

## Quantification of left ventricular regional functions using ECG-gated myocardial perfusion SPECT —Validation of left ventricular systolic functions—

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**Objective:** We have developed a program to quantify regional left ventricular (LV) function and wall motion synchrony using ECG-gated myocardial perfusion SPECT (MPS). This preliminary study was undertaken to validate the use of this program for estimating regional LV systolic function. **Methods:** Patients were subjected to MPS by  $^{99m}\text{Tc}$ -sestamibi at rest. The study included 20 patients who were confirmed to have a low probability of coronary artery disease (LPG; low probability group), 19 heart disease patients who were examined by MPS and equilibrium radionuclide angiography (ERNA) (ERG; ERNA group), and 24 patients who were examined by MPS and 2-dimensional echocardiography (2DE) (2DEG; 2DE group). The values of the ejection fraction (EF) and peak ejection rate (PER) were estimated. The global functions evaluated by this program were compared with those obtained by ERNA in the ERG. For regional assessment, the reference values of the functional indices were obtained for 17 LV segments in LPG. The Z score, (reference average value of the segment – patient's value of the segment)/reference standard deviation of the segment, was used for the evaluation of regional functions; a score equal to or greater than 2 was defined as abnormal. Semiquantitative visual interpretation of 2DE was used as the standard to assess wall motion. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of these criteria and the relationship between 2DE grading and Z scoring were validated in 2DEG. **Results:** The values of the global EF and PER evaluated by this program correlated with those determined by ERNA ( $r = 0.76$  and  $0.58$ , respectively;  $p < 0.005$  and  $0.01$ , respectively). The sensitivities of regional EF and PER for segmental wall motion abnormalities were  $86.7\%$  and  $68.7\%$ , respectively; their specificities were  $86.7\%$  and  $95.5\%$ , respectively; their PPVs were  $64.3\%$  and  $79.2\%$ , respectively; and their NPVs were  $96.0\%$  and  $91.7\%$ , respectively. The Z scores of these indices significantly correlated with the scores determined by 2DE ( $r_s = 0.70$  and  $0.68$ , respectively;  $p < 10^{-10}$ ). **Conclusion:** The potential of this program to quantify the regional systolic function was validated.

**Key words:** gated myocardial perfusion SPECT, quantitative analysis, left ventricle, regional function