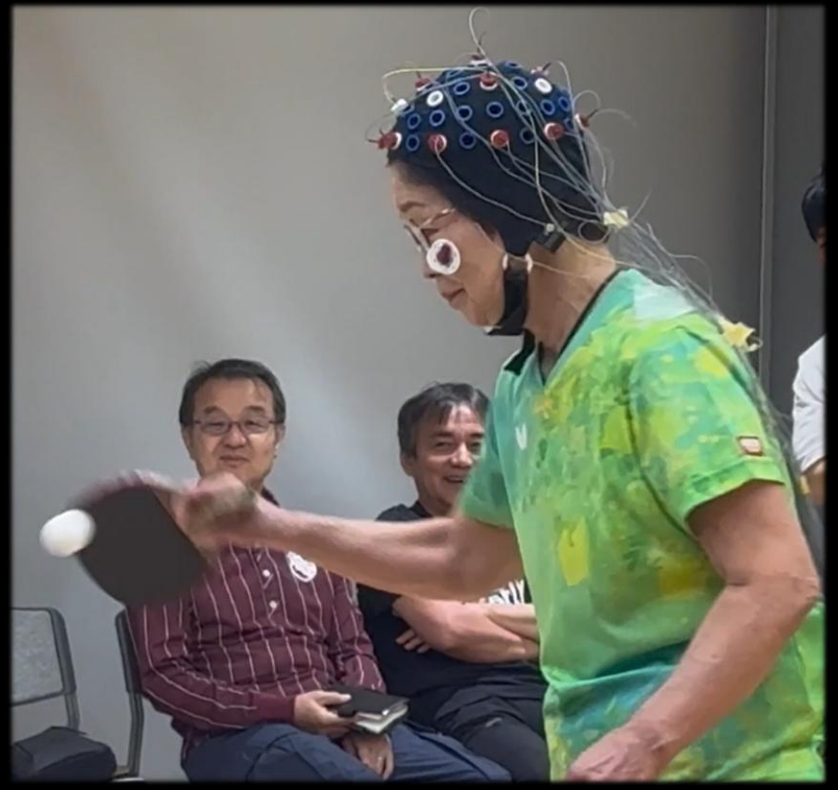
T-NEXT × MITS TECHNOLOGIES

Joint Research on the Prevention and Improvement of Dementia through Table Tennis

2026.7.31

Verification of the MCI-Suppressing Effect of Table Tennis Using GTEC

T-NEXT × MITS TECHNOLOGIES



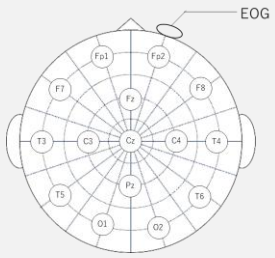
Overview of the Analysis (Preliminary Study + Main Study)

Preliminary Study

Objective: Identify cognitive functions and their corresponding brain regions,

and build evidence for the brain-activating effect of table tennis

Hypothesis: “Table tennis activates brain regions related to cognitive function,” so progression can be suppressed even in those approaching dementia.

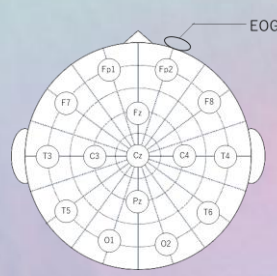


EEG: analysis with g.USBamp (g.tec)

Main Study

Further details will be reported once they are finalized.

Preliminary Study (analysis with g.USBamp [g.tec])



4 participants
2 with no table tennis experience
one in their 60s and one in their 70s, either sex
2 experienced players
one in their 60s and one in their 70s, either sex

In each group, measurements taken before and after exercise such as walking, and before and after table tennis play

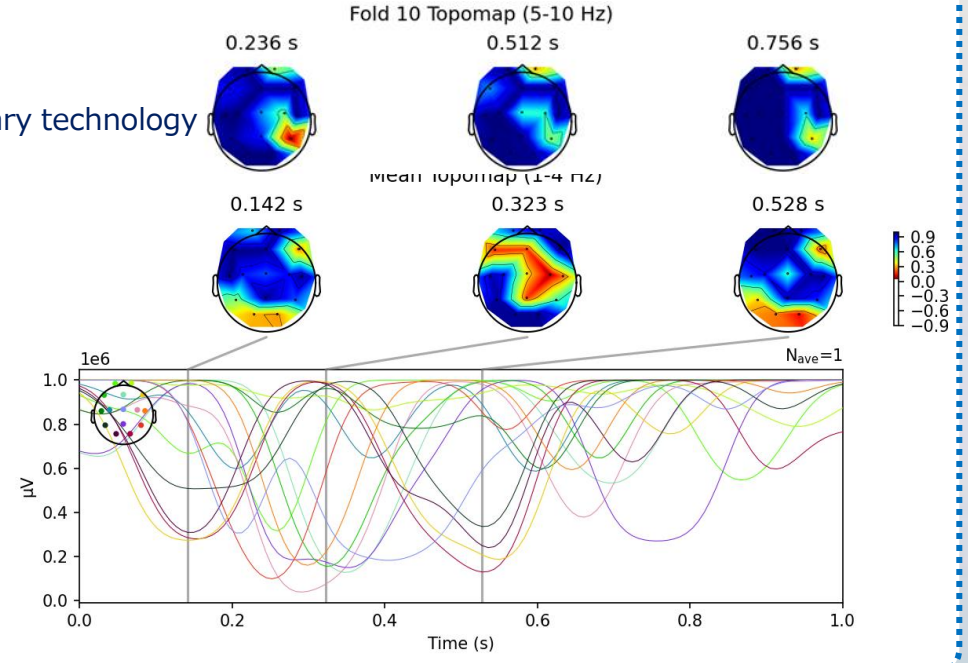
<Analytical Perspective>
Identify EEG components related to exercise and to table tennis, and map the scalp distribution of activation over time

