

# CORONARY ARTERY DISEASE RISK STRATIFICATION BY THE METHOD OF PHASEGRAPHY BASED ON SINGLE CHANNEL ELECTROCARDIOGRAPHY

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**Background.** Phasegraphy – the innovative method for analysis and interpreting of electrocardiogram (ECG), allowing broadening the range of diagnostic parameters, indicative for the initial pathological processes in the heart. The principal feature of this method – the reliable assessment of the specific diagnostic parameter  $\beta T$  based on real-time ECG. The  $\beta T$  is attributable to the symmetry of T-wave, and assessed by the construction of ECG phase «portrait» on the phase plane in coordinates  $z(t), \dot{z}(t)$ , where  $\dot{z}(t)$  is a velocity of change of the heart electrical activity signal. Nowadays insufficient evidence is available on the clinical application of  $\beta T$  to detect the populations with the high risk of coronary artery disease (CAD).

**Purpose:** to establish the patterns of  $\beta T$  values in the general population, examined in the scope of primary care screening for pathologic conditions and disorders, stratify the studied population into CAD risk groups, and determine the diagnostic value of  $\beta T$  to detect the CAD high-risk (HR) group.

**Methods.** We ruled out the program of planned primary care screening for pathologic conditions and disorders, covered 590 persons (410 [69,5%] males; age <30 ys [n=85 (14,4%)]; 31-60 ys [n=423 (71,7%)] and  $\geq 61$  ys [n=82 (13,9%)]). We studied the clinical and conventional laboratory parameters. CAD was verified according to the current guidelines. The conventional 12-lead ECG was performed. The  $\beta T$  was assessed by the method of phasegraphy based on single channel ECG.

**Results.** According to the  $\beta T$  value, the studied population was stratified into three CAD risk groups: 1) «low» risk (n=103 [17,4%];  $\beta T < 0,7$  units [u]) (LR); 2) «intermediate» risk (n=424 [71,9%];  $0,7 \leq \beta T \leq 1,05$  u); and 3) «HR» (n=63 [10,7%];  $\beta T > 1,05$  u). The conventional time domain ECG did not allow differentiating the LR and HR groups. On the contrary, the construction of ECG phase «portrait» on the phase plane in coordinates  $z(t), \dot{z}(t)$  enabled to distinguish the LR and HR ECG patterns. The frequency of CAD in HR group was significantly higher comparing with LR group: 30% vs. 4%, respectively ( $p < 0,001$ ). The HR group was also significantly associated with the conventional ECG T-wave changes, strongly indicating the suspected myocardial ischemia: 86% vs. 54% in LR group, respectively ( $p = 0,006$ ). The conventional cardiovascular risk factors, including age, blood pressure and total serum cholesterol level, were more pronounced in HR group comparing with LR group. The sensitivity of  $\beta T > 1,05$  u for discrimination the CAD high vs. «non-high» risk status was 93,3%, specificity – 93,4%.

**Conclusion.** The method of phasegraphy allows to assess of  $\beta T$ , which broaden the diagnostic value of conventional ECG and could be used as a simple and reliable tool for the screening of myocardial ischemia. In case of  $\beta T > 1,05$  a person is assigned to the CAD high-risk group and has to be comprehensively examined without any delay, and also to be appropriately followed-up.