The Scientific Journal of CosmoIntel
The First Scientific Journal in T-Consciousness Research

# An Investigation of the Electrical Activity of the Brain during the Treatment with Faradarmani Consciousness Field in the Faradarmangar Population

Mohammad Ali Taheri[1], Fatemeh Modarresi-Asem[2], Farid Semsarha[3*]

* Corresponding author: Farid Semsarha
Email: Semsarha@ut.ac.ir

1. Sciencefact R&D Department, Cosmointel Inc. Research Center, Ontario, Canada
2. Cancer Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Institute of Biochemistry and Biophysics (IBB), University of Tehran, Tehran, Iran

https://doi.org/10.61450/joci.v1i2.19

## Abstract

Researchers have extensively investigated consciousness, the mind–body interaction, and its manifestations in the brain. The Faradarmani Consciousness Field (FCF), as introduced by Mohammad Ali Taheri (the founder), is a method of initiating a Connection with the Cosmic Consciousness Network (CCN) through the mediating role of the human mind, while the brain functions as a detector in this process. As a result of this *Connection*, the scanning process of a being (an organism's) condition—for example, the health status of its cells and, consequently, its organs—is carried out. This study was conducted to investigate the effect of the FCF on electroencephalographic (EEG) features as important indicators of brain function. The results showed that, among Faradarmangar population (Faradarmani practitioners), a significant increase in power within the Gamma 2 frequency band (35–40 Hz) was observed during the Connection, compared with the control condition (resting state, without Connection), in the medial frontal gyrus (BA6) and the paracentral lobule (BA31) of the frontal lobe. Based on the cortical electrical activity of the Faradarmangars during the FCF Connection, increased gamma-wave power and activation of brain regions involved in memory, attention, perception, and the intrinsic activity of the default mode network were observed. These findings distinguish the FCF Connection, as demonstrated through patterns of brain activity (brain waves and activated regions), from established mind–body approaches such as various forms of meditation.

**Keywords:** T-Consciousness Field, Cosmic Consciousness Network (CCN), default mode network, EEG, Faradarmani, Faradarmangar, gamma wave, mind–body

**Introduction**

Consciousness and its nature remain unknown to the scientific community [1]. Questions concerning where consciousness resides, its internal and external dimensions, how it is experienced, and related issues remain largely unanswered, or receive different answers depending on the field of study. The role of the brain in providing the necessary conditions for consciousness experience is currently one of the most interesting and challenging scientific topics and represents a common focus across many experimental studies [2].

One of the oldest methods for investigating the manifestation of consciousness in the body is the measurement of the brain's electrical activity using electroencephalography (EEG). In 1924, Hans Berger recorded the first human electroencephalogram (EEG) in an attempt to discover the physiological basis of psychological phenomena. Although this objective was not achieved, his work led to the identification of several brain-wave patterns, including α and β waves, and to the introduction of the term 'electroencephalogram' [3].

Subsequent studies further characterized brain activity in terms of the cortical regions involved and the frequencies of the recorded brain waves. The power of these waves has been determined under different functional states of the brain. Brain waves with frequencies above 30 Hz (gamma waves) have been associated with a variety of cognitive functions, including neural processes related to alertness [4], consciousness perception [5], solving an urgent issue [6], attention [7], and working memory and long-term memory processes [8]. Other brain waves with frequencies below 30 Hz—beta (12–30 Hz), alpha (8–12 Hz), theta (4–8 Hz), and delta (0.5–4 Hz)—correspond to oscillatory electrical activity associated with progressively deeper states of relaxation and sleep [9]. In addition, distinct electrical regions of the cerebral cortex have been identified, comprising a total of 52 Brodmann areas grouped into 11 histological regions [10]. These different cortical regions are involved in a wide range of cognitive and behavioral functions [11]. The distinction between task and resting states in the measurement of brain electrical activity constitutes a fundamental step in studies of consciousness. The resting state, or the brain's baseline state, and its differences from the active state have been described in various ways. Koch et al. (2016) reported new findings indicating that the anatomical neural correlates of consciousness are located primarily in the well-defined posterior cortical region, which includes sensory areas, rather than in the frontoparietal network involved in task monitoring and reporting [12].

