Deep brain stimulation for focal epilepsy

see also Deep brain stimulation for epilepsy.

DBS of the bilateral anterior nucleus of the thalamus is an Food and Drug Administration-approved, safe, and efficacious treatment option for patients with refractory focal epilepsy

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The pulvinar has remained largely unstudied as a neurostimulation target to treat refractory epilepsy. Because the pulvinar has connections with the posterior quadrant, neurostimulation may be effective if applied to seizures originating in this area. Burdette et al. performed a retrospective chart review of patients with regional neocortical epilepsy onsets in the posterior quadrant treated with Responsive neurostimulation. Demographics, epilepsy history, clinical seizure frequencies, and neuropsychological testing results were obtained from the chart. Electrocorticogram (ECoG) records stored by the RNS System were reviewed to evaluate electrographic seizure onset patterns. The patients were followed for 10, 12.5, and 15 months. All patients were responders (≥50% seizure reduction), and two of the three patients experienced a ≥90% reduction in seizures at the last follow-up. Pre- and postsurgical neuropsychological evaluations were compared for two of the patients, and there was no evidence of cognitive decline found in either patient. Interestingly, mild cognitive improvements were reported. The third patient had only postimplant neuropsychological testing data available. Findings for this patient suggested executive dysfunction that was present prior to the RNS System which did not worsen with surgery. A visual inspection of ECoGs revealed near-simultaneous seizure onsets in neocortical and pulvinar leads in two patients. Seizure onsets in the third patient were more variable. This is the first published report of brain-responsive neurostimulation targeting the pulvinar to treat refractory regional onset epilepsy of posterior quadrant origin [1].

Following electrode implantation, a subgroup of patients treated with deep brain stimulation (DBS) for focal epilepsy exhibits a reduction of seizure frequency before stimulation is initiated. Microlesioning of the target structure has been postulated to be the cause of this “insertional” effect (IE) [2].

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Burdette D, Mirro EA, Lawrence M, Patra SE. Brain-responsive corticothalamic stimulation in the pulvinar nucleus for the treatment of regional neocortical epilepsy: A case series. Epilepsia Open. 2021 Sep;6(3):611-617. doi: 10.1002/epi4.12524. Epub 2021 Aug 3. PMID: 34268893; PMCID: PMC8408587.
2)
Thuberg D, Buentjen L, Holtkamp M, Voges J, Heinze HJ, Lee H, Kitay AY, Schmitt FC. Deep Brain Stimulation for Refractory Focal Epilepsy: Unraveling the Insertional Effect up to Five Months Without Stimulation. Neuromodulation. 2021 Feb 12. doi: 10.1111/ner.13349. Epub ahead of print. PMID: 33577139.