P-130

Serial Topographic EEG Changes Following Repeated rTMS in a Patient with Vegetative State: Case Study

Joo-Won Lee, M.D., Hyo Jeong Lee, M.D.
Department of Rehabilitation Medicine, Bundang Jesaeng Hospital
Department of Rehabilitation Medicine, Nowon Eulji Medical Center, Eulji University
anaell730@gmail.com

Introduction

- Vegetative state (VS) following hypoxic brain injury
  - Limited therapeutic options
  - Need objective biomarkers to evaluate

- Repetitive transcranial magnetic stimulation (rTMS)
  - Noninvasive neuromodulatory intervention in disorders of consciousness

- We evaluated **longitudinal changes in topographic electroencephalography (EEG) and spectral power following repeated rTMS in a patient with VS**.

Case Report

- A 63-year-old woman
  - Hypoxic brain injury and remained in a VS
  - Coma Recovery Scale–Revised (CRS-R) : 7
  - Tracheostomy
  - PEG

- **High-frequency rTMS (10 Hz)** was delivered over the **left dorsolateral prefrontal cortex (Lt. DLPFC; F3–F5)** at 100% of the individual resting motor threshold (rMT).

- First treatment term (18 sessions)
  - Topographic EEG demonstrated **increased delta and alpha power** with **decreased beta power** compared with baseline.
  - Suggest early cortical network modulation

- Second treatment term (19 sessions)
  - no significant interval EEG change

- 3-month follow-up
  - EEG continued to show no significant spectral or topographic change

- Additional treatment (15 sessions)
  - 3-month follow-up after final treatment term
  - EEG demonstrated **decreased delta power** with **relative increases in alpha and beta bands** compared with the prior recording
  - **Modulation of cortical activity patterns and partial reorganization of background activity**

- No meaningful behavioral improvement was observed on CRS-R during the clinical course.

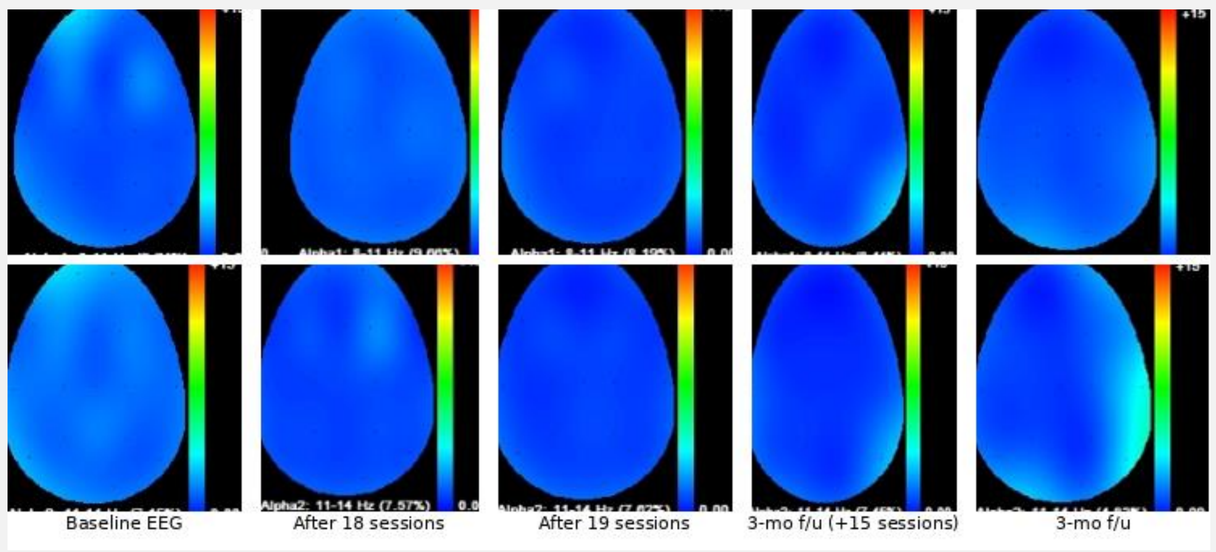

Fig. 1. Serial Alpha Band Topography (top: Alpha1 [8–11 Hz], bottom: Alpha2 [11–14 Hz])