Shulman et al. [13] first described the Default Mode Network (DMN) in 1997. Subsequently, Raichle et al. (2001) [14] observed that when an individual is not focused on the external world, specific brain regions exhibit greater metabolic activity than during cognitively goal-directed tasks, and that the activity of these regions decreases when the individual engages in goal-directed behavior. Collectively, these regions—also referred to as the Default Mode Resting State Network (DMRSN)—comprise a set of brain areas including the ventral and dorsal medial prefrontal cortex (BA 24, 10m, 10r, 10p, 32a, 32c, 9), the anterior/posterior cingulate cortex (BA 29/30, 23/31), the inferior parietal lobule (BA 39, 40), the lateral temporal cortex (BA 21), and the hippocampal formation [15].

Over the past two decades, the Default Mode Network (DMN) has been shown to be associated with self-awareness [16], mental states [17], and human awareness [18]. Furthermore, it has been demonstrated that EEG gamma power in the frontal and midline regions reflects the activity of the Default Mode Network (DMN) [19,20].

Investigating the mind-body relationship through the measurement of brain activity during various meditation practices has become one of the main areas of consciousness research in healthy individuals, focusing on the manifestation of different activity states in the brain. Kaur and Singh (2015) reviewed studies on the effects of different types of meditation on brain waves [21]. Their review examined Buddhist meditation, Transcendental Meditation (TM), Yoga meditation, and several other less well-known forms of meditation, and found that increases in delta, theta, and alpha frequency bands in the frontal, occipital, and parietal regions distinguish different

meditation practices. In addition, Desai et al. (2015) conducted a comprehensive review of fifteen published studies on various Yoga techniques and their effects on brain waves [22]. They found that different Yoga techniques significantly increased alpha, beta, and theta waves in the frontal cortex. In a systematic review of 56 studies involving 1,358 healthy participants, Lomas et al. (2015) reported that mindfulness is associated with increased alpha and theta power, reflecting a relaxed state of consciousness [23]. In contrast, no consistent pattern was observed for beta, delta, or gamma waves. Several studies have also emphasized that long-term meditation can suppress and reduce Default Mode Network processing and its associated gamma-wave power [19, 20, 24, 25].

In addition to the numerous studies on different forms of meditation, which have consistently reported significant increases in alpha, delta, and theta waves together with reductions in gamma-wave activity, a small number of meditation practices have been found to exhibit increased high-gamma activity alongside the brain-wave patterns typically associated with meditation. In these cases, however, the increase occurs in regions other than the Default Mode Network. Braboszcz et al. (2017) reported enhanced high-gamma activity (60–110 Hz) in the parieto-occipital regions during three traditional meditation practices—Vipassana, Himalayan Yoga, and Isha Shoonya—in experienced meditators under specific conditions compared with controls [26]. In addition, increased occipital gamma power associated with long-term meditation practice and enhanced sensory awareness has been reported [27], and other related studies have also been reviewed [28].

According to Taheri, there are T-Consciousness Fields with a non-frequency nature that exist as subsets of the Cosmic Consciousness Network (CCN). The effect of these fields begins through a brief; momentary attention directed toward them. This brief attention is initiated by a trained individual, referred to as a *Faradarmangar* [29]. In the present study, the electrical activity of the brains of Faradarmangars (Faradarmani practitioners) was investigated while establishing the Faradarmani Consciousness Field (FCF).

## Methods

Thirty-six healthy Faradarmangars (28 females and 8 males), aged between 20 and 50 years (mean age: 36.5 ± 6.20 years), who had successfully completed the corresponding two-year training program, participated in this study.

