thrombus formation in the coronary arteries. Death is not easy to study but consequences of supraventricular tachyarrhythmias can be studied.

**Method:** a retrospective study of serious complications of supraventricular arrhythmias with a high heart rate was performed in patients referred to our clinic for ablation treatment. The study period was from January 1999 to May 2004. The following manifestations of the tachyarrhythmia were included: Syncope, acute left ventricular heart failure (within 24 hours of the start of the arrhythmia), chest pain, and acute myocardial infarction, preexcituted atrial fibrillation with syncope or circulatory collapse.

**Results:** during the study period, 725 ablations were performed to different arrhythmia substrates (AVNRT, WPW, AF, AFL, and EAT). 190 serious manifestations of the arrhythmia were found: 128 (18%) syncpe, 6 (1%) acute left ventricular heart failure, 35 (5%) chest pains, 18 (2.5%) acute myocardial infarction, 3 (0.4%) preexcituted AF with syncope or circulatory collapse.

Summary: during 5.5 years 725 ablations of supraventricular arrhythmias were performed. Serious complications due to a high ventricular heart rate were found in 190 (26%) of the patients. Most common were syncope and chest pain. 18 patients fulfilled the criteria for acute myocardial infarction.

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**402**

**Low-intensity exercise testing for assessment of ventilatory efficiency in heart failure patients under cardiac resynchronization therapy**

O. Baiťa, D. MacCarter, J. Kreuz, B. L. deritz, J.O. Schwab

**Bonn, Germany; University of Bonn, Dept. of Medicine - Cardiology, Bonn, Germany**

**An Evaluation of the efficacy of cardiac resynchronization therapy (CRT) in patients with heart failure (HF) and ventricular conduction delay requires an intense testing programme including the six minute walk test (SMWT), peak exercise testing, and echocardiography. This prospective study evaluated the cardiopulmonary response to low-intensity exercise in order to identify parameters, which may help to simplify the quantification of therapeutic success, and possibly may serve as predictors of mortality in such pts.**

**Methods:** The study group consisted of 10 HF pts. (66±9 yrs; 6 male) with QRS>120 ms who underwent low-intensity exercise at 35 W on a treadmill (LITE-Protocol) with breath-by-breath gas exchange analysis. Stress tests were performed prior to and 3 months post implantation of a biventricular pacing device. The ratio minute-ventilation (VE) to expired carbon dioxide (VC02), a known predictor of mortality in HF pts., was analysed from rest to steady state performing linear regression analysis. In addition, the mean end-tidal CO2 (ETC02), heart rate at steady state (HRss), VE/VC02 ratio at steady state, the distance of the six-minute walk test, and the ejection fraction (EF) were determined.

**Results:** The VE to VC02 ratio in the dynamic phase from rest to steady state decreased significantly with CRT from 42.1±7.9 to 31.9±6.9 (24%; p<0.01). ETC02 (pre: 37.2±11.6 vs. post: 49.6±19.9), HRss (103±18/min vs. 95±7/min) and the VE/VC02 ratio at steady state (38±1.32 vs. 31.8±5.5) did not exhibit a statistically significant difference. During the SMWT (prior to: 303.7±60.2m vs post: 367±50.2m; p<0.05) and the (23.8±4.9% vs. 29.9±6.0%, p<0.05) improved significantly.

**Conclusion:** The VE to VC02 ratio in the dynamic phase of cardiopulmonary response to low-level exercise improves in parallel to the improvement in six minute walk test and left ventricular ejection fraction.

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**403**

**Prevalence and characteristics of ventricular arrhythmias after the initiation of biventricular pacing**


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**Background:** recently, the appearance or worsening of ventricular arrhythmias after receiving biventricular pacing (BVP) has been reported. However, its prevalence and characteristics remain unclear.

**Methods:** this study included 39 patients (pts) with advanced heart failure who underwent BVP (9 women; 63±11 years). At the time of pacemaker implantation, 30 pts were in NYHA functional class III and the remaining 9 were in class IV despite maximal pharmacologic therapy. Twenty-nine pts had dilated cardiomyopathy (DCM), 9 ischemic cardiomyopathy and the remaining patient cardiac sarcoidosis. The left ventricular ejection fraction (LVEF) determined by LV angiography or echocardiography was less than 35%, and the QRS duration was greater than 140 ms in all pts.

**Results:** of the 39 pts that underwent BVP, 3 (8%) showed the appearance of ventricular arrhythmias after receiving BVP (1 woman; LVEF: 26±10%). Recurrent, sustained monomorphic ventricular tachycardia (VT) was documented in 2 pts with DCM, and frequent, monomorphic premature ventricular contractions (PVC) was documented in the remaining patient with ischemic cardiomyopathy. The LV lead was placed in a lateral marginal vein (1) and a posterolateral vein (1).