ex. Shift of focus: occipital → temporal & parietal → occipital
Sustained focus in the right temporal region, etc.

<Expected Findings>
Brain activation from exercise vs. brain activation from table tennis
Activation by table tennis > activation by exercise

Activated regions (illustrative)

*Mapping uses MITS proprietary technology



Preliminary Study (exploratory pilot trial of resting-state brain activity, May 24, 2026)

<Study Objective>

A preliminary examination of how resting-state brain activity patterns change before and after a table tennis intervention.

➡ Changes in resting-state EEG indices (specific brain regions) after table tennis were examined.

<Location>

Tamasu Co., Ltd. (1-7-1 Asagaya-minami, Suginami-ku, Tokyo)

Conducted May 24, 2026

1. Study Design

This study was a preliminary comparative trial designed to exploratorily evaluate acute changes in brain activity induced by a table tennis intervention.

2. Participants

Community-dwelling healthy older adults in their 60s to 80s, 2 men and 2 women (4 in total).

Participants were independent in activities of daily living, capable of light-to-moderate exercise, and had table tennis experience.

Participant ①: Female, 69

Participant ②: Female, 81

Participant ③: Male, 69

Participant ④: Male, 74

Preliminary Study (exploratory pilot trial of resting-state brain activity, May 24, 2026)

3. EEG Setup

After the rest period, EEG electrodes are attached. All measurements are completed within 20 minutes of attachment.

4. Pre-Measurement (pre-intervention resting-state EEG)

After electrode attachment, pre-intervention resting-state EEG is recorded: 2 min eyes-closed rest, 2 min eyes-open rest

5. Warm-Up (common to all groups)

A 5-minute warm-up is performed before EEG attachment: walking / light joint mobility (shoulder rotations, marching in place, etc.) / deep breathing

6. 11-Minute Table Tennis Rally

Performed continuously at a comfortable moderate intensity. No conversation permitted.

- Rally (fixed course) 3 min ➡ 1 min rest
- Rally (forehand and backhand at random) 3 min ➡ 1 min rest
- Game format (starting from 8-0 so the participant wins) 3 min

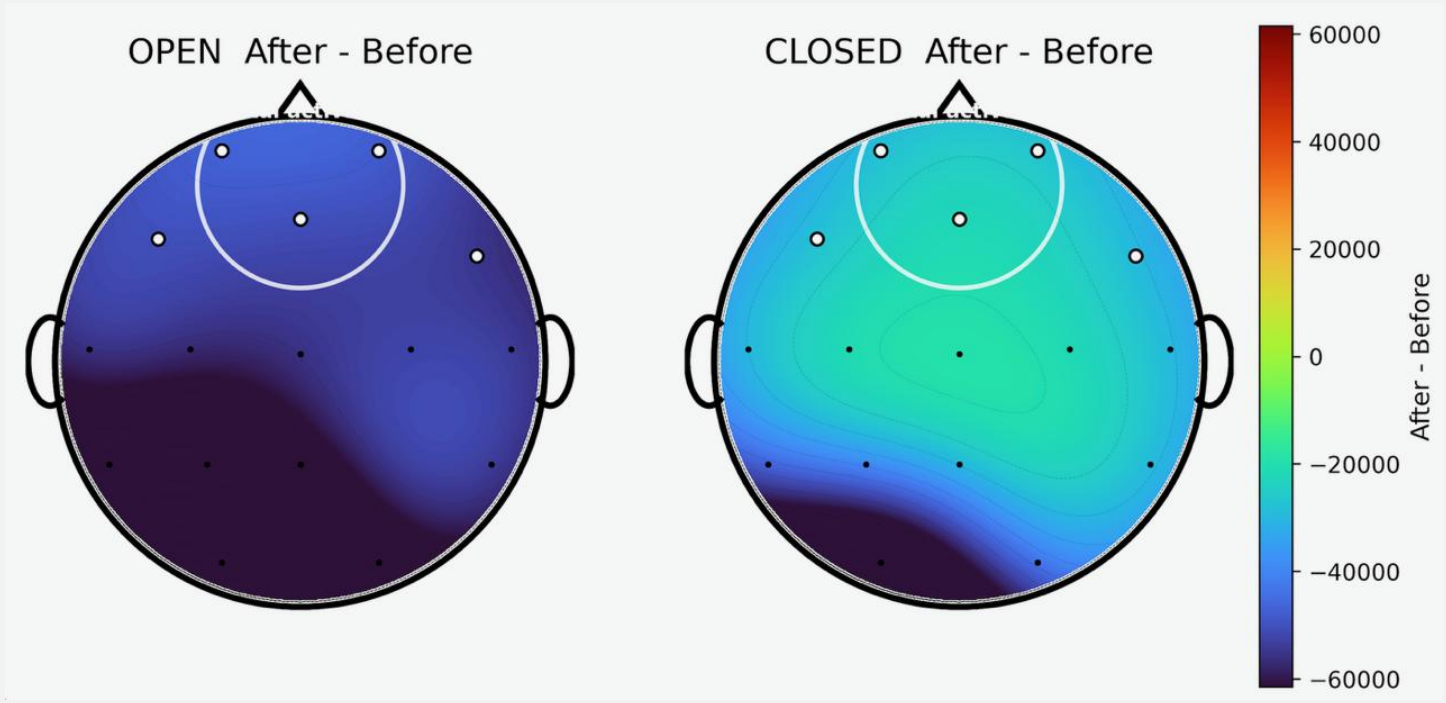
7. Post-Measurement (post-intervention resting-state EEG)