### Application of the Faradarmani Consciousness Field

In the Faradarmangar population, each participant can initiate the FCF for themselves. In other words, the Faradarmangar initiates a Connection between the subject under study (in this project, themselves) and the Cosmic Consciousness Network (CCN). This process is referred to as *Announcement.*

Announcement is the process by which Mohammad Ali Taheri, or any Announcer authorized by him, mentally passes the name of the subject under study together with the arranged time and location, thereby transmitting the subject's initial information to the Cosmic Consciousness Network (CCN). The subject under study may be a patient or any individual who wishes to experience a Connection with the Cosmic Consciousness Network (CCN). In the present study, the subject of the Announcement is the Announcer themself. According to Taheri's theory, a Faradarmangar (serving as the Announcer in Figure 1) is a trained and certified individual who has successfully completed the required training courses. These courses, which typically take approximately two years to complete, provide both theoretical and practical instruction on the application of T-Consciousness Fields within the Cosmic Consciousness Network (CCN).

### Connection to the Cosmic Consciousness Network (CCN)

This is a process that is accessible to everyone, at any location worldwide, 24 hours a day. Except for the present study, in which the Announcers themselves were the subjects of the study, for any research or experience involving the use of T-Consciousness Fields, each researcher or volunteer is required to register on the Cosmointel website[4]. After registration, the user must access the “Research /

Connection Experience" section and complete the relevant form.

For any study or experience conducted at a specific time and location, it is necessary for researchers or volunteers to provide essential information about their experiment to the designated guidance center. It should be noted that both registration on the website and the Announcement request are free of charge.

**EEG Recording**

EEG data were recorded from the participants during both the 'rest' and 'task' conditions in a quiet, dimly lit room while they were seated with