In the remaining patient, the LV lead was placed surgically on the LV anterolateral portion using an epicardial pacing wire. The right ventricular lead was placed in the apex in all pts. In a patient who demonstrated sustained VT 1 day after the BVP, VT (123bpm; RBBB pattern; left axis deviation) was reproducibly initiated and terminated by programmed electrical stimulation. Concealed entrainment was obtained during pacing from the LV posteroseptum near the mitral annulus where a distinct diastolic potential was recorded during the arrhythmia. Radiofrequency ablation abolished this VT. Another patient with DCM demonstrated a hemodynamically unotolerated VT (194 bpm; LBBB pattern; inferior axis) 60days after the BVP, and he finally received an ICD. In the remaining patient, frequent PVCs appeared 13days after the BVP, but disappeared after changing the antiarrhythmic delay of the pacing mode. At the end of a follow-up period of 20±18 months, they remained in NYHA class II, and none required re-hospitalization due to worsening heart failure.

**Conclusions:** although rare, ventricular arrhythmias can occur after receiving BVP, indicating that changes in the activation pattern may play an important role in the genesis of the arrhythmia. A satisfactory clinical outcome could be obtained with a tailored approach for new-onset ventricular arrhythmias after the BVP.

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**404**

**Is a change in New York Heart Association functional class a valid measure of response to cardiac resynchronization therapy?**

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**Purpose:** cardiac Resynchronization Therapy (CRT) is an evolving therapy for patients with advanced heart failure. In order to prove its efficacy objective measures of response are needed. Improvement in New York Heart Association (NYHA) functional class is often considered a measure of response. We sought to evaluate whether NYHA functional class improvement correlates with other clinical or echocardiographic parameters of response to CRT.

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**MONDAY, 27 JUNE 2005, 14:00-18:00**

**PAPER HALL**

**P1-109**

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**Bonn, Germany; University of Bonn, Dept. of Medicine - Cardiology, Bonn, Germany**

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**Methods:** The study group consisted of 10 HF pts. (66±9 yrs; 6 male) with QRS>120 ms who underwent low-intensity exercise at 35 W on a treadmill (LITE-Protocol) with breath-by-breath gas exchange analysis. Stress tests were performed prior to and 3 months post implantation of a biventricular pacing device. The ratio minute-ventilation (VE) to expired carbon dioxide (VC02), a known predictor of mortality in HF pts., was analysed from rest to steady state performing linear regression analysis. In addition, the mean end-tidal CO2 (ETC02), heart rate at steady state (HRss), VE/VC02 ratio at steady state, the distance of the six-minute walk test, and the ejection fraction (EF) were determined.

**Results:** The VE to VC02 ratio in the dynamic phase from rest to steady state decreased significantly with CRT from 42.1±7.9 to 31.9±6.9 (24%; p<0.01). ETC02 (pre: 37.2±11.6 vs. post: 49.6±19.9), HRss (103±18/min vs. 95±7/min) and the VE/VC02 ratio at steady state (38±1.32 vs. 31.8±5.5) did not exhibit a statistically significant difference. During the SMWT (prior to: 303.7±60.2m vs post: 367±50.2m; p<0.05) and the (23.8±4.9% vs. 29.9±6.0%, p<0.05) improved significantly.

**Conclusion:** The VE to VC02 ratio in the dynamic phase of cardiopulmonary response to low-level exercise improves in parallel to the improvement in six minute walk test and left ventricular ejection fraction.
Methods: data of 99 consecutive patients implanted with CRT were analyzed. All patients had been implanted according to current guidelines. Clinical and echocardiographic parameters were recorded at baseline, and repeated 1-3 months post-implantation. The differences between NYHA functional class (defined as the change in NYHA class post implantation compared to baseline) were calculated and correlated with the changes in each of the other clinical and echocardiographic parameters pre- and post-implantation.

Results: of 99 patients, 51 (51%) had NYHA class improvement, with an average NYHA class decrease from 3.1±0.5 at baseline to 2.7±0.7 post implantation for all patients (P<0.001). This change did not correlate with changes in any of the following echocardiographic parameters: LV systolic (−0.8±5 mm) LV diastolic diameter (−0.1±1.9 mm), LVEF (+0.9%±3.4%), systolic mitral regurgitation (MR) grade (−0.6±1.3), diastolic MR duration (−39±58 msec), mitral wave E/A ratio (−0.2±1.5), E wave deceleration time (27±2.69 msec) and interventricular delay (−18.9±36 msec). Nor was there any correlation with the change in 6 minute walk distance (41±142m). The only significant correlation was between the changes in the NYHA class and the changes in the quality-of-life score, as evaluated by Minnesota Living with Heart Failure (MLHIF) questionnaire (correlation coefficient = 0.7).

