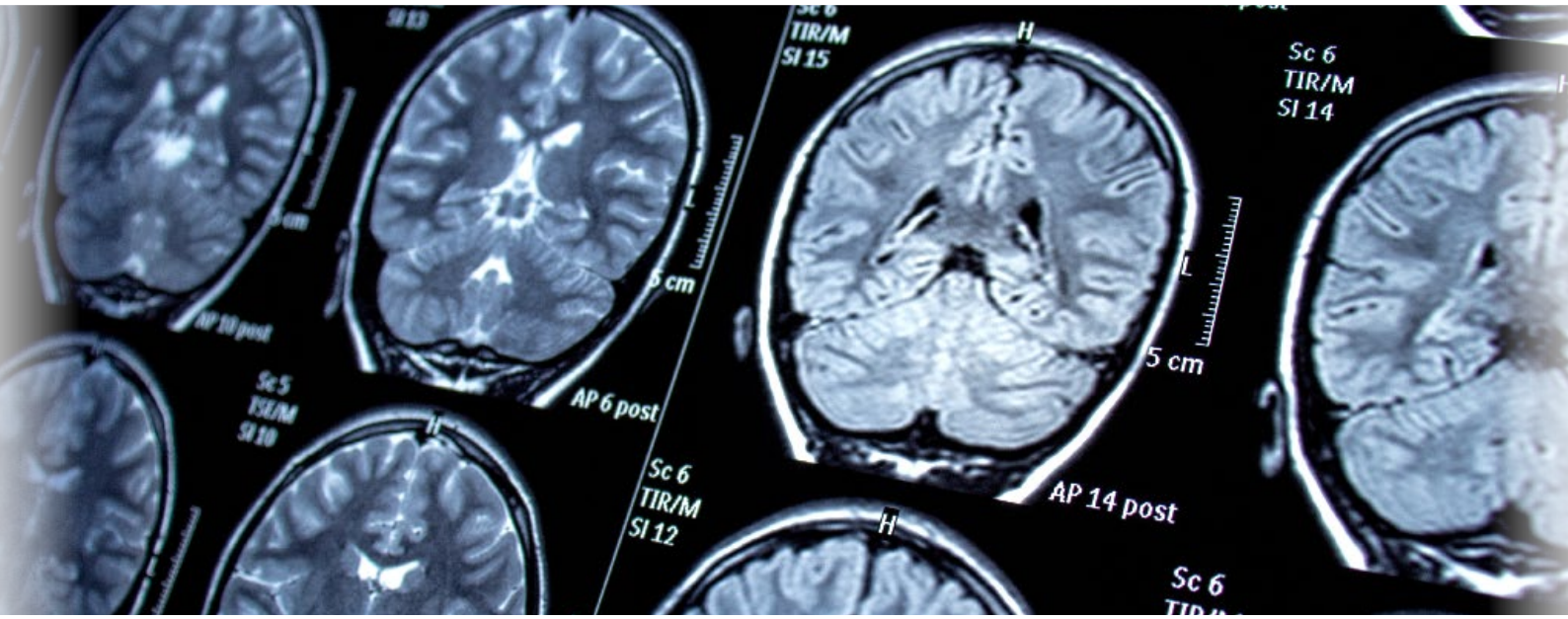
MASARYK UNIVERSITY

Method for Prediction of Clinical Response to VNS Therapy in Epileptic Patients

A statistical model for predicting the effectiveness of VNS based on the analysis of conventional EEG recordings.

Resective surgery is currently the best therapeutic option for the treatment of patients with drug-resistant epilepsy. However, there is still a substantial amount of intractable patients, who are not eligible for resective surgery or in whom resective surgery fails to abolish seizures. Chronic vagal nerve stimulation (VNS) is a well-established palliative method, introduced into the treatment of drug-resistant epilepsy in 1994.



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CHALLENGE

It rarely results in complete seizure freedom (~ 5 % of treated subjects), but offers the possibility for substantial (i.e. ≥ 50 %) seizure reduction in approx 50-60 % of patients. On the other hand, the seizure frequency remains unchanged in about 25 % of patients on VNS therapy.

A reliable method of identification of patients who would profit from VNS therapy would bring substantial benefits in patient selection, minimization of useless surgery procedures, and reduction of financial expenses. Unfortunately, currently, there is no method available for the prediction of the individual efficacy of this treatment prior to the implantation of the VNS device. Recently, several authors aimed to identify predictors of VNS outcomes. Despite a significant effort, clinical predictors of individual responsiveness to VNS therapy are still elusive.

TECH OVERVIEW

The invention is a non-invasive prognostic method for patients suffering from epilepsy, which is based on the analysis of data from routine paraclinical examination of patients with epilepsy (standard EEG recording), therefore there is no increased burden on the patient during the examination. This method allows us to predict with high reliability whether patients will belong to the group of so-called future responders or non-responders, i.e. patients sensitive or unresponsive to vagus nerve stimulation (VNS).

Patients with drug-resistant epilepsy may be implanted with a chronic vagus nerve stimulator (VNS) as part of their treatment. In approximately 50 % of patients, VNS has a good effect, seizure frequency is significantly reduced (by at least 50 % or more) and patients are assessed as responders. In the remaining 50 % of patients, the vagal stimulator does not have a significant effect and these patients are assessed as non-responders. At present, it is not possible to distinguish between future responders and non-responders based on preoperative data.

BENEFITS

— Determination of clinical response to vagus nerve stimulation
— Clear distinction between responders and non-responders
— Retrospective data obtained from routine EEG records
— 90 % accuracy

APPLICATIONS

The benefits for responders and non-responders are obvious: patients insensitive to VNS would not have to undergo uncomfortable and complicated surgery that would provide no benefit to them, and more patients sensitive to VNS could receive the right treatment to help them. Thus, this procedure both reduces the burden of “unnecessary” surgical interventions associated with implantation and subsequent necessary removal of the VNS in non-responders and results in significant financial cost savings for the healthcare system.

The method is suitable for EEG device manufacturers.