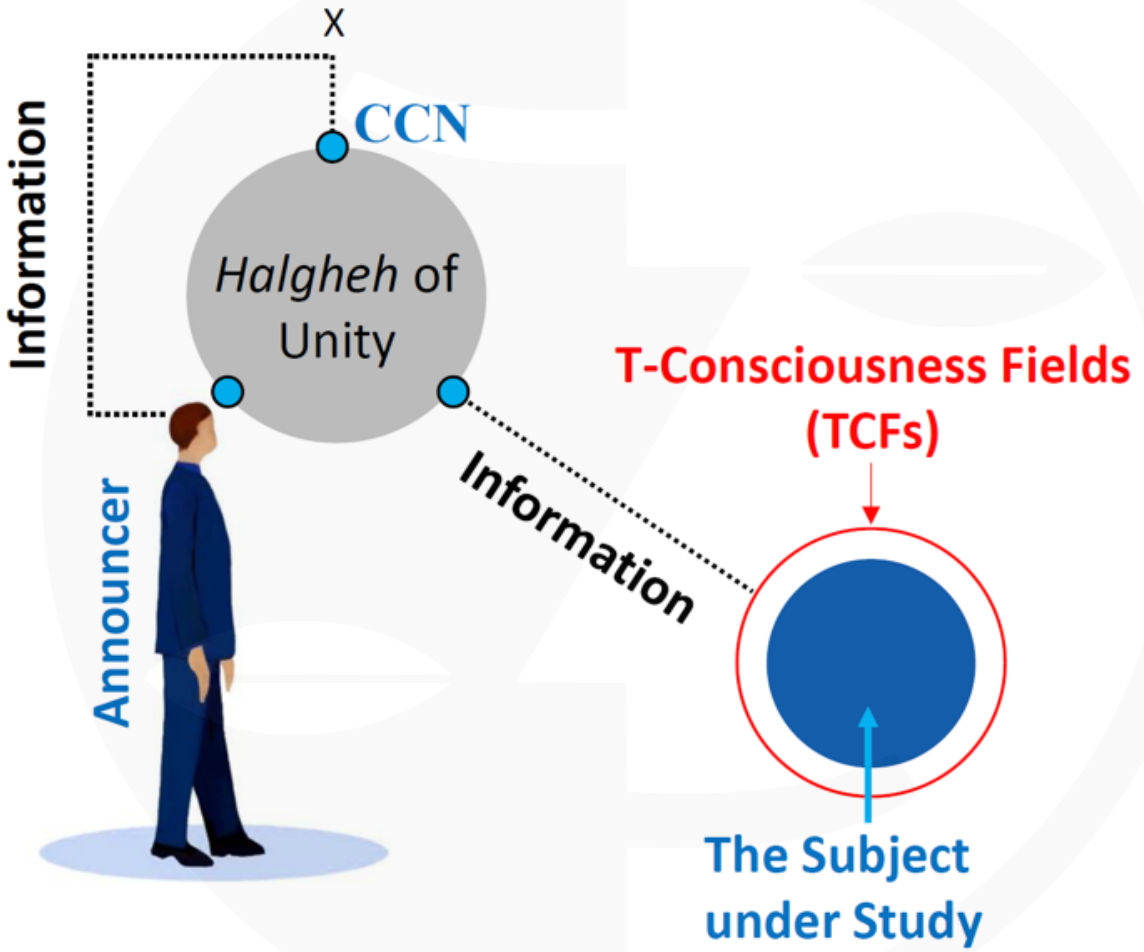



Figure 1. Schematic illustration of the 'Announcement' process and the 'Connection' between the subject under study and the Cosmic Consciousness Network (CCN) through a T-Consciousness Field, according to Mohammad Ali Taheri's theory.

4. www.cosmointel.com

their eyes closed. Recordings lasted approximately 15 minutes and were obtained using a 19-channel EEG system (EEGR 19-26, Medicom, Russia) with the following electrode placements: Fp1, Fp2, F7, F3, Fz, F4, F8, T3, C3, Cz, C4, T4, T5, P3, Pz, P4, T6, O1, and O2. During the task condition, participants were instructed to initiate the FCF Connection according to Taheri's theory.

Since different EEG frequency bands reflect different brain functions, the data were digitally filtered into ten frequency bands: delta (1–4 Hz), theta (4–8 Hz), alpha 1 (8–10 Hz), alpha 2 (10–12 Hz), beta 1 (12–15 Hz), beta 2 (15–18 Hz), beta 3 (18–25 Hz), high beta (25–30 Hz), gamma 1 (30–35 Hz), and gamma 2 (35–40 Hz). At least two minutes of EEG data from each participant were selected for quantitative analysis. Power spectrum analysis was performed using the 'Fast Fourier Transform' (FFT). For each of the 19 monopolar derivations, absolute power, relative power, and mean frequency were calculated for the above frequency bands. Absolute power ($\mu V^2$) was the only parameter used to generate functional images of neural electrical activity for the five classical EEG bands: delta, theta, alpha, beta, and gamma.

**Regional Analysis**

In this study, the three-dimensional intracerebral distribution of neural electrical activity, or current density, was evaluated using Low-Resolution Brain Electromagnetic Tomography (LORETA) across the 1–40 Hz frequency range. LORETA estimates this parameter from the distribution of scalp-recorded potentials based on the assumption that, among all possible solutions to the inverse problem, the smoothest solution is the most probable. This assumption is consistent with the premise that neighboring neurons are activated synchronously [30]. The three-dimensional solution space in LORETA is restricted to the cortical gray matter and hippocampus, as defined by the Talairach Brain Atlas [31] and its corresponding digital probabilistic atlas (Brain Imaging Centre, Montreal Neurological Institute).

**Statistical Analysis**

To compare each participant's EEG data between the rest and task conditions, a paired *t*-test was performed. Statistical significance was assessed at $p < 0.05$ and $p < 0.01$.

**Results**

The results showed a significant increase in gamma 2 activity (35–40 Hz) in the fronto-central region of the brain during the task condition compared with the resting condition (Figure 2).