Conclusions: there is no correlation between the change in NYHA functional class and multiple objective parameters of response in patients receiving CRT. The only correlation found was with another subjective parameter of response (MLHIF score). These findings suggest the need for a more objective means of evaluation of response to CRT, as subjective measures may be affected by placebo effects and are not necessarily supported by objective measures of response.

405 Influence of intensified medical attention on disease status of heart failure patients with a resynchronization device

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Background: Leiden University Medical Center is conducting a study that closely monitors congestive heart failure (CHF) patients for 1 year to provide insight on development of heart failure decompensation. This knowledge can be used to detect and possibly even predict such episodes. The study design requires close medical monitoring via weekly home nurse visits. The purpose of this analysis was to evaluate the possible biasing impact of these visits on the patient’s heart failure disease state.

Methods: eighteen heart failure patients were closely monitored by weekly nurse home visits. Patients had received Cardiac Resynchronization Therapy (CRT) for 3.3 to 27.5 months (mean 10.4 months) prior to study enrollment so improvements by CRT were already realized. During study monitoring, patients actively recorded weight and blood consumption (17 vs 18 ml/kg/min); ejection fraction (24 vs 25%); NYHA (2.8 vs 2.8), LV systolic (59 vs 59 mm) and diastolic (72 vs 71 mm) diameter; O2 saturation (95 vs 95); weight (84 vs 84 kg); systolic (112 vs 115 mmHg) and diastolic (66 vs 71 mmHg) BP; QOL score (38 vs 42). Heart rate slightly increased from 65±10 to 69±10 bpm (n=17; p=.06). Patient reported orthopnea (18 vs 0%, p=.06) and paroxysmal nocturnal dyspnea (31 vs 0%, p=.01) decreased but other patient symptoms were unchanged.

Conclusions: intensified medical attention by means of weekly nurse home visits to heart failure patients receiving CRT did not change the heart failure status nor impact the quality of life scores after two month of weekly nurse home visits. Weekly home visits by a nurse appeared to have no major biasing placebo effect under the conditions tested.

406 What factors influence hemodynamic improvement after right ventricular to biventricular pacing system upgrade?

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It is still hard to predict hemodynamic effects of biventricular pacing system (BiVp) despite established inclusion criteria for CRT and left ventricular pacing (LVp) techniques. The aim of the study was to find the predictors of acute hemodynamic improvement after right ventricular (RVp) to biventricular pacing system upgrade.

Methods: The study group consisted of 69 patients with permanently implanted BiV pacing system with standard CRT criteria. Hemodynamic effect was determined using impedance cardiography (BioZ; Cardiodynamics). Cardiac Index (CI) and other indirect parameters were determined during 3 min periods of RV and BiV pacing in turn. Correlations were searched among clinical, echocardiographic, ECG and initial hemodynamic parameters and multivariate analysis was performed as well.

Results: Cardiac contractility was higher during BiVp than RVp and LVp: CI (l/min/m²): RVp 2,25±4, LVp 2,20±4, BiVp 2,56±4 [ANOVA LSD p<0,05]. Increase of CI after RV to BiV reprogramming correlated with CI during RVp (r=-0,50 p<0,001), Thoracic Fluid Index (TFI) (r=-0,32 p<0,01) and with difference of CI between RVp vs LVp (r=0,57 p<0,001) and LVp vs BiVp (r=0,30 p<0,05). Values of CI during LVp, BiVp, echocardiographic parameters, NYHA class, RVp-, LVp-, BiVp- QRS durations and axis, and their changes did not correlate with differences of CI during RVp and BiVp. Multivariate analysis showed that only CI during RVp and RVp vs LVp CI difference determined acute hemodynamic effect of BiVp in comparison to RVp.

Conclusions: Increase of CI of RVp to BiVp upgrade depends mainly on cardiac performance during right ventricular pacing and its improvement caused by change from RVp to single site LVp.

407 The relationship of LV ejection fraction and NYHA classification in congestive heart failure patients

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Background: The correlation between left ventricular ejection fraction (LVEF) and NYHA functional classification (NYHA) in patients (pts) with congestive heart failure (CHF) has been reported as variable in many studies.

Methods: NYHA and LVEF were assessed for 1961 consecutive pts (60.1% male; age 72 ± 11.8 years; LVEF 47 ± 15.6%) followed in the St. Jude Medical device database. 52% of the pts had a history of CAD (defined by coronary artery bypass grafting, percutaneous transluminal