillator, CRT-P- Cardiac resynchronization pacemaker

Table E2: Completed Studies

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
4196 Attain Ability IDE	NCT00271544	Completed	NCT Posted	NA
4296 Attain Ability Plus	NCT00927251	Completed	NCT Posted	NA
4396 Attain Ability Straight IDE	NCT00853593	Completed	NCT Posted	NA
Adaptive Cardiac Resynchronization Therapy Study	NCT00980057	Completed	1. Martin DO, Lemke B, Birnie D, et al. (2012). Investigation of a novel algorithm for synchronized left-ventricular pacing and ambulatory optimization of cardiac resynchronization therapy: results of the adaptive CRT trial. <i>Heart Rhythm</i>. 9(11):1807-14. doi: 10.1016/j.hrthm.2012.07.009. 2. AF Results abstract appended 3. 30-day readmission abstract appended	1. Yes-Excluded(Did not address any of our Key Questions) 2. NA 3. NA
ADVANCE CRT - D: Antitachycardia Pacing (ATP) Delivery for Painless Implantable Cardioverter Defibrillator (ICD) Therapy	NCT00147290	Completed	NCT posted	NA
Avoid DelivEring TherApies for Non-sustained Arrhythmias in ICD PatiEnts III (ADVANCEIII)	NCT0061717	Completed	1. NCT Posted 2. Maurizio Gasparini, M, Proclemer, A, Klersy, C et al. (2013). Effect of Long-Detection Interval vs Standard-Detection Interval for Implantable Cardioverter-Defibrillators on Antitachycardia Pacing and Shock Delivery The ADVANCE III Randomized Clinical Trial. <i>JAMA</i>, 309(18):1903-1911. 3. Proclemer, A, Arenal,A, Lunati, M et al. (2014). Association of Long vs Standard Detection Intervals for Implantable Cardioverter-Defibrillators With Hospitalizations and Costs. <i>JAMA</i>, 312(5):555-557.	1. NA 2. Not Captured (Reviews ICD only) 3. Not Captured (Reviews ICD only)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
APAF: Assessment of Cardiac Resynchronization Therapy in Patients With Permanent Atrial Fibrillation	NCT00111527	Completed	Brignole M, Botto G, Mont L, et al. (2011). Cardiac resynchronization therapy in patients undergoing atrioventricular junction ablation for permanent atrial fibrillation: a randomized trial. <i>Eur Heart J</i> . 32(19):2420-9. doi: 10.1093/eurheartj/ehr162.	Yes-Included
Attain TM Bipolar OTW Model 4194 US Clinical Study	Not Registered	Completed	Johnson, WB, Hoyt, R, Bailin, S, et al. (2005). Relationship between LV pacing thresholds, R-wave amplitudes, and impedances to LV vein size and locations in a bipolar LV lead. <i>Heart Rhythm</i> ;2(5): S123–S124, doi:http://dx.doi.org/10.1016/j.hrthm.2005.02.385	Not Captured(Address es technical aspects not our KQ)
Attain StarFix IDE	NCT00269230	Completed	Crossley, GH, Exner, D, Mead, RH, Sorrentino, RA, et al. (2010). Chronic performance of an active fixation coronary sinus lead. <i>Heart Rhythm</i> ; 7(4), doi:10.1016/j.hrthm.2010.01.007	Yes-Excluded(Not relevant to our Key Questions)
Attain Success	NCT00990964	Completed	NCT Posted	NA
Biventricular Versus Right Ventricular Pacing in Heart Failure Patients With Atrioventricular Block (BLOCK HF)	NCT00267098	Completed	1. NCT posted 2. Curtis, AB, Worley, SJ, Adamson, PB, et al. (2013). Biventricular Pacing for Atrioventricular Block and Systolic Dysfunction. <i>N Engl J Med</i> ; 368:1585-93. DOI: 10.1056/NEJMoa1210356	1.NA 2.Yes-Included
Care-HF CArdiac Resynchronization in Heart Failure	NCT00170300	Completed	1. Cleland, JGF, Daubert, JC, Erdmann, E, et al. (2005). The Effect of Cardiac Resynchronization on Morbidity and Mortality in Heart Failure. <i>N Engl J Med</i> ;352:1539-49. 2. Wikstrom, G, Lundqvist, CB, Andren, B, et al. (2009). The effects of aetiology on outcome in patients treated with cardiac resynchronization therapy in the CARE-HF trial.	1.Yes-Included 2.Yes-Included 3.Yes-Excluded(Not relevant to our Key Questions)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			<i>European Heart Journal</i>; 30, 782–788, doi:10.1093/eurheartj/ehn577 3. Yao, G, Freemantle, N, Calvert, MJ, et al. (2007). The long-term cost-effectiveness of cardiac resynchronization therapy with or without an implantable cardioverter-defibrillator. <i>European Heart Journal</i> 28, 42–51, doi:10.1093/eurheartj/ehl382	
CARIBE HF	Not Registered	Completed	Grosu, A, Senni, M, Iacovoni, A, (2011). Cardiac resynchronization in combination with beta blocker treatment in advanced chronic heart failure (CARIBE-HF): the results of the CARIBE-HF study. <i>Acta Cardiol</i> ;66(5):573-80	Yes-Excluded(Not relevant to our Key Questions)
