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강연 제목: 간질 발작 조절을 위한 신경 조절 효과가 향상된 자극 전략 개발
Stimulation strategy with improved neuromodulatory effect for controlling epileptic seizures

Abstract

Epilepsy is a neurological disorder affecting millions of people worldwide, and its high irregularity and unforeseeable nature often result in physical injuries and can severely disrupt a person's daily life. Electrical stimulation is an alternative therapeutic option for patients who are refractory to medication. In particular, direct electrical stimulation of the seizure focus can terminate epileptic oscillations, but it is thought to be impractical for the hippocampus, the most prevalent seizure focus in temporal lobe epilepsy (TLE) due to its large size and elongated shape. Here, we present a new electrical stimulation strategy for the precise and selective modulation of the hippocampus to terminate epileptic seizures. Our proposed method, called 'sequential narrow-field stimulation', terminates electrographic seizures, and alleviates physiological and histological responses after seizure episodes, by focusing stimulus energy at the spatially extensive hippocampal structure. We tested the efficacy and safety of our method in a rodent model of TLE. Through various in vivo and in silico approaches, our proposed modality demonstrates spatiotemporal preciseness and selectiveness for modulating the pathological target region which may have potential for further investigation as a therapeutic approach.

Brief Biosketch

Wonok Kang is currently a postdoctoral researcher under the supervision of Prof. Sung-Min Park in the Department of Convergence IT Engineering at POSTECH, South Korea. He received his B.S. degree in School of Electronics Engineering from Kyungpook National University, South Korea, in 2017. He received his Ph.D. in School of Interdisciplinary Bioscience and Bioengineering from POSTECH, in 2023. His main research interests include neurostimulation and implantable medical device.