amplitude waves, where electric activation of both ventricles are balanced. Endocardial electrical manifestation of the site of origin of VF corresponds to the fragmented signals between myocardial EGM. The fragmentation initially appears in recordings closer to the origin, usually near the septum (His recording) and later in different sites of the heart.

**Conclusions:** The analysis of electrocardiographic and endocardial recordings helps understand the mechanisms of VF.

## 23.2 CARDIAC AUTONOMIC NERVOUS SYSTEM EVALUATION IN PARKINSON DISEASE AND MULTISYSTEM ATROPHY: VALUE OF HRV

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**Introduction:** A protocol for Cardiac Autonomic Nervous System Evaluation (CANSE) was used to quantify the degree of dysautonomia in Parkinson disease (PD) and Multisystem Atrophy (MSA) patients (pts).

**Methods used:** 14 pts, 12 with PD, 2 with MSA and 14 normal controls (NC) studied. Neurological derangement quantified with UPDR III and Hoehn/Yahr scales (HYS). CANSE performed according to the 5-tests Ewing Score (ES) [0–1/10 (normal), 2–4/10 (borderline), 5–10/10 (abnormal)] and with and Heart Rate Variability analysis (HRV), carried out in the time-domain (TD) and frequency-domain (FD), calculated in 5-minutes intervals during sleep and activity from 24h ECG Holter recordings.

**Results:** only for HYS evidenced significantly higher value in MSA as compared with PD ($p < 0.01$). ES was higher in MSA (mean score 5.5) compared with PD (2.88), PD + diabetes (3.66) and NC (1.5). SDNN index and r-MSSD ($p < 0.05$) were abnormal in PD+MSA. Total Power, LF-HF components and LF/HF ratio were abnormal in PD/MSA. Higher ES and HRV abnormality correlated with neurological derangement.

**Conclusions:** CANSE provides accurate assessment of ANS derangement in PD/MDA pts, useful to guide clinical and drugs management.

## 23.3 ELECTROCARDIOGRAPHIC RISK MARKERS IN RELATION TO INTRACORONARY BONE MARROW CELL THERAPY FOR ACUTE MYOCARDIAL INFARCTION

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**Introduction:** The data on ECG risk markers in relation to intracoronary bone marrow cell (BMC) therapy for acute ST-elevation AMI are limited.

**Methods used:** We evaluated whether intracoronary BMC therapy results in changes in ECG risk markers, and whether these risk markers are associated with the BMC therapy induced recovery of LVEF.

**Results:** LVEF changed $4.0 \pm 11.2$ % vs. $-1.4 \pm 10.2$ % from baseline to 6 months in BMC ($n = 40$) vs. placebo ($n = 40$) treatment groups, respectively ($p = 0.03$), in the FINCELL study. BMC therapy had no statistically significant influence on any of the studied ECG risk markers. Baseline lower inferior J-point amplitude and lower inferior ST-segment deviation were statistically significantly associated with the improvement of LVEF in the BMC treatment group (Table).

| | QRS | QTc | Inf. J-point amplitude | Inf. ST-segment deviation |
|---|---|---|---|---|
| ΔLVEF | $r = 0.15$<br>$p = 0.41$ | $r = -0.10$<br>$p = 0.60$ | $r = -0.39$<br>$p = 0.03$ | $r = -0.42$<br>$p = 0.01$ |

**Conclusions:** Intracoronary BMC treatment has neutral effects on the ECG risk markers. Baseline lower inferior J-point amplitude and ST-segment deviation are associated with the improvement of LVEF in patients with ST-elevation AMI who receive intracoronary BMC therapy.

## 23.4 COMPARISON BETWEEN MODIFIED-MOVING AVERAGE AND SPECTRAL TWA METHODS DURING EXERCISE-ECG

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**Introduction:** T wave alternans (TWA) is an electrocardiographic index that reflects dispersion of repolarization often preceding arrhythmic events. The comparison between spectral and modified moving average (MMA)-TWA analysis during cardiac pacing, has showed a trend in the paired relationship. Our study is the first comparing MMA and spectral TWA during exercise ECG.

**Methods used:** We simultaneously assessed spectral and MMA-TWA during exercise-ECG in 47 patients affected by dilated cardiomyopathy (DC) (59.6 % post-ischemic and 40.4 %.idiopatic). Mean age of our study population was $58 \pm 13.8$ years old (83 % male): Mean EF % was $43.3 \pm 9.4$ %.

**Results:** The paired relationship between MMA and spectral TWA showed a lack of significance ($P = 0.8$). Mean MMA-TWA value did not significantly differ among patients with negative or non-negative spectral-TWA results ($P = 0.36$).

**Conclusions:** No correlation between exercise ECG spectral and MMA-TWA was observed in patients affected by DC, suggesting that these two methods possibly detect two different aspects of TWA. Further studies correlating results of exercise-ECG spectral and MMA-TWA to arrhythmic events are needed.

## 23.5 COST-EFFECTIVENESS OF T-WAVE ALTERNANS (TWA) IN THE PROGNOSTIC STRATIFICATION OF HEART FAILURE PATIENTS

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**Introduction:** ICD prevents sudden cardiac death, but it is expensive. Many papers validated TWA in the prognostic stratification of arrhythmic risk in primary prevention patients.

