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Background: The aims of this study were to estimate the prevalence of genetic alterations in *LMNA*, *EMD*, and *SCN5A* genes in iDCM patients and to define the indication to offer this testing.
Methods: We did perform clinical examination (anamnesis, ECG, 24-hours Holter Monitoring, EchoCG, neurologic examination) and molecular genetic investigations (LMNA, EMD, and SCN5A coding areas sequencing) of DNA samples from 72 unrelated Russian iDCM probands. Probands were subdivided into 2 clinical groups: 46 "pure" DCM patients including 10 proband younger 3 years old (group I) and 26 DCM patients with atrial or ventricular arrhythmias and/or conduction block (group II). Genomic DNA sample was isolated from EDTA venous blood by standard methods. For mutation screening, original intronic primers were developed that encompassed the complete coding sequence, the splice sites, and the adjacent areas.
Results: We identified 6 LMNA gene mutations in 6 unrelated families (DCM, 1A; 18 patients) and 1 SCN5A mutation in 1 family (DCM 1E; 2 patients). No mutation in EMD gene was found. In group I, we did find single mutation in LMNA gene in 2-year-old male proband. Diagnostic efficiency of LMNA, EMD, and SCN5A gene analysis was 2.2%. In group II, we did find 5 LMNA mutations in 5 probands (20%) and 1 SCN5A mutation in 1 proband (4%). The cardiac features were similar in patients with mutations in DCM 1A and DCM 1E genes. Most of the patients (93%) had various rhythm and conduction defects except one 2-year-old patient. The prevalence and intensity of arrhythmias were age dependent and had increased with age. The various degrees of conduction defects were observed in 87%, atrial fibrillation in 59%, PM or ICD implanted in 57%; ventricular arrhythmias in 34%. All ascertained arrhythmias were stably resistant for drug treatment, and about 28% patients died suddenly despite medication. Patients with mutations in these genes are resistant for antiarrhythmic drugs and could be rate as candidate for interventional treatment. Only LMNA mutations carriers had clinical manifestation of muscular weakness (56%) and flexor contractures (12%).
Conclusion: We suppose that genetic screening of LMNA and SCN5A genes with following medical genetic counseling could be reasonable for Russian patients with combination of iDCM, conduction system diseases with or without muscular involvement . Analysis of the LMNA, EMD, and SCN5A genes as routine diagnostic procedure for "pure" DCM patients seems to be controversial.

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O39

Discrimination of coronary artery disease patients by means of heart rate variability analysis during exercise stress testing

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Background: The purpose of this study is to identify patients with coronary artery disease (CAD) by means of the instantaneous power and frequency of heart rate variability (HRV) components during stress testing.
Methods: A database of treadmill stress testing was analyzed including the recordings of 78 patients with CAD (positive coronary angiography), 48 patients with low risk of a cardiac event (Framingham index <5%), and 66 asymptomatic volunteers. First, an integral pulse frequency modulation model with time-varying threshold was used to estimate the HRV signal. Second, the instantaneous power and frequency of the low-frequency (LF) and high-frequency (HF) HRV components were derived using a parametric decomposition of the Smoothed Pseudo Wigner Ville distribution, which makes use of respiratory information, which was indirectly derived from the ECG. Third, a Wilcoxon rank sum test was used to compare every pair of study groups regarding indices derived from the power and frequency of the LF and HF components at different time instants: the first minute of the exercise (nr), 3 minutes before peak stress (n1), 1 minute before peak stress (n2), 1 minute after peak stress (n3), and 3 minutes after peak stress (n4). Fourth, a linear discriminant analysis was applied to classify subjects in every pair of study groups.
Results: The null hypothesis of equal medians between the CAD and low-risk groups is rejected ($P < .01$) for indices derived from the HF power at n1, n3, and n4; the LF power at n1, n2, and n3; and the HF frequency at n1 and n2. A linear discriminant analysis classified patients in the CAD and low-risk groups with a sensitivity of 75% and a specificity of 63% with only 1 variable and with sensitivity of 81% and specificity of 79% with 4 variables.
Conclusion: Indices derived from HRV analysis during exercise stress testing may improve the diagnosis of CAD.

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O40

High-resolution electrocardiogram for evaluation of heart function during exposure to subacute hypobaric hypoxia

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Background: High-altitude climbing presents a wide spectrum of health risks, including exposure to hypobaric hypoxia. Risks are also typically exacerbated by the difficulty in appropriately monitoring for early signs of organ dysfunction in remote areas. We investigated whether high-resolution advanced electrocardiogram (ECG) analysis might be helpful as a noninvasive and easy-to-use tool (eg, instead of Doppler echocardiography) for evaluating early signs of heart overload in hypobaric hypoxia.
Methods: Nine nonacclimatized healthy trained alpine rescuers (age, 43.7 ± 7.3 years) climbed in 4 days to the altitude of 4200 m on Mount Ararat. Five-minute high-resolution 12-lead ECGs were recorded (Cardiosoft) in each subject at rest in the supine position on different days but at the same time of day at 4 different altitudes: 400 (reference altitude), 1700, 3200, and 4200 m. Changes in conventional and advanced resting ECG parameters, including in beat-to-beat QT and R-R variability, waveform complexity, signal-averaged, high-frequency, and spatial/spatiotemporal ECG, was estimated by calculation of the regression coefficients in independent linear regression models. A P value of less than .05 was adopted as statistically significant.
Results: As expected, the R-R interval and its variability both decreased with increasing altitude, with trends $k = -96$ milliseconds/1000 m with $P = .000$ and $k = -9$ milliseconds/1000 m with $P = .001$, respectively. Significant changes were found in P-wave amplitude, which nearly doubled from the lowest to the highest altitude ($k = 41.6$ μV/1000 m with $P = .000$), and nearly significant changes in P-wave duration ($k = 2.9$ milliseconds/1000 m with $P = .059$). Changes were less significant or nonsignificant in other studied parameters including those of waveform complexity, signal-averaged, high-frequency, and spatial/spatiotemporal ECG.
Conclusion: High-resolution ECG analysis, particularly of the P wave, shows promise as a tool for monitoring early changes in heart function due to exposure to high altitude.

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The prognostic capacity of clinically indicated exercise test is enhanced by combined analysis of exercise capacity, heart rate recovery and T-wave alternans