Clinical Investigation of the Medtronic Concerto™ Device	NCT00268320	Completed	Crossley GH, Aonuma K, Haffajee C, et al. (2009). Atrial fibrillation therapy in patients with a CRT defibrillator with wireless telemetry. <i>Pacing Clin Electrophysiol</i> . 32(1):13-23. doi: 10.1111/j.1540-8159.2009.02171.x	Yes-Excluded (Not relevant to our Key Questions)
Compare Remote Patient Management and Standard Care in CRT-D and ICD-patients to Assess the Effect on Heart Failure	NCT00730548	Completed	Zabel M, Vollmann D, Lüthje L, et al (2013). Randomized Clinical evaluation of wireless fluid monitoring and remote ICD management using OptiVol alert-based predefined management to reduce cardiac decompensation and health care utilization: the CONNECT-OptiVol study. <i>Contemp Clin Trials</i> ; 34(1):109-16. doi: 10.1016/j.cct.2012.10.001.	#944- Yes-Excluded(Not relevant to our Key Questions)
CONNECT Study - Clinical Evaluation Of Remote Notification to Reduce Time to Clinical Decision	NCT00402246	Completed	1. NCT Posted 2. Crossley, GH, Boyle, A, Vitense, H, et al. (2011) The CONNECT (Clinical Evaluation of Remote Notification to Reduce Time to Clinical Decision) Trial: The Value of Wireless Remote	1.NA 2.Not Captured(Not relevant to key questions)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			Monitoring With Automatic Clinician Alerts. <i>J. Am. Coll. Cardiol.</i> 2011;57;1181-1189, doi:10.1016/j.jacc.2010.12.012	
Diagnostic Outcome Trial in Heart Failure (DOT-HF Trial)	NCT00480077	Terminated	van Veldhuisen DJ, Braunschweig F, Conraads V, et al. (2011). Intrathoracic impedance monitoring, audible patient alerts, and outcome in patients with heart failure. <i>Circulation</i> ; 18;124(16):1719-26, doi:10.1161/CIRCULATIONAHA.111.043042.	Not Captured (Not randomized and does not address relevant Key Questions)
EVOLVO	NCT00873899	Completed	Landolina M, Perego GB, Lunati M, et al. (2012). Remote monitoring reduces healthcare use and improves quality of care in heart failure patients with implantable defibrillators: the evolution of management strategies of heart failure patients with implantable defibrillators (EVOLVO) study. <i>Circulation</i> ; 125(24):2985-92. doi: 10.1161/CIRCULATIONAHA.111.088971.	Yes-Excluded(Does not evaluate a CRT)
FAST	NCT0028927	Completed	Abraham, WT, Compton, S, Haas, G et al. (2011). Intrathoracic Impedance vs Daily Weight Monitoring for Predicting Worsening Heart Failure Events: Results of the Fluid Accumulation Status Trial (FAST). <i>Congest Heart Fail</i> ; 17(2):51-5, doi: 10.1111/j.1751-7133.2011.00220.x	Yes-Excluded(Not relevant to our Key Questions)
IMPROVE-HF	NCT00303979	Completed	1. Curtis, AB, Yancy, CW, Albert, NM, et al. (2009). Cardiac resynchronization therapy utilization for heart failure: Findings from IMPROVE HF. <i>Congestive Heart Failure</i>; 158(6):956-964, doi:10.1016/j.ahj.2009.10.011. 2. Fonarow, GC, Albert, NM, Anne B. Curtis, AB, et al. (2010). Improving Evidence-Based Care for Heart Failure in Outpatient Cardiology	1. Yes-Excluded (Not relevant to our Key Questions) 2. Yes-Excluded(Not relevant to our Key Questions)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			Practices Primary Results of the Registry to Improve the Use of Evidence-Based Heart Failure Therapies in the Outpatient Setting (IMPROVE HF). <i>Circulation</i>; 22:585-596,DOI:10.1161/CIRCULATIONAHA.109.934471 3. Shukla, A, Curtis, AB, Mehra, MR et al. (2013). Factors Associated with Improvement in Utilization of Cardiac Resynchronization Therapy in Eligible Heart Failure Patients: Findings from IMPROVE HF. <i>PACE</i>; 36: 433-443, doi: 10.1111/pace.12090 4. Fonarow, GC, Albert, NM, Curtis, AB et al. (2011). Associations Between Outpatient Heart Failure Process-of-Care Measures and Mortality. <i>Circulation</i>; 123:1601-1610, DOI: 10.1161/CIRCULATIONAHA.110.989632	3.Yes-Excluded(Not relevant to our Key Questions) 4.Yes-Excluded(Not relevant to our Key Questions)
InSync III	Not Registered	Completed	León, AR, Abraham, WT, Brozena, S et al. (2005). Cardiac Resynchronization With Sequential Biventricular Pacing for the Treatment of Moderate-to-Severe Heart Failure. <i>Journal of the American College of Cardiology</i> ; 46(12):2298–304, doi:10.1016/j.jacc.2005.08.032	Yes-Included
InSync III Marquis	NCT00271232	Completed	Abraham, WT, León, AR, St. John Sutton, MG, et al. (2012). Randomized controlled trial comparing simultaneous versus optimized sequential interventricular stimulation during cardiac resynchronization therapy. <i>Am Heart J</i> ; 164:735-41.	Yes-Excluded(Not relevant to our Key Questions)
InSync Model 8040 (InSync) and InSync III Model 8042 (InSync III) Registry	NCT00273182	Completed	NCT posted	NA

