PISCOM

Perissinotti et al. present a modified version of the SISCOM procedure that uses interictal PET instead of interictal SPECT for seizure onset zone localization. Perissinotti et al. called this new nuclear medicine imaging processing technique PISCOM (PET interictal subtracted ictal SPECT coregistered with MRI).

They retrospectively studied 23 patients (age range 4-61 years) with medically refractory epilepsy who had undergone MRI, ictal SPECT, interictal SPECT and interictal FDG PET and who had been seizure-free for at least 2 years after surgical treatment. FDG PET images were reprocessed (rFDG PET) to assimilate SPECT features for image subtraction. Interictal SPECT and rFDG PET were compared using statistical parametric mapping (SPM). PISCOM and SISCOM images were evaluated visually and using an automated volume of interest-based analysis. The results of the two studies were compared with each other and with the known surgical resection site.

SPM showed no significant differences in cortical activity between SPECT and rFDG PET images. PISCOM and SISCOM showed equivalent results in 17 of 23 patients (74%). The seizure onset zone was successfully identified in 19 patients (83%) by PISCOM and in 17 (74%) by SISCOM: in 15 patients (65%) the two techniques showed concordant successful results. The volume of interest-based analysis showed no significant differences between PISCOM and SISCOM in identifying the extension of the seizure onset zone. However, PISCOM showed a lower amount of indeterminate activity due to propagation, background or artefacts.

Preliminary findings of this initial proof-of-concept study suggest that perfusion and glucose metabolism in the cerebral cortex can be correlated and that PISCOM may be a valid technique for identification of the seizure onset zone. However, further studies are needed to validate these results [1)]

Children with drug-resistant focal epilepsy have a compromised quality of life. Epilepsy surgery can control or significantly reduce the seizures. Aparicio et al. assessed and compared the usefulness of PISCOM, with SISCOM and 18F-FDG PET (FDG-PET) in pre-surgical evaluation of paediatric drug-resistant focal epilepsy.

Twenty-two children with pharmcorefractory epilepsy, mainly extratemporal, who had undergone pre-surgical assessment including SISCOM and FDG-PET and with postsurgical favorable outcome (Engel class I or II) for at least two years, were included in this proof-of-concept study. All abnormalities observed in SISCOM, FDG-PET and PISCOM were compared with each other and with the known epileptogenic zone (EZ) based on surgical treatment, histopathologic and surgical outcome results. Global interobserver agreement, Cohen's Kappa coeficient and PABAK statistic were calculated for each technique.

ISCOM concordance with the known EZ was significantly higher than SISCOM ($p<0.05$), and no statistically differences were found with FDG-PET. PISCOM showed successful identification in 19 of 22 cases (86%), successful concordant with FDG-PET in 17 (77%), and SISCOM in 11 (50%). If we consider PISCOM and FDG-PET results together, both techniques successfully localized the known EZ in all cases. The measures of agreement between two experts in nuclear medicine were higher in PISCOM than in SISCOM and FDG-PET.

PISCOM could provide complementary presurgical information in drug-resistant paediatric focal epilepsy, particularly in cases in which FDG-PET is doubtful or negative, replacing SISCOM and sparing the use of interictal SPECT [2)]

[1)]

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[2)]

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