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Abstracts

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Impact of the reconstruction method in the localization of the seizure onset by SISCOM in drug-resistant epilepsy

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Aim: The goal of neuroimaging in epilepsy is to localize the region of seizure onset. Ictal-interictal subtraction SPECT with MRI co-registration (SISCOM) has proven to be a valuable tool in localizing the epileptogenic focus. However, there is still a lack of standardization regarding SPECT images processing. The aim of this study is to determine the clinical impact of different SPECT reconstruction parameters in this patient group. **Methods:** We retrospectively studied 15 cases (6 male, median age 37±10 years). Each patient underwent an ictal and interictal SPECT, MRI, video-EEG and PET. SPECT images were acquired using a Philips Skylight SPECT/CT (Philips). Ictal injection of the radiopharmaceutical (74 MBq of 99mTc-HMPAO) was done manually in the first 25 seconds from the beginning of the epileptic seizure. Data was processed using 12 standard reconstructions: filtered Back-Projection method (FBP) with a butterworth filter of power 6 and cutoff frequency 0.35 (BF6,0.35); OSEM with 2 iterations, 10 subsets (OSEM2,10) using BF6,0.5 or BF10,0.5; OSEM6,8 using BF6,0.5 or BF10,0.5; and OSEM8,16 with BF10,0.3. All data was reconstructed with and without Chang's attenuation correction (AC). Ictal and interictal co-registrations with MRI were performed using SPM12 and the subtraction using our in-house software (with python 3.6). SISCOM visual analysis was performed with a z-score threshold of 2. Additionally, z-scores were computed for each anatomical region from the AAL atlas. A blind review of each image was performed by an experienced neurologist. SISCOM localization was compared with the hypothesis of seizure onset obtained using the other techniques, and whenever possible, to the post-surgical evolution. Additionally, the physician selected the most visually appealing reconstruction in each case, based on lesion conspicuity and background noise. **Results:** OSEM2,10 AC with BF10,0.5 or BF6,05 or OSEM6,8 BF6,0.5 presented the most concordant results in 83% of the patients. OSEM8,16 BF10,0.3 only presented concordant results in 25% cases and FBP BF6,0.35 only in 44% cases. Chang AC improve the mean concordance of all reconstructions (73% vs 64%). OSEM2,10 AC BF6,0.5 was selected as the most visually appealing reconstruction in 85% cases. The use of AC reduces the z-score maximums (mean value 5.2 vs 4.7). Differences up to 19% were found in the variations of maximum z-scores per patient. **Conclusions:** Reconstruction parameters play an important role in the correct localization of the epileptogenic focus. According to our results, standardization is necessary to find the parameters that more precisely locate the epileptogenic focus.