The valve uptake index: a new measure in [18F]FDG PET/CT for the diagnosis of prosthetic valve endocarditis

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Background: Diagnosis of PVE by PET/CTA is based on visual and quantitative evaluation of morpho-metabolic features. The FDG uptake pattern is a main diagnostic criterion, but can be visually unclear and susceptible to subjectivity. The valve uptake index (VUI) is a new measure designed to provide a more objective indication of the distribution of metabolic activity.

Purpose: To validate the diagnostic accuracy of the valve uptake index (VUI) (SUVmax-SUVmean)/SUVmax, in patients with suspicion of prosthetic valve endocarditis (PVE). To establish a cut-off value that allows diagnosis of infection. Finally, to determine the incremental value of adding the VUI to the classic parameters for the diagnostis of PVE by PET/CT.

Methods: Retrospective analysis of 122 patients, with a conclusive diagnosis of definite or rejected PVE and who had undergone a cardiac PET/CTA scan. We measured the VUI and recorded the SUVmax, SUVratio, uptake pattern and the presence of endocarditis-related anatomic lesions. The diagnostic accuracy of these parameters was calculated.

Results: The VUI values were 0.54±0.1 vs. 0.36±0.08 in the definite PVE group vs. the rejected group, respectively (mean±SD; $p<0.001$). A cut-off value of VUI$>$0.45 showed a sensitivity, specificity and diagnostic accuracy for PVE of 85%, 90.3% and 87.4%, and significantly increased diagnostic ability for confirming endocarditis when combined with the standard diagnostic criteria.

Conclusions: The VUI had good diagnostic accuracy for PVE. The diagnostic power of currently used morphometabolic parametersis significantly increased by the addition of the VUI. Integration of the VUI in the diagnostic algorithm may clarify doubtful cases, and improve the diagnostic yield of PET/CTA.