Immediately after the intervention, participants are seated and resting-state EEG is recorded.

2 min eyes-closed rest / 2 min eyes-open rest

Preliminary Study Results

Participant ①: Female, 69

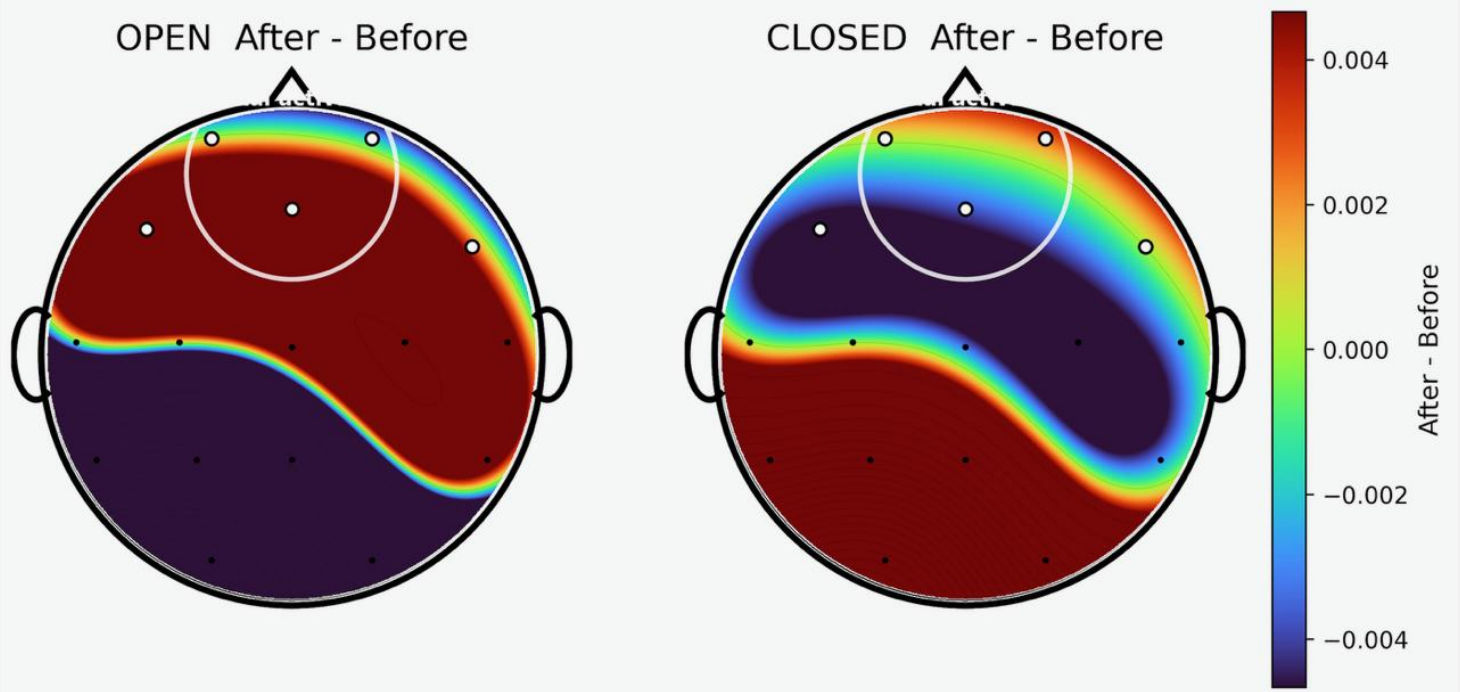


After table tennis, the activity load of the occipital lobe, which handles visual information processing, decreased, and the brain as a whole became more efficient. This is considered a state in which unnecessary activity was suppressed, rather than one of cognitive fatigue.

