

**Functional evaluation of myocardial viability
by ^{99m}Tc tetrofosmin gated SPECT
—A quantitative comparison with ^{18}F fluorodeoxyglucose
positron emission CT (^{18}F FDG PET)—**

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To validate functional analysis of gated SPECT in detecting myocardial viability, seventeen patients (male 15, female 2, mean age 58) with angiographically proven chronic ischemic heart disease (RCA 6, LAD 10, LCX 1) and eight normal volunteers (all male) were studied. All patients underwent ^{18}F FDG PET and ^{99m}Tc tetrofosmin (TF) gated SPECT within a week. After being displayed in a polar map, myocardial perfusion was regionally determined by the mean count in 9 segments at end diastole (ED) and end systole (ES) in gated SPECT. Systolic function was determined by the count increase ratio from ED to ES (WTI: $\text{ES} - \text{ED}/\text{ED}$). Glucose metabolism was assessed by ^{18}F FDG PET in the segments correspondent to those defined for SPECT. TF %uptake of $< 60\%$ was defined as hypoperfusion, and FDG %uptake of $< 50\%$ was defined as reduced glucose metabolism. Results: The myocardial segments were classified into 3 categories: “normal” perfusion ($n = 85$), “mismatch” (reduced perfusion with reserved FDG uptake, $n = 25$) and “matched” reduced perfusion and metabolic reduction ($n = 26$). Mean WTI in “mismatch” segment was 0.38 ± 0.21 , and was significantly greater than that in “matched reduced” segments, 0.15 ± 0.20 ($p < 0.001$). It was also greater than that in “normal” segments, 0.27 ± 0.16 . Regression analysis showed that association between WTI and FDG %uptake was significant ($r = 0.57$, $p < 0.0005$) for the ischemic segments (“mismatch” + “matched”, $n = 51$), but the association was weak for the entire segments although it was statistically significant ($r = 0.26$, $p = 0.02$, $n = 136$). Conclusion: For the segments determined as infarct by perfusion image, systolic functional analysis by gated SPECT is helpful in differentiation of a viable myocardial region or artifact from a scar. Nevertheless, further clinical and technical assessment is required for ECG gating to eliminate overestimation of viability and to warrant clinical use.

Key words: myocardial viability, gated SPECT, positron emission tomography (PET), ^{99m}Tc tetrofosmin, ^{18}F FDG (fluorodeoxyglucose)