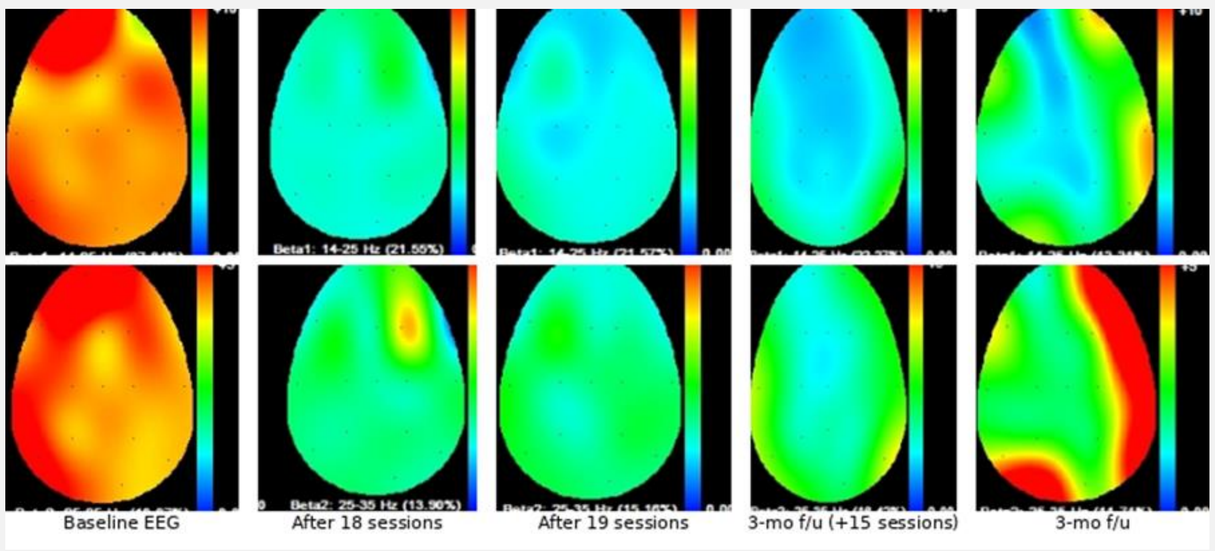

Fig. 2. Serial Beta Band Topography (top: Beta1 [14–25 Hz], bottom: Beta2 [25–35 Hz])

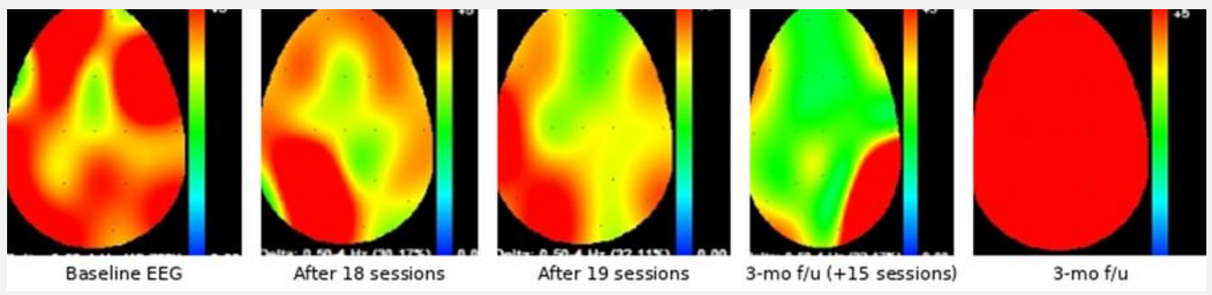

Fig. 3. Serial Delta Band Topography [0.5–4 Hz]

Conclusion

- Serial topographic EEG and spectral analyses identified longitudinal changes in cortical activity following repeated rTMS in a VS patient.
- Observed **shifts in frequency band distribution** may reflect **alterations in cortical network dynamics**.

- However, causal relationships cannot be established in this single-case study.

- Quantitative EEG may provide complementary information for monitoring neuromodulatory interventions in neurorehabilitation, but its clinical significance requires validation in controlled studies.