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
InSync Sentry Registry	Not Registered	Completed	Vollmann, D, Nägele, H, Schauerte, P, et al. (2007). Clinical utility of intrathoracic impedance monitoring to alert patients with an implanted device of deteriorating chronic heart failure. <i>Eur Heart J</i> ; 28 (15): 1835-1840, doi: 10.1093/eurheartj/ehl506	Yes-Excluded(Does not evaluate a CRT)
InSync Study	Not Registered	Completed	Gras, D, Leclercq, C, Tang, ASL, et al. (2002). Cardiac resynchronization therapy in advanced heart failure the multicenter InSync clinical study. <i>The European Journal of Heart Failure</i> ; 4:311–320.	Yes-Included
Left Ventricular Capture Management Study	NCT01089634	Completed	Crossley, GH, Mead, H, Kleckner, K, et al. (2007). Automated Left Ventricular Capture Management. <i>PACE</i> ; 30:1190–1200.	Not Captured(Not relevant to our Key Questions)
Medtronic Shock-Less Study on Physician Utilization of Shock Reduction Programming	NCT00856349	Completed	NCT posted	NA
MIRACLE	Not Registered	Completed	1. Abraham, WT, Fisher, WG, Smith AL, et al. (2002). Cardiac Resynchronization in Chronic Heart Failure. <i>N Engl J Med</i>; 346(24):1845-1853. 2. León, AR, Abraham, WT, Curtis, AB, et al. (2005). Safety of Transvenous Cardiac Resynchronization System Implantation in Patients With Chronic Heart Failure Combined Results of Over 2,000 Patients From a Multicenter Study Program. <i>Journal of the American College of Cardiology</i>. 46(12):2348–56, doi:10.1016/j.jacc.2005.08.031.	1Yes-Included 2. Yes-Included
MIRACLE ICD	Not Registered	Completed	Young, JB, Abraham, WT, Smith, AL et al. (2003). Combined Cardiac	Yes-Included