“Wasteful energy consumption in the brain decreased, shifting it to a more efficient state.”

Preliminary Study Results

Participant ②: Female, 81

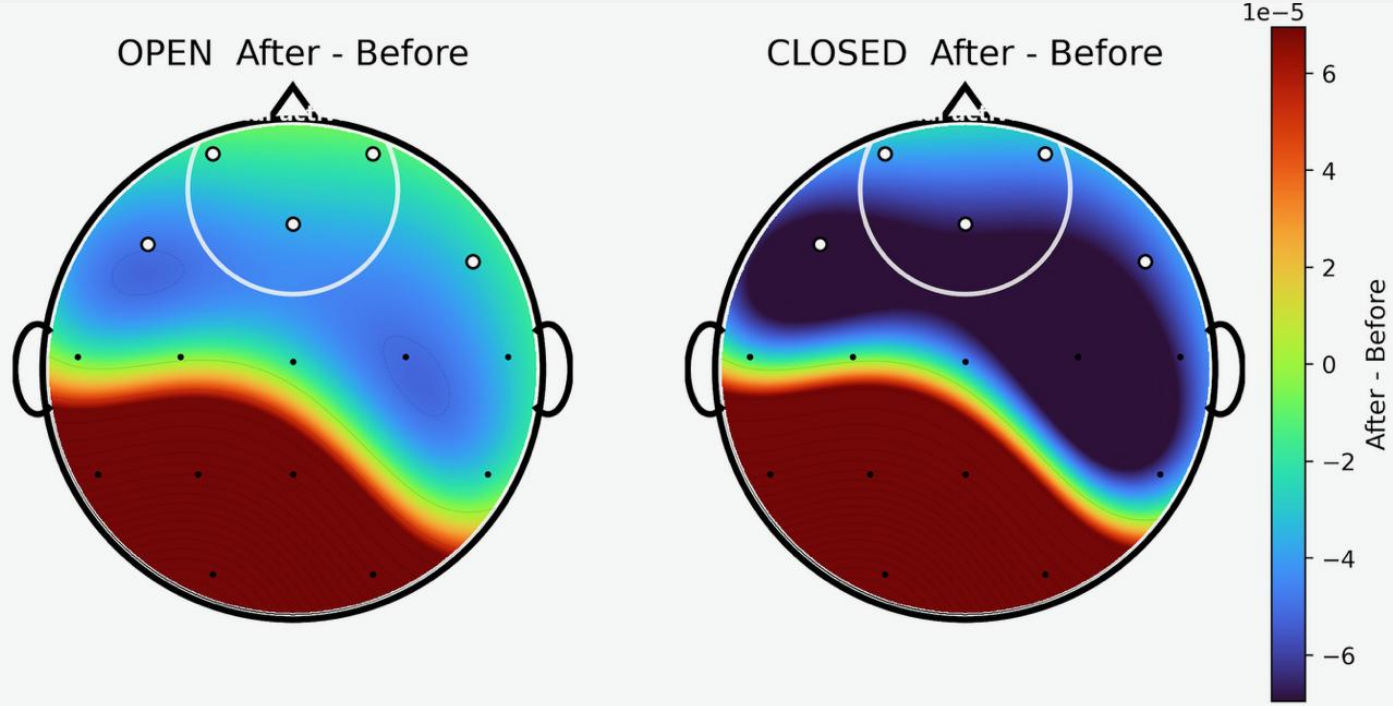


This is the most typical activation pattern among the four participants.
It suggests that attentional function and cognitive control systems were strongly activated after table tennis.
Studies in older adults often observe prefrontal cortex activation following cognitive tasks, and the present result is consistent with this.

“Table tennis reignited the brain’s engine.”