**Objectives:** to evaluate the cost-effectiveness of TWA.

**Methods used:** In 2008–2010, 127 patients with a LVEF $\leq 35\,\%$ underwent TWA test (Cambridge Heart Inc.). The outcome was termed negative or non-negative; non-negative patients underwent ICD implantation. Once the ratio between this number and the all-over number of patients who had had indication for ICD implant was established, we estimated how much the National Health System could save (cost of each procedure € 24,000).

**Results:** The total cost for the patients not eligible as well as for the non-negative TWA patients (57) amounted to € 1,776,000. Should, according to current guidelines, all patients be submitted to implantation, the expense would have been € 3,048,000. Surmising a cost of € 250 for each TWA, cost-saving was € 1,244,500.

**Conclusions:** If the data on prognostic value was confirmed in guidelines, the cost of ICD implants would be reduced considerably and more patients could benefit from the resources.

## 23.6 EXERCISE CAPACITY AND PREVALENCE OF VENTRICULAR ARRHYTHMIAS IN CHILDREN DOING MODERATE SPORT

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**Objectives:** to evaluate the exercise capacity and presence of arrhythmias in children when doing moderate sport. (Table I)

We observed 78 children (64 boys and 14 girls) mean age 13,4 yrs (5,5–18 yrs). All patients underwent exercise treadmill test with evaluation of maximal metabolic workload, maximal achieved heart rate (expressed as max bpm as well as percentage of age predicted maximal heart rate) and pressure response to exercise. Presence of ventricular arrhythmias and their pattern during exercise were also evaluated in all patients.

Applied sports: Volleyball (12 pts, 15,4 %); Football (44 pts, 56,4 %); basketball (5 pts, 6,4 %); Rowing (2 pts, 2,6 %); Athletics (3 pts, 3,8 %); Sport dancing (1pt, 1,3 %); Jockey (1 pt, 1,3 %); Gymnastics Sports (3pts, 3,8 %); Handball (2 pts, 2,6 %); Tennis (1pt, 1,3 %); Racing (1 pt, 1,3 %); Swimming (1 pt, 1,3 %); Fitness (2 pts, 2,6 %)

**Results:** Exercise was very well tolerated by all patients. Mean exercise duration was 12 minutes and 26 seconds. Mean metabolic workload was 15,2 METS. Mean maximal achieved heart rate was 181,1 bpm (103,0 % of age predicted max HR). Mean systolic blood pressure was 142,6 mmHg and diastolic blood pressure – 88,2 mmHg. Exaggerated pressure response was noticed in 9 pts: 2 – regarding SBP ($>160$ mmHg) and 7 – DBP ($>95$ mmHg).

Ventricular arrhythmias was observed in 32 children (41,0 %) mainly class II according Lown scale (3 pts – 3,8 % had ventricular arrhythmias classified as IVA acc Lown sc.). Observed arrhythmias disappeared during stress test in 21 from 32 pts (65,6 %).

**Conclusions:**

1. Benign ventricular arrhythmias, usually disappearing during exercise, were presented in approximately 40 % of children when doing moderate sport
2. In spite of ventricular arrhythmias, children doing moderate sport had excellent exercise capacity.
3. Inappropriate pressure response during exercise was observed in about 1/10 of children doing moderate sport.

## 23.7 RELATIONSHIP BETWEEN THE RENIN-ANGIOTENSIN SYSTEM AND VENTRICULAR ARRHYTHMIAS

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**Introduction:** Changes in the Renin-Angiotensin System (R.A.S.) reduces ventricular arrhythmias (V.A.) mechanisms.

**Methods used:** Human and animal models to study R.A.S. change after the intervention.

**Summary of Results:**

1. Eighty-five (85) patients (p.) with an increase in L.V.M. were given 20 mg of Enalapril (E) for a year. There was a reduction of L.V.M. of 40 % and VA 88 %. The E.F. increased from $45 \pm 5$ to $60 \pm 8$ %.($P < 0.001$).
2. Junction Gaps (J-G) are physiological structures important in myocardial function. Using (J-.G.) in paired myocites, infusion of E. intracellularly showed an increase of J.G. conductivity(G-I) of $106 \pm 3$ % msec. Infusion of angiotensin II(AII) reduced G-I. by 80 %.
3. Infusion I.V. of E. reduced QRS duration,($113 \pm 10$ to $107 \pm 7$ msec.) $P < .005$, QTC and QT dispersion. 20 % showed disappearance of late potentials.
4. Using paired myocites- trabeculae, E. produced hyperpolarization, increase in the amplitude of action potentials and increase of the refractory period. The minimal current intensity required to induce a propagated response was increased. AII produces the opposite.

**Conclusions:** Changes in R.A.S. has a role in reducing V.A. in heart disease.

## 23.8 ACCURACY OF 3D RIGHT VENTRICLE RECONSTRUCTION PERFORMED WITH CARTOSOUND SYSTEMS IN ARRHYTHMOGENIC RIGHT VENTRICULAR CARDIOMYOPATHY

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**Introduction:** Electroanatomical (EA) voltage mapping is increasingly used to detect right ventricle (RV) endocardial low-voltage regions, reflecting fibrofatty myocardial replacement, in patients (pts) with arrhythmogenic right ventricular cardiomyopathy (ARVC). Anyway, this imaging technique, based on point-by-point reconstruction of the 3D virtual anatomy, is time consuming and offers a limited anatomical accuracy. Recently, a new mapping system, integrating 2D intracardiac echo (ICE) and EA 3D mapping (CartoSound™ system – Biosense Webster) has been developed.