

Epilepsy is one of the most common neurological disorders with prevalence 0,5 to 1 %. Considerable number of patients (particularly children) suffers from intractable focal epilepsy caused by focal cortical dysplasia (FCD) – a localized malformation of cortical development. The only treatment option in these patients remains resective epilepsy surgery. Its goal is to remove the epileptogenic zone (EZ) defined as the area of the cerebral cortex that is indispensable for the generation of epileptic seizures.

There is currently no exclusive diagnostic test for localizing EZ localization; the localization hypothesis is based on combination of more diagnostic methods. Neuroimaging methods (especially magnetic resonance imaging - MRI) are crucial for localizing EZ; however, functional neuroimaging methods analyzing different functional aspects of the brain tissue can be equally important. The goal of this PhD study is to analyze value of functional neuroimaging methods (especially SPECT and SISCOM respectively and FDG-PET) for the EZ localization in patients with focal intractable epilepsy. In the first presented study we analyzed value of ictal SPECT examination for the EZ localization in a large cohort of pediatric patients with FCD operated on in Miami Children's Hospital, Florida. The study proved that complete surgical removal of SPECT hyperperfusion zone strongly predicts favorable postsurgical patients outcome. We also demonstrated that ictal SPECT is as important for the EZ localization as the combination of MRI and intracranial EEG. The study did not prove practical localization value of subcortical SPECT activations. In the second presented study we assessed the value of SISCOM and FDG-PET for the EZ localization in patients with focal intractable epilepsy and normal MRI finding.