

# Functional brain changes using electroencephalography after a 24-week multidomain intervention program to prevent dementia

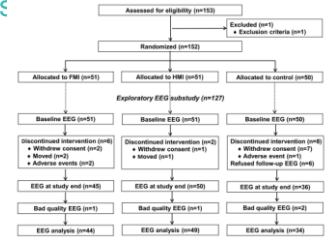
Hee Kyoung Park, et al.  
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## Purpose

- In the process of people with MCI progressing from QEEG to Alzheimer's disease, the relative and absolute power of alpha is low, and the state alpha activity gradually decreases as cognitive function is gradually impaired.
- In Alzheimer's disease, QEEG is correlated with Mini Mental State Examination (MMSE), biomarkers of organisms, and structural changes.
- Thus, it has proven to be useful in predicting responses to treatment.
- Among the dementia prevention programs, FINISH GERICS INTERVENTION STUDY TO PREVENTIVE Cognitive Impairment and Disability (FINGER) was able to confirm improvement in cognitive function in the elderly, but it did not produce biological effects such as structural brain imaging.

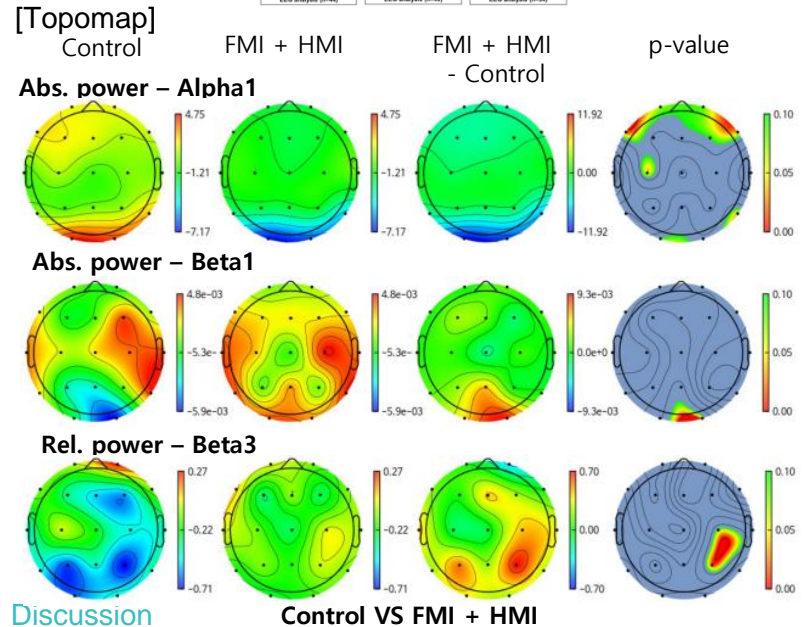
## Subjects / Methods

### Study Diagram

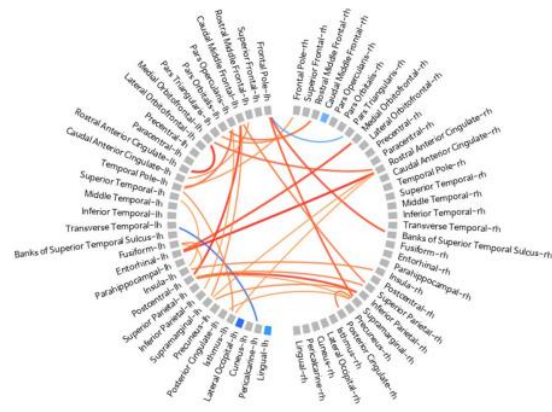


- A total of 127 participants (FMI(Facility-based multidomain intervention) 44 people, HMI(Home-based multidomain intervention) 49 people, control 34 people)
- Dementia prevention program: Workbook (memory): 50 minutes twice a week / Physical exercise: 60 minutes with three times a week / 50 minutes of diet / lifestyle change education
- EEG analysis used iSyncBrain (iMedisync Inc.), an AI EEG analysis program.
- K-MMSE and RBANS (Repeatable Battery for the Assessment of Neuropsychological Status) were used for cognitive function evaluation.

## Results



### [Connectivity of Alpha 1 - imaginary Coherence]



### Control VS FMI

Increased alpha1 connectivity in FMI+HMI compared to Control (red)  
Increased Alpha1 connectivity in Control compared to FMI+HMI (blue)

### [Cognitive Ability]

After the dementia prevention program, RBANS showed improvement in FMI and HMI groups compared to control.

### [EEG]

- Groups of FMI and HMI who implemented dementia prevention programs compared to Control group:
- The absolute power of alpha1 is increased in the frontal, central, and temporal lobes
- Increased relative power of beta1 in the larynx.
- The absolute power of beta3 in the right top area is increased.
- FMI group has increased connectivity compared to control group.
- The FMI+HMI group has a reduced path length of alpha1 compared to the Control group.

## Discussion

- This is the first study to use QEEG to investigate functional brain changes according to dementia prevention programs.
- Compared with the Control group, it was found that the relative power of beta1, absolute power of beta3, absolute power of alpha1, and the connectivity of alpha1 bands increase.
- The increased connectivity of alpha1 may be associated with an improvement in RBANS total score.
- In the FMI + HMI group, the decrease of alpha signifies a positive change in the recovery of brain networks.
- Therefore, all of the above changes suggest positive early changes in neurophysiological indicators due to the dementia prevention program identified by QEEG.