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			Resynchronization and Implantable Cardioversion Defibrillation in Advanced Chronic Heart Failure: The MIRACLE ICD Trial. <i>JAMA</i> ; 289(20):2685-2694, doi:10.1001/jama.289.20.2685.	
MIRACLE ICD II	Not Registered	Completed	Abraham, WT, Young, JB, León, AR, et al. (2004). Effects of Cardiac Resynchronization on Disease Progression in Patients With Left Ventricular Systolic Dysfunction, an Indication for an Implantable Cardioverter-Defibrillator, and Mildly Symptomatic Chronic Heart Failure. <i>Circulation</i> ; 110:2864-2868, doi:10.1161/01.cir.0000146336.92331.d1.	Yes-Included
MOMIJI	Not Registered	Completed	Momomura, S, Tsutsui, H, Sugawara, Y, et al. (2012). Clinical Efficacy of Cardiac Resynchronization Therapy With an Implantable Defibrillator in a Japanese Population – Results of the MIRACLE-ICD Outcome Measured in Japanese Indication (MOMIJI) Study –. <i>Circulation Journal</i> ; doi: 10.1253/circj.CJ-11-1341.	Yes-Excluded(Not relevant to our Key Questions)
OMNI	NCT00277524	Completed	Sweeney, MO, Sakaguchi, S, Simons, G, et al. (2012). Response to the Center for Medicare & Medicaid Services coverage with evidence development request for primary prevention implantable cardioverter-defibrillators: Data from the OMNI study. <i>Heart Rhythm</i> ; 9(7):1058-1066, doi:10.1016/j.hrthm.2012.02.027.	Yes-Excluded(Not relevant to our Key Questions)
OptiVol® Care Pathway	NCT00847288	Completed	NCT posted	NA
PANORAMA	NCT00382525	Completed	Al Kandari F, et al, Regional variations in baseline characteristics of cardiac rhythm device recipients: The PANORAMA observational cohort	Not Captured(Not relevant to our key questions)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			study, <i>IJC Heart & Vessels</i> (2014), http://dx.doi.org/10.1016/j.ijchv.2014.06.008	
PARTNERS HF: Program to Access and Review Trending Information and Evaluate Correlation to Symptoms in Patients With Heart Failure	NCT00279955	Completed	NCT posted	NA
Primary Prevention Parameters Evaluation Study (PREPARE)	NCT00279279	Completed	Wilkoﬀ, B. L., Williamson, B. D., Stern, R. S., et al. (2008). Strategic programming of detection and therapy parameters in implantable cardioverter-deﬁbrillators reduces shocks in primary prevention patients: results from the PREPARE (Primary Prevention Parameters Evaluation) study. <i>J Am Coll Cardiol</i> , 52(7), 541-550. doi: 10.1016/j.jacc.2008.05.011	Not Captured(Not relevant to our key questions)
Progressive Ventricular Dysfunction Prevention in Pacemaker Patients	NCT00170326	Completed	Stockburger M1, Gómez-Doblas JJ, Lamas G, et al. (2011). Preventing ventricular dysfunction in pacemaker patients without advanced heart failure: results from a multicentre international randomized trial (PREVENT-HF). <i>Eur J Heart Fail</i> ;13(6):633-41. doi: 10.1093/eurjhf/hfr041.	Yes-Included
Prospect	NCT00253357	Completed	1. Chung, E. S., Leon, A. R., Tavazzi, L., et al. (2008). Results of the Predictors of Response to CRT (PROSPECT) trial. <i>Circulation</i>, 117(20), 2608-2616. doi: 10.1161/CIRCULATIONAHA.107.743120 2. Sullivan RM, Murillo J, Gerritse B, et al. (2013). Do baseline diastolic echocardiographic parameters predict outcome after resynchronization therapy? Results from the PROSPECT trial. <i>Pacing Clin Electrophysiol</i>. 36(2):214-20. doi: 10.1111/pace.12042.	1.Yes-Excluded 2.Yes-Excluded

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
REsynchronization reVERses Remodeling in Systolic Left vEntricular Dysfunction (REVERSE)	NCT00271154	Completed	1. Gold, M. R., Daubert, J. C., Abraham, W. T., et al. (2013). Implantable defibrillators improve survival in patients with mildly symptomatic heart failure receiving cardiac resynchronization therapy: analysis of the long-term follow-up of remodeling in systolic left ventricular dysfunction (REVERSE). <i>Circ Arrhythm Electrophysiol</i>, 6(6), 1163-1168. doi: 10.1161/CIRCEP.113.000570 2. Linde, C., Abraham, W. T., Gold, M. R., et al. (2008). Randomized trial of cardiac resynchronization in mildly symptomatic heart failure patients and in asymptomatic patients with left ventricular dysfunction and previous heart failure symptoms. <i>J Am Coll Cardiol</i>, 52(23), 1834-1843. doi: 10.1016/j.jacc.2008.08.027 3. Linde, C., Gold, M. R., Abraham, et al. (2013). Long-term impact of cardiac resynchronization therapy in mild heart failure: 5-year results from the REsynchronization reVERses Remodeling in Systolic left vEntricular dysfunction (REVERSE) study. <i>Eur Heart J</i>, 34(33), 2592-2599. doi: 10.1093/eurheartj/ehq160 4. Linde, C., Mealing, S., Hawkins, N., et al. (2011). Cost-effectiveness of cardiac resynchronization therapy in patients with asymptomatic to mild heart failure: insights from the European cohort of the REVERSE (Resynchronization Reverses remodeling in Systolic Left Ventricular Dysfunction). <i>Eur Heart J</i>, 32(13), 1631-1639. doi: 10.1093/eurheartj/ehq408	1.Yes-Excluded (Population inclusion criteria do not fall within the QRS>/=120ms range and LVEF</=35%) 2.Yes-Excluded(Population inclusion criteria do not fall within the QRS>/=120ms range and LVEF</=35%) 3.Yes-Excluded(Population inclusion criteria do not fall within the QRS>/=120ms range and LVEF</=35%) 4.Yes-Excluded(Not relevant to key questions)

