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## 강연제목: 경두개 집속초음파 및 대뇌피질전도도 기반의 뇌전증 발작 페루프 조절 시스템

## Transcranial focused ultrasound and ECoG-based closed-loop system for epileptic seizure control

### Abstract:

Transcranial focused ultrasound (tFUS) is a promising non-invasive neuromodulation technique for controlling epileptic seizures due to its superior spatial specificity and depth penetrability. Here, we demonstrate a tFUS-based closed-loop system with electrocorticography (ECoG) monitoring that modulates the stimulation protocol for precise seizure control in a kainic acid (KA)-induced rat epilepsy model. Detection of epileptic high-frequency oscillations (HFOs) triggered tFUS stimulation of the rat hippocampus prior to seizure-related spike-wave generation, leading to a reduction in spike-wave duration and suppression of the brain oscillatory power, including theta and gamma bands. Furthermore, our parameter-modulating closed-loop feedback system achieved seizure suppression by individually tuning sonication parameters for each animal. Using this system, we were able to provide optimized tFUS stimulation for effective seizure control.

### Brief Biosketch

Dr. Jeungeun Kum is currently a postdoctoral researcher of the Bionics Research Center, Korea Institute of Science and Technology. She received her Ph.D degree in Bio-Medical Science and Technology from the University of Science and Technology, in 2024. From 2024 to 2025, she was a postdoctoral researcher at Department of Intelligent Precision Healthcare Convergence, Sungkyunkwan University. Her current research interest is developing non-invasive neuromodulation techniques with transcranial ultrasound and *in vivo* electrophysiology-based brain monitoring.