

A trial for the quantification of regional myocardial blood flow with continuous infusion of Tc-99m MIBI and dynamic SPECT

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We propose a new method to quantify regional myocardial blood flow (rMBF) by continuous infusion of Tc-99m MIBI and dynamic SPECT.

Methods: Five patients with old myocardial infarction were studied. During continuous infusion of MIBI (approximately 740 MBq) with a syringe pump in 10 min, dynamic SPECT scan was performed every minute and lasted 20 min after the start of infusion to identify myocardial uptake of MIBI. Input function was obtained from the radioactivity in the left ventricle (LV) in dynamic SPECT images. Spillover fraction between LV and myocardium (M) was corrected with phantom data. The influx constant (Ku) was calculated by Patlak plot graphical analysis, and compared with rMBF measured by PET (F) with N-13 ammonia based on Patlak plot analysis with correction for the extraction fraction. To correct the limited first-pass extraction of MIBI, linearization correction by means of the permeability-surface area (PS) product value was also applied. **Results:** Spillover fractions of MIBI were 0.169 ± 0.056 from LV to M, and 0.042 ± 0.021 from M to LV. Ku was well correlated with F ($Ku = 0.057 + 0.220F$, $r = 0.83$, $p < 0.01$) and the slope and correlation were improved after linearization ($F_{MIBI} = -0.131 + 0.858F$, $r = 0.94$, $p < 0.01$). **Conclusion:** The proposed method has the potential to be a clinically feasible tool for quantitative measurement of rMBF.

Key words: continuous infusion, dynamic SPECT, graphical plot, myocardial blood flow, quantification