Preliminary Study Results

Participant ③: Male, 69

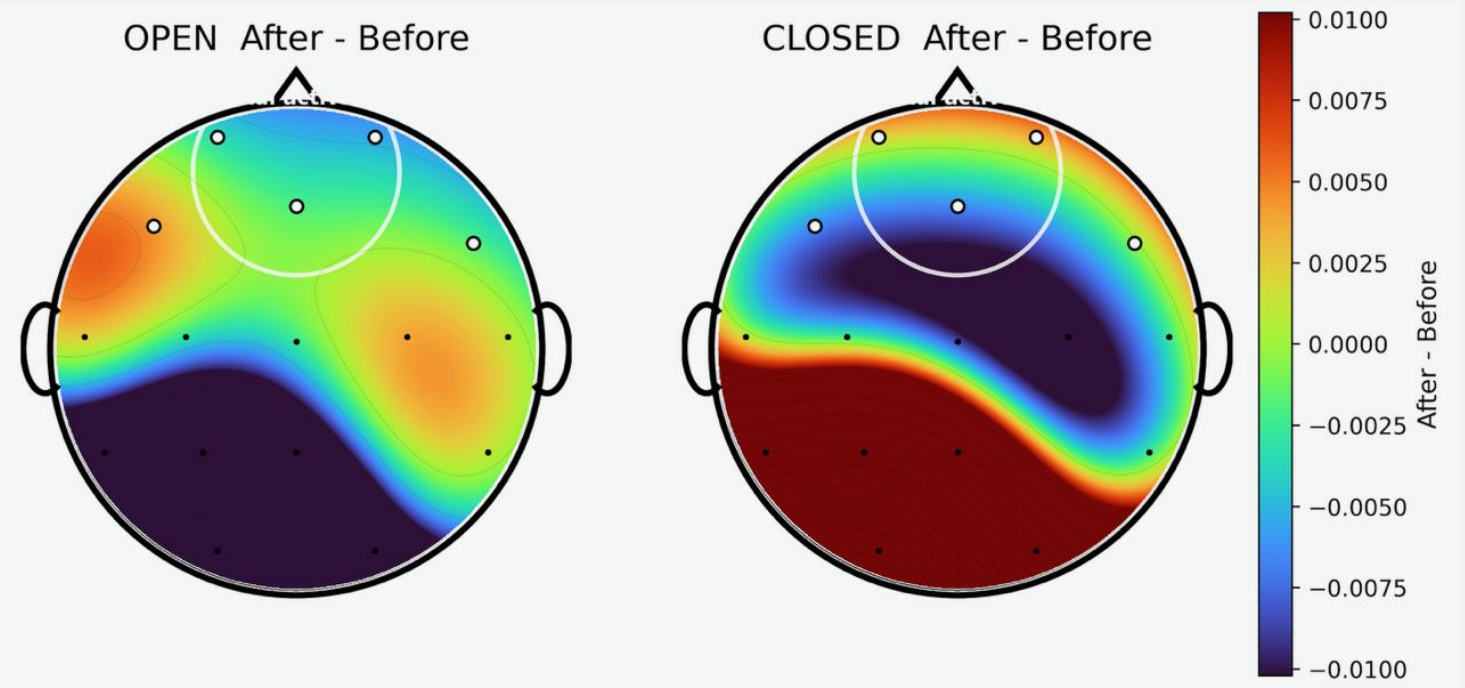


Left-frontal-dominant activation is seen, and frontal activation is sustained.
The left frontal lobe is frequently associated with positive emotion and motivation.
It is possible that table tennis improved not only cognitive function but also emotional state.

“Not only the ability to think, but also the ability to feel positive, was enhanced.”

Preliminary Study Results

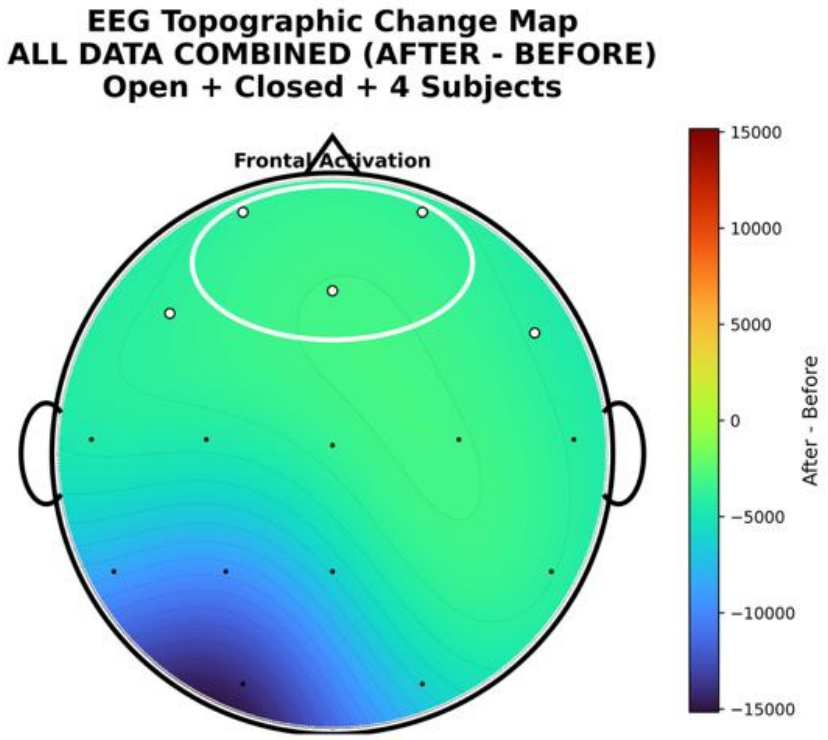
Participant ④: Male, 74



Activation of the cognitive control network is observed.
In particular, changes in the frontal and central regions may reflect reactivation of neural networks involved in motor planning and body control.

“Moving the body also rebooted the brain.”