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
Resynchronization/Defibrillation for Ambulatory Heart Failure Trial (RAFT)	NCT00251251	Completed	Tang, ASL, Wells, GA, Talajic, M et al. (2010). Cardiac-Resynchronization Therapy for Mild-to-Moderate Heart Failure. <i>N Engl J Med</i> ; doi: 10.1056/NEJMoa1009540	Yes-Included
Role of long dEtection window programming in patients with LEft VentriculAr dysfunction, Non-ischemic eTiology in primary prevention treated with a biventricular ICD study (RELEVANT)	Not Registered	Completed	Gasparini, M., Menozzi, C., Proclemer, A, et al. (2009). A simplified biventricular defibrillator with fixed long detection intervals reduces implantable cardioverter defibrillator (ICD) interventions and heart failure hospitalizations in patients with non-ischaemic cardiomyopathy implanted for primary prevention: the RELEVANT [Role of long dEtection window programming in patients with LEft VentriculAr dysfunction, Non-ischemic eTiology in primary prevention treated with a biventricular ICD] study. <i>Eur Heart J</i> , 30(22), 2758-2767. doi: 10.1093/eurheartj/ehp247	Yes-Included
Sense HF	NCT00400985	Completed	Conraads, V. M., Tavazzi, L., Santini, M., et al. (2011). Sensitivity and positive predictive value of implantable intrathoracic impedance monitoring as a predictor of heart failure hospitalizations: the SENSE-HF trial. <i>Eur Heart J</i> , 32(18), 2266-2273. doi: 10.1093/eurheartj/ehp050	Yes-Excluded(Does not evaluate a CRT)
Study to Characterize Atrial Fibrillation in CHF Patients Indicated for CRT	NCT00156728	Completed	Leclercq, C, Pedeletti, L, Ritter, P, et al. (2006). Unexpectedly Low Incidence of Atrial Fibrillation in Heart Failure Patients Treated by Cardiac Resynchronization Therapy <i>Circulation</i> ;114(II)_617.	NR(Does not address Key Questions)
Study to Evaluate System Safety and Clinical Performance of the Protecta Implantable Cardioverter Defibrillator (ICD) Plus Cardiac Resynchronization Therapy Defibrillator (CRT-D)	NCT00982397	Completed	Wollmann, C. G., Lawo, T., Kuhlkamp, V., et al. (2014). Implantable Defibrillators With Enhanced Detection Algorithms: Detection Performance and Safety Results from the PainFree SST Study. <i>Pacing Clin Electrophysiol</i> . doi:	Will be included in the final report

Completed/Terminated Study Title	NCT #	Study Status	Results:	Status
			10.1111/pace.12390	

NA-Not applicable, ICD- Implantable Cardiac Defibrillator, KQ- Key question, CRT- Cardiac resynchronization, CRT-D- Cardiac resynchronization defibrillator, CRT-P- Cardiac resynchronization pacemaker

Other Results of Interest

Project Name	Results:	
CRT Meta-Analysis Project	Cleland JG, Abraham WT, Linde C, et al. (2013). An individual patient meta-analysis of five randomized trials assessing the effects of cardiac resynchronization therapy on morbidity and mortality in patients with symptomatic heart failure. <i>Eur Heart J</i> ;34(46):3547-56. doi: 10.1093/eurheartj/eh290.	Yes-Excluded(No original data (systematic reviews, meta-analysis, editorial, commentary)
United Kingdom National Institute for Health and Care Excellence (NICE) technology appraisal	National Institute for Health and Care Excellence. (2014). Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure (review of TA95 and TA120). NICE technology appraisal guidance 314. guidance.nice.org.uk/ta314 Document package available at (manufacturer submission is document #13): http://www.nice.org.uk/guidance/ta314/resources/arrhythmias-icds-heart-failure-cardiac-resynchronisation-evaluation-report4	NR(Not relevant to key questions)

NA-Not applicable, ICD- Implantable Cardiac Defibrillator, KQ- Key question, CRT- Cardiac resynchronization, CRT-D- Cardiac resynchronization defibrillator, CRT-P- Cardiac resynchronization pacemaker