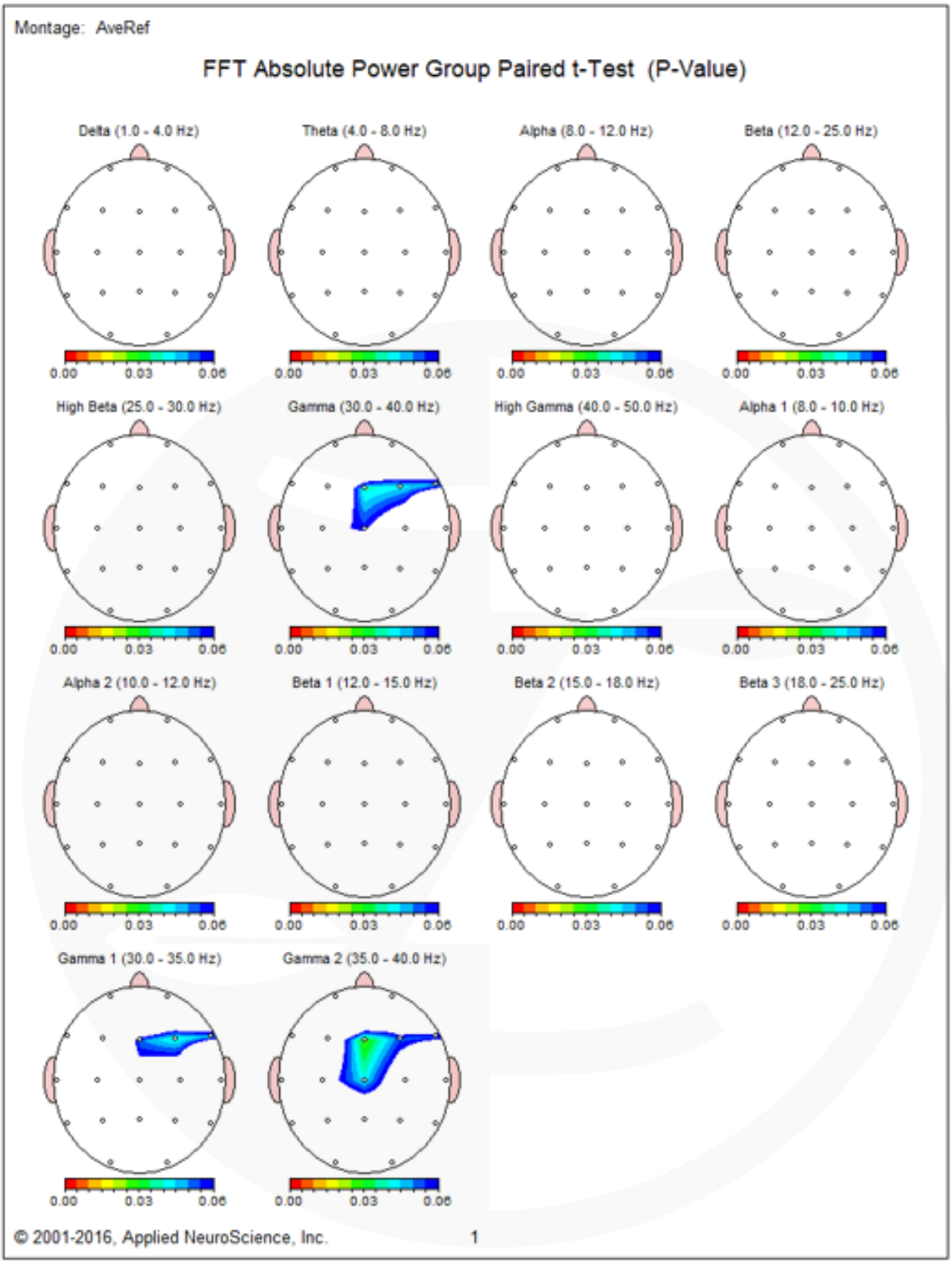



Figure 2. Increased gamma activity during the 'task' condition (i.e., Faradarmani Consciousness Field Connection) at electrodes Fz, F4, F8, and Cz (Sig. < 0.05).

As shown in Table 1, the increase in Gamma 2 (35–40 Hz) power at channels F4, F8, Fz, and Cz was statistically significant. The highest absolute Gamma 2 power was observed at Fz, while the greatest increase relative to the control condition was recorded at F8.