Preliminary Study Results (mean of 4 participants)

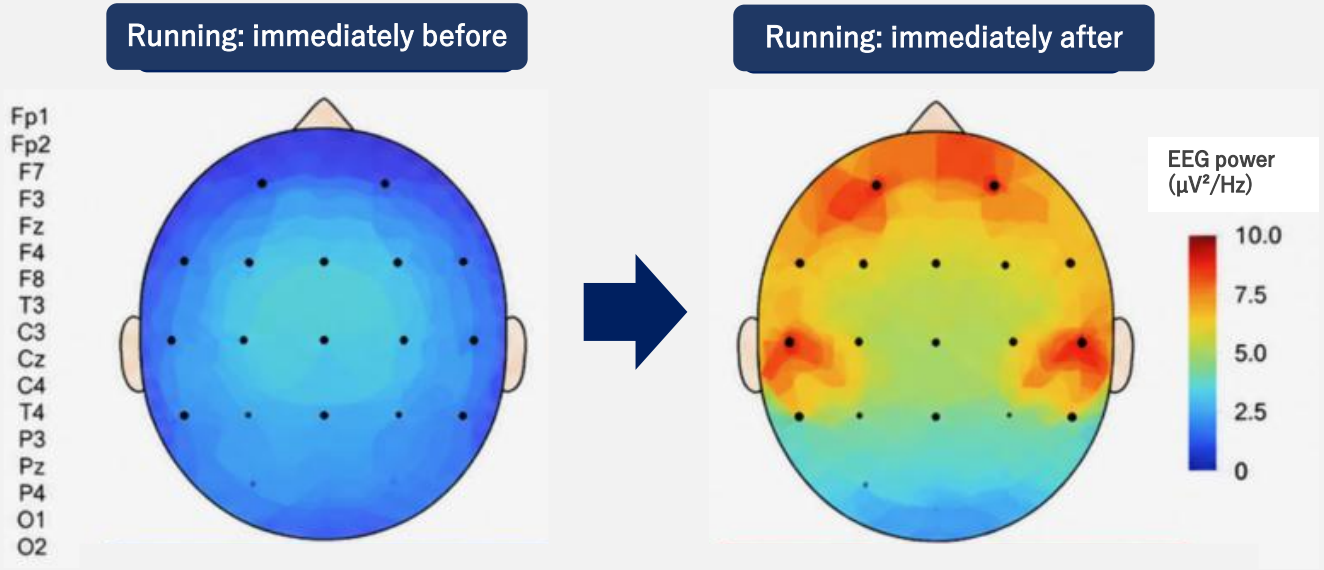


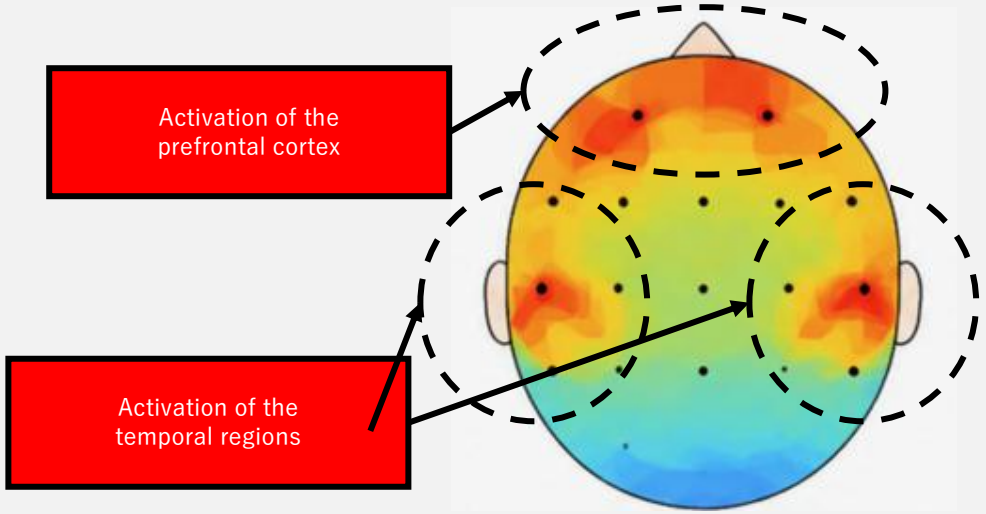
After playing table tennis, changes in prefrontal cortex activity were observed across all participants. Consistent changes were seen particularly in the prefrontal cortex, which is involved in decision-making, attentional control, and executive function, suggesting that table tennis may act not simply as physical exercise but as a complex brain stimulus accompanied by cognitive demand.

Meanwhile, decreased activity was observed from the occipital to the parietal regions, suggesting a possible reduction in visual processing load after exercise and a redistribution of brain activity.

Overall, the findings suggest that table tennis is an exercise that promotes “cognitive switching” rather than mere “physical activity,” and that it may efficiently stimulate frontal lobe networks.

