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### Gene-based $\beta$ -blocker therapy for long-QT syndrome type 2: comparison between Nadolol and Propranolol

Chisato Okamoto, Takeshi Aiba, Tsukasa Kamakura, Mitsuru Wada, Kenichiro Yamagata, Kohei Ishibashi, Koji Miyamoto, Satoshi Nagase, Takeshi Noda, Kengo Kusano

Japan

**Background:** Nadolol is recently preferred as a specific  $\beta$ -blocker for patients with long-QT syndrome type-2 (LQT2). However, it is still unclear why nadolol is superior than other  $\beta$ -blockers in suppression of QT interval prolongation and subsequent arrhythmias during acute sympathetic stress.

**Methods:** This study enrolled 13 consecutive LQT2 patients (10 female) who had been administered nadolol (30–60mg/day) as a de-novo treatment (n=6) or replaced by other  $\beta$ -blockers such as propranolol (n=5), bisoprolol (n=1) and atenolol (n=1) due to syncope events. Seven patients underwent epinephrine test (bolus:0.1 $\mu$ g/kg follow by continuous injection:0.1 $\mu$ g/kg/min) before (no- $\beta$ -blocker) and after propranolol and switched to nadolol.

**Results:** Epinephrine-test significantly prolonged the QTc interval ( $\Delta$ QTc= +62+/-63ms) at no- $\beta$ -blocker, in contrast, either nadolol (n=7) or propranolol (n=2) completely suppressed, or rather shortened the QTc interval ( $\Delta$ QTc: -64+/-39ms and -92+/-11ms, respectively). Moreover, no significant difference was observed in the  $\Delta$ QTc between propranolol and nadolol. On the other hand, 7 of 13 (54%) had syncope attack in spite of taking  $\beta$ -blockers except nadolol. However, although a short-term follow-up periods (203 (79–352) days), no events occurred and the baseline QTc interval was significantly shortened after nadolol (491+/-39 to 447+/-23ms, p<0.01).

**Conclusions:** Nadolol and propranolol have a similar protective effect against the acute sympathetic stimulation, however, nadolol may have a potent superiority in abbreviation of QTc interval and suppression of arrhythmic events in LQT2.

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### Nonlinear parameters of heart rate variability and detection of high risk patients after myocardial infarction based on artificial intelligence analysis

Branislav Milovanovic, Drasko Furundzic, Tatjana Gligorijevic, Dusica Jovanovic

Serbia

**Background:** Data mining using data driven learning model is widely used in almost all fields of scientific research, including medicine.

**Goal:** The main aim is to assess predictive value of nonlinear parameters of heart rate variability using using classical statistical analysis and artificial intelligence in order to reveal the best approach of analysis.

**Methods:** In our study 1705 patients were included, 286 (16.77%) died from all cardiac causes. We analyzed next nonlinear parameters: Hurst exponent (H), Approximate entropy (ApEn), SD1 index of Poincare plot (SD1), SD2 index of Poincare plot (SD2), Sd1/Sd2 ratio, Alpha 1 index (Alpha 1), Alpha 2 index (Alpha 2), age and gender. All parameters were extracted from Task force system with real beat to beat analysis (Graz, Austria). Multilayer Perceptions (MLP), performing supervised learning technique (backpropagation). The training is performed at 50% of the examples (911) and the model is tested for 910 of the remaining examples.

**Results:** The separately impact of each variable was in values: Hurst exponent (H) (6.9349) Approximate entropy (ApEn) (6,1641), SD1 index of Poincare plot (SD1) (2,5351), SD2 index of Poincare plot (SD2) (16,3996), Sd1/Sd2 ratio (17,5156), 1Alpha 1 index (Alpha 1) (1,9395), Alpha 2 index (Alpha 2) (3,7857), age and gender. Final conclusion was that strongest predictors were Sd1/Sd2 ratio and Sd2 index, practically the same results using survival analysis (Cox regression and Kaplan Meier analysis). Classification on the test sample was unexpectedly accurate with highly reliable discrimination of high risk patients after myocardial infarction and patients without risk.

**Conclusion:** The model-based MLP structure of artificial intelligence is very strong mathematical approach in risk stratification in combination with standard statistical procedures with advantage to create system of analysis without errors.

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### Comparison of the Influences for Autonomic Tone between Cryo-balloon and Hot-balloon Ablation for Paroxysmal Atrial Fibrillation

Satoshi Miyazawa, Seiji Fukamizu, Iwanari Kawamura, Rintaro Hojo, Harumizu Sakurada, Masayasu Hiraoka

Japan

**Background:** Previous studies suggested that cryo-balloon ablation (CBA) for paroxysmal atrial fibrillation (PAF) influences ganglionated plexi (GP) in epicardial fat pad. Therefore, heart rate variability (HRV) changes after procedure. However, the effect for HRV by hot-balloon ablation (HBA) has not been investigated.

**Objective:** The aim of this study is to compare the influences for autonomic tone after CBA and HBA procedure.

**Methods:** Twenty seven patients (68.0 $\pm$ 9.7 year old, 20 male) who performed pulmonary vein isolation (PVI) for PAF and underwent