Table 1. Gamma 2 (35–40 Hz) band power across all 19 EEG channels during the 'rest' and 'task' conditions, and the differences between them.

| Channel | Rest | | Task | | Diff | | |
|---|---|---|---|---|---|---|---|
| | **Mean/μV²** | **SD** | **Mean/μV²** | **SD** | **Mean/μV²** | **P value** | **Diff. Percent** |
| FP1-AVE | 0.79 | 0.47 | 0.97 | 0.72 | 0.19 | 0.22 | 23.80% |
| FP2-AVE | 0.68 | 0.39 | 0.97 | 0.89 | 0.29 | 0.13 | 42.78% |
| F3-AVE | 0.62 | 0.59 | 0.82 | 0.70 | 0.20 | 0.09 | 31.25% |
| F4-AVE | 0.78 | 0.83 | 1.14 | 0.95 | 0.35 | 0.05 | 45.18% |
| C3-AVE | 0.44 | 0.30 | 0.72 | 0.72 | 0.29 | 0.07 | 66.25% |
| C4-AVE | 0.60 | 0.36 | 1.06 | 1.00 | 0.46 | 0.08 | 77.24% |
| P3-AVE | 0.43 | 0.29 | 0.67 | 0.66 | 0.23 | 0.10 | 53.46% |
| P4-AVE | 0.54 | 0.35 | 0.84 | 0.83 | 0.31 | 0.07 | 56.73% |
| O1-AVE | 0.63 | 0.50 | 0.83 | 0.72 | 0.20 | 0.14 | 31.98% |
| O2-AVE | 0.81 | 0.55 | 0.99 | 0.91 | 0.18 | 0.24 | 22.10% |
| F7-AVE | 0.75 | 0.55 | 1.09 | 0.73 | 0.34 | 0.16 | 44.62% |
| F8-AVE | 0.81 | 0.37 | 1.41 | 0.89 | 0.59 | 0.05 | 72.95% |
| T3-AVE | 0.59 | 0.40 | 0.85 | 0.68 | 0.26 | 0.14 | 44.34% |
| T4-AVE | 0.93 | 0.47 | 1.56 | 1.46 | 0.63 | 0.19 | 68.25% |
| T5-AVE | 0.49 | 0.33 | 0.61 | 0.48 | 0.12 | 0.26 | 24.03% |
| T6-AVE | 0.60 | 0.37 | 0.79 | 0.68 | 0.19 | 0.32 | 30.78% |
| Fz-AVE | 0.62 | 0.57 | 0.89 | 0.79 | 0.27 | 0.03 | 43.82% |
| Cz-AVE | 0.56 | 0.37 | 0.93 | 0.91 | 0.36 | 0.04 | 64.71% |
| Pz-AVE | 0.48 | 0.32 | 0.75 | 0.75 | 0.26 | 0.09 | 54.74% |

LORETA results revealed significant differences in the following brain regions. The first was the medial frontal gyrus, corresponding to Brodmann area 6 (BA6). The second was the paracentral lobule, corresponding to Brodmann area 31 (BA31).

Figures 3 and 4 show two-dimensional and three-dimensional maps of the brain activity in the *Faradarmangar* during the announcement of the FCF, relative to the resting state.