(Example) Brain regions activated by running



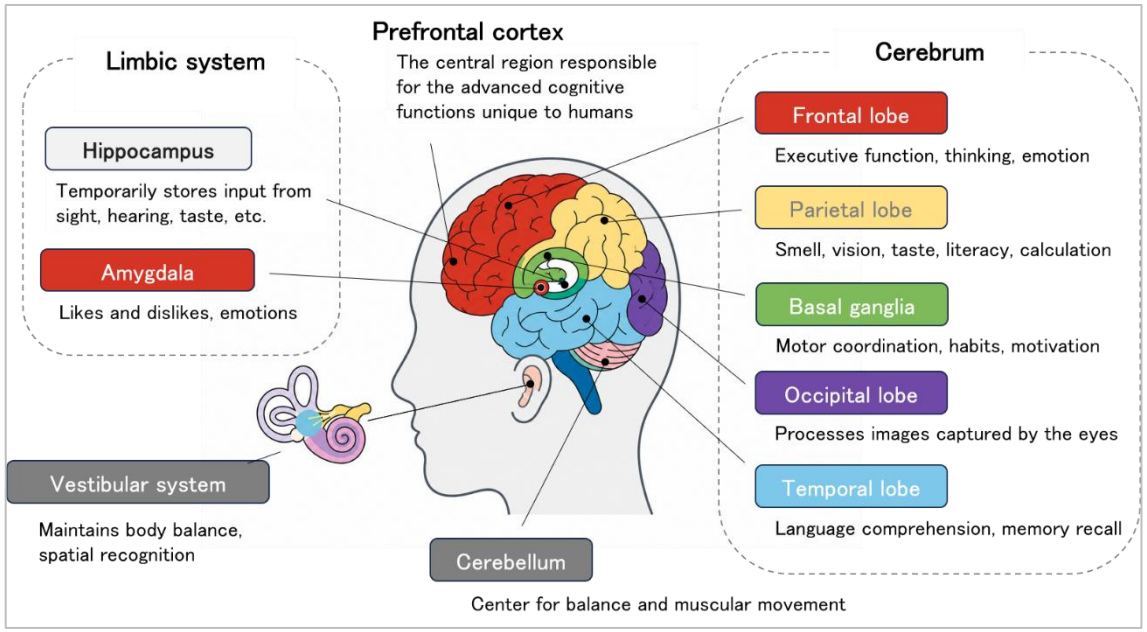


Running (aerobic exercise) activates the hippocampus, prefrontal cortex and temporal regions, improving memory and mood.

Brain Regions Activated and Expected Effects by Type of Exercise

- **Aerobic ➡ hippocampus, prefrontal cortex ➡ memory**
- **HIIT ➡ hippocampus ➡ learning ability**

  (High-Intensity Interval Training)
- **Resistance training ➡ prefrontal cortex ➡ judgment**
- **Balance ➡ vestibular system ➡ spatial cognition**
- **Dance ➡ basal ganglia, cerebellum ➡ flexibility**
- **Tai chi / yoga ➡ prefrontal cortex ➡ emotional stability**



"Main Regions of the Brain and Their Functions"

Expected Effects by Type of Exercise and Their Evidence

Exercise	Primary functions affected	Related brain regions	Representative evidence
Aerobic exercise: walking, running, cycling	Memory, spatial cognition, general cognition	Hippocampus Prefrontal cortex	One year of aerobic exercise increased hippocampal volume in older adults by approximately 2% and improved spatial memory. Elevated BDNF is also implicated.
HIIT (high-intensity interval training)	Hippocampus-dependent learning, memory, information processing, executive function	Hippocampus Hippocampal networks	Six months of HIIT improved hippocampus-dependent learning in older adults, with effects potentially persisting long term. Changes in BDNF and cortisol are also implicated.
Resistance / strength training	Executive function, attention, working memory	Prefrontal cortex Fronto-striatal system	In an RCT of older women, resistance training improved executive functions including selective attention, conflict resolution, set shifting and working memory.
Balance exercise	Spatial cognition, memory, postural control, attention	Vestibular system, hippocampus Parietal lobe, cerebellum	Balance training improved memory and spatial cognition. Effects were seen without cardiorespiratory gains, suggesting vestibular stimulation may influence the hippocampus and parietal lobe.
Coordination exercise: dance, ball games, complex footwork	Cognitive flexibility, motor learning, attention switching	Basal ganglia, cerebellum Prefrontal cortex	Coordination exercise and motor-fitness interventions have been reported to increase basal ganglia volume (caudate nucleus, globus pallidus), correlating with cognitive performance.
Mind-body exercise: tai chi, yoga, etc.	Attention, emotion regulation, executive function, stress control	Prefrontal cortex, hippocampus Insular cortex, cingulate cortex	Reviews report associations of tai chi and yoga with prefrontal and hippocampal plasticity, emotion regulation and improved cognitive function.

