

Computations and technological innovations for epilepsy diagnosis and control

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Epileptic seizures are manifestations of epilepsy, a brain dynamical disorder second only to stroke and Alzheimer's disease. Epilepsy, sometimes called the *window to the brain function*, affects about 1% of the human population and it is only partially controlled by existing antiepileptic drugs, surgery and other modes of treatment. Direct or indirect neurostimulation or neuromodulation for control of seizures is a recently introduced treatment modality (e.g., vagus nerve stimulation (VNS), deep brain stimulation (DBS), transcranial direct current stimulation (tDCS)). Stimulation (electrical, magnetic) and *in-situ* drug administration appear to be promising modalities for treatment of epilepsy, especially in medically refractory cases, conservatively estimated to be about 30% of patients with epilepsy, that is, 18 million people worldwide. Animal studies and clinical trials are in progress in this emerging interdisciplinary area of neuroscience, neuroengineering, neurosurgery and neurology worldwide, initiated by individual investigators in academic centers, start-up companies and established pharmaceutical and medical device companies.

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