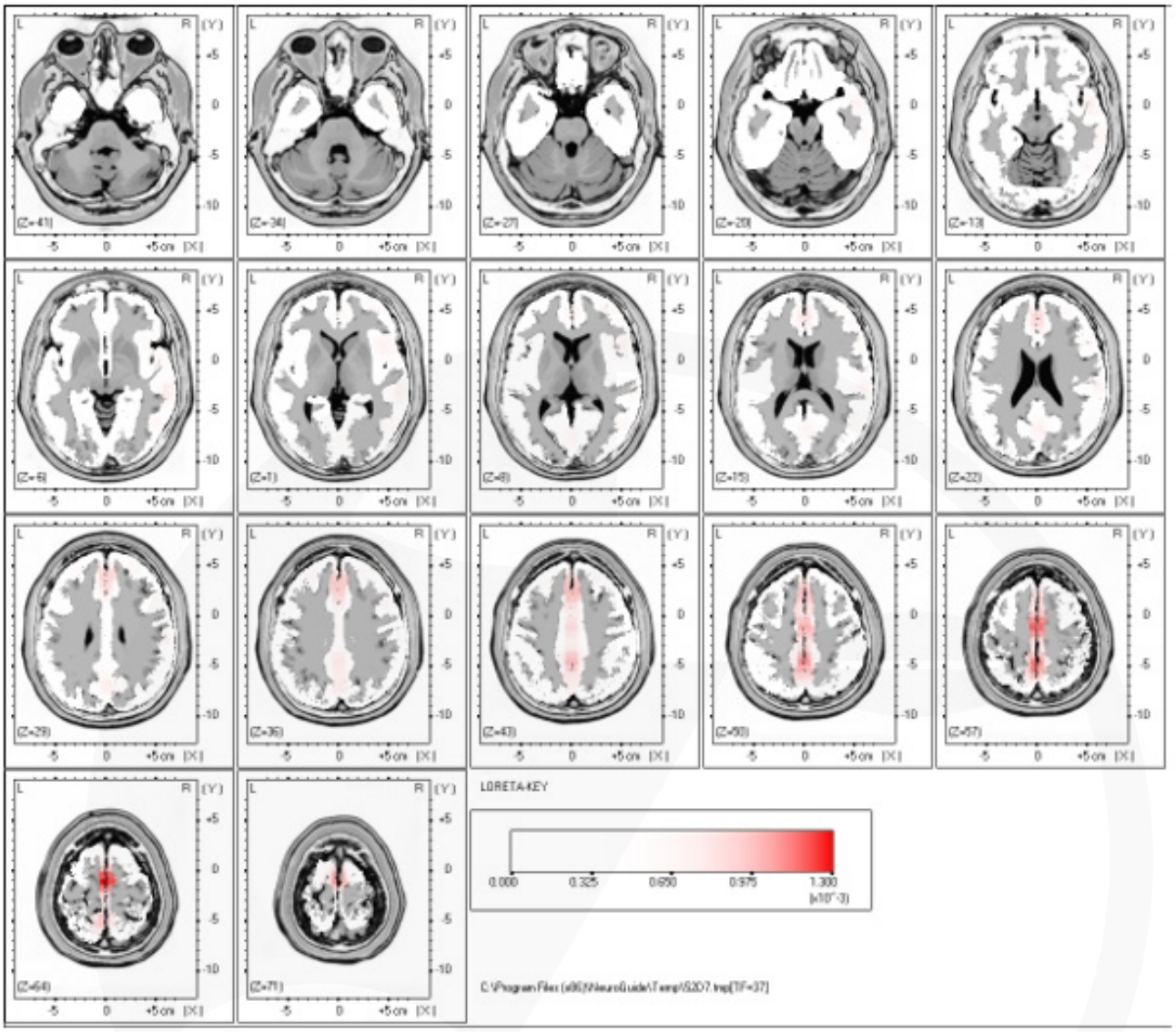



Figure 3. Two-dimensional representation of the brain activity regions in the Faradarmangar population during the Faradarmani Consciousness Field Connection.

