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Analysis of epileptogenic changes detected in the PET/CT, EEG and MRI studies and their correlation with post-surgical outcomes

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Aim: The aim of the study is to compare the amount of epileptogenic foci found in EEG and PET/CT; determine most common localizations of epilepsy focal points in both functional and structural imaging methods; determine the success rate of surgery in the operated patients when the focal points of epilepsy coincided in all three imaging methods and; verify the concordance between the location of epileptogenic focal points found in EEG and PET/CT studies.

Methods: We studied a group of 35 patients with clinically proven refractory epilepsy. All patients underwent an MRI, fluorodeoxyglucose-18-PET scan, and an EEG. 14 patients underwent neurosurgical operation with removal of epileptogenic foci. Assessment of normality was verified by the Kolmogorov-Smirnov and Shapiro-Wilk tests. The Wilcoxon signal criteria were used to compare the two dependent samples whose data did not match the normal distribution. Concordance was evaluated by using Cohen's kappa (κ).

Results: PET/CT lesion quantity Sig. $p<0.05/p<0.05$; EEG epileptogenic foci quantity Sig. $p<0.05/p<0.05$. According to Wilcoxon signed ranks test we can make assertion that there is a statistically significant difference between the number of epileptogenic foci found in PET/CT and EEG studies (Sig. $0.021<0.05$). Most common localization for epileptogenic activity in all three methods was temporal lobe (39.6-48.6%). 10/14 patients who underwent surgery demonstrated excellent postsurgical outcomes, with no epileptic seizures; 3/14 patients had 1-2 seizures after surgery and 1/14 patient had same or more epileptic seizures. Measure of agreement kappa value was 0.637; asymptotic standardized errora was 0.096; approximate Tb was 6.253; approximate significance was <0.005.

Conclusion: Surgical treatment may offer high hope for patients with intractable epileptic seizures. PET/CT is extremely useful imaging method to assist in the localization of epileptogenic zones. The dynamic functional information that brain PET/CT provide is highly complementary to anatomical imaging in MRI and functional information in EEG.

Recent Publications

1. Fisher R S, Acevedo C, Arzimanoglou A, Bogacz A, Cross J H, Elger C E et al. (2014) ILAE official report: A practical clinical definition of epilepsy. Epilepsia 55(4):475–82.
2. Murray C J, Vos T, Lozano R, Naghavi M, Flaxman A D, Michaud C et al. (2012) Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 380:2197–223.
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4. Roy T and Pandit A (2011) Neuroimaging in epilepsy. Annals of Indian Academy of Neurology 14(2):78-80.
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Biography

Tomas Budrys is a Radiologist working in the University Hospital at the Department of Radiology specializing in Nuclear Medicine and Neuroradiology. He is specialized in Nuclear Medicine and Neuroradiology. Tomas Budrys is a last year Doctoral student working as a Lecturer for more than three years, teaching students and residents. He has published three articles with Clarivate Analytics indexing. Currently, he is developing new radiology journal and maintaining many websites associated with radiology. Tomas Budrys research interests include medical physics, neuroradiology, nuclear medicine and safety in radiology. He is also a Member of the organizations like RSNA (Radiological Society of North America), ESR (European Society of Radiology) and LRA (Lithuanian Radiology Association).

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