Expected Effects of Table Tennis and Other Exercises

Exercise	Main brain regions	Expected effects
Table tennis	**Prefrontal cortex + cerebellum + parietal lobe**	**Emotional regulation, improved attention, dementia prevention**
Walking	Hippocampus	Improved memory
Running / aerobic exercise	Hippocampus + prefrontal cortex	Improved memory, improved mood
Resistance training	Prefrontal cortex	Improved judgment, improved concentration
Dance	Basal ganglia + cerebellum + hippocampus	Improved cognitive flexibility
Yoga	Prefrontal cortex + amygdala	Stress reduction, emotional stability
Tai chi	Vestibular system + prefrontal cortex	Fall prevention, maintenance of cognition
Balance exercise	Vestibular system + parietal lobe	Improved spatial cognition
Mountain hiking	Hippocampus + prefrontal cortex	Improved memory and problem-solving ability

Why Table Tennis Is Especially Interesting

Table tennis involves

- Predicting ball trajectory
- Inferring the opponent's intention
- Split-second decision-making
- Body control

all at the same time.

Therefore

Prefrontal cortex
Attentional control / emotional inhibition / judgment

Parietal lobe
Spatial cognition / predicting ball position

Cerebellum
Timing learning / motor learning

are activated simultaneously.

In other words

Table tennis is "exercising while doing brain training."

Recent studies report that table tennis players show higher
"executive function," "attention-switching ability" and "reaction speed" than the general population.

Why Table Tennis Is Especially Interesting: Emotion

The prefrontal cortex governs
“anger inhibition,” “anxiety regulation” and “stress tolerance.”

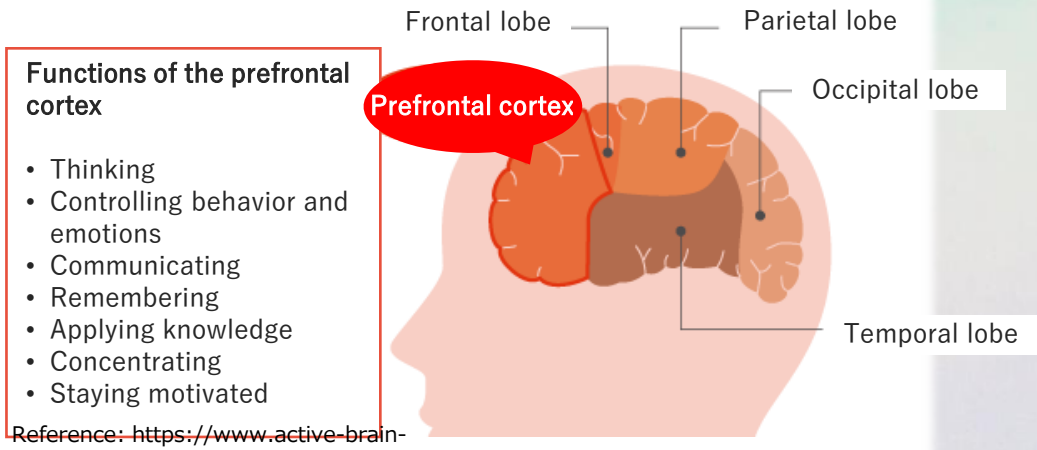
In short, after table tennis: excitement ↗ stress ↘

Prefrontal cortex activation

Amygdala suppression

Reduced negative emotion

This sequence is considered plausible



Reference: https://www.active-brain-club.com/ecscripts/reqapp.dll?APPNAME=forward&PRGNAME=ab_brain_detail&ARGUMENTS=-A3,-A201812,-A20181221141722391,-A

Table tennis is particularly characterized by “emotional regulation,” and is closely related to “volition,” “sustained motivation” and “social interaction,” which are regarded as important for dementia prevention;

**through complex brain activity involving judgment, prediction and emotional regulation,
a dementia-prevention effect can be expected.**

Preliminary Study Results: Summary

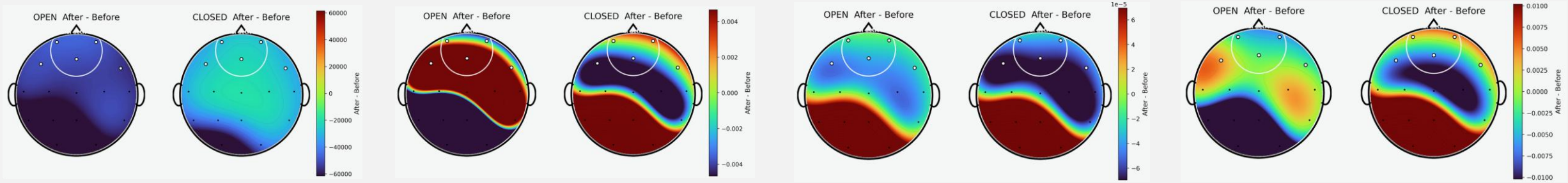


Table tennis is a sport that stimulates the prefrontal cortex, the brain's command center.
Accordingly,

「table tennis as an exercise for dementia prevention and the maintenance of cognitive function」 holds considerable promise.

Table tennis is not merely exercise; it is

"an exercise that stimulates the brain's prefrontal cortex and activates cognitive function."