Neuromodulation for Epilepsy

Neuromodulation can be an option, especially when epilepsy surgery is not possible or did not lead to seizure freedom. Epilepsy is associated with reduced quality of life (QoL), which heavily depends on seizure control.The most recent Cochrane reviews have shown that vagus nerve stimulation and deep brain stimulation of the anterior nucleus of the thalamus, lead to a responder rate OR of, respectively, 1.93 and 1.20. The question arises if neuromodulation for drug-resistant epilepsy (DRE) will be more cost-effective than sole treatment with ASM. A study aims to determine the change in QoL after neuromodulation. Secondarily, they will aim to study the cost-effectiveness of these treatments.

Methods and analysis: This prospective cohort study aims at including 100 patients aged 16 or above who will be referred for neuromodulation, from January 2021 to January 2026. After informed consent, QoL and other relevant parameters will be assessed at baseline, 6 months, 1, 2 and 5 years after surgery. Data on seizure frequency will be derived from patient charts. We expect that DRE patients will report better QoL after neuromodulation. Even if they would still report seizures, the treatment can be seen as useful. This is especially true when patients can participate in society again to a greater extent than before treatment.

Ethics and dissemination: The board of directors of participating centres all gave permission for this study to commence. The medical ethics committees decided that this study does not fall under the Medical Research Involving Human Subjects Act (WMO). The findings of this study will be presented at (inter)national conferences and in peer-reviewed journals.

Trial registration number: NL9033 [1].

Three neuromodulation therapies, all using implanted device and electrodes, have been approved to treat adults with drug-resistant focal epilepsy, namely, the vagus nerve stimulation for drug-resistant epilepsy. in 1995, deep brain stimulation of the anterior nucleus of the thalamus (ANT-DBS) in 2018 (2010 in Europe), and responsive neurostimulation (RNS) in 2014.

Several palliative neuromodulation treatment modalities are currently available for adjunctive use in the treatment of medically intractable epilepsy. Over the past decades, a variety of different central and peripheral nervous system sites have been identified, clinically and experimentally, as potential targets for chronic, nonresponsive therapeutic neurostimulation. Currently, the main modalities in clinical use, from most invasive to least invasive, are anterior thalamus deep brain stimulation, vagus nerve stimulation, and trigeminal nerve stimulation. Significant reductions in seizure frequency have been demonstrated in clinical trials using each of these neuromodulation therapies [2].

Deep brain stimulation for drug-resistant epilepsy

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2)
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