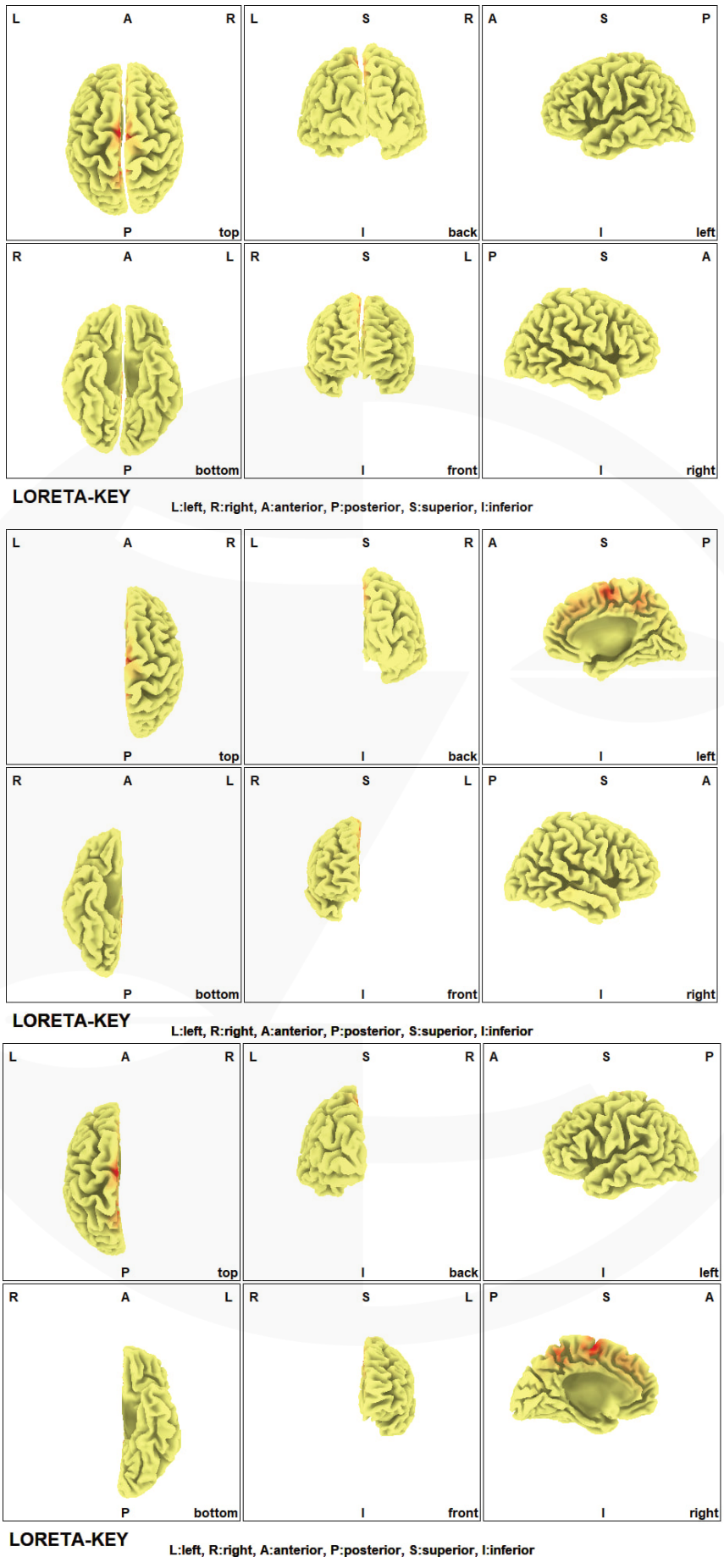



Figure 4. Three-dimensional map of the brain activity regions in the Faradarmangar population during the Faradarmani Consciousness Field Connection.

**Discussion**

Based on Mohammad Ali Taheri's theory, Faradarmani differs from other mind–body interaction methods in both mechanism and purpose. In its mechanism, emphasis is placed on the connection between the Whole Consciousness, or the Cosmic Consciousness Network (CCN), which contains the data and information of the totality of the universe and every animate and inanimate component of it. The purpose of this 'Connection' is defined as the correction and reconstruction of the mentioned components. In this approach, during a Connection initiated by *Faradarmangar* (announcer), the human brain functions as a detector and receiver, exhibiting the manifestations of this Connection and serving as its intermediary.

In this study, which was conducted in line with other approaches for investigating mind–body interactions and aimed at examining brain electrical activity during the *Faradarmani* Connection in a *Faradarmangar* population, it was observed that brain activity during this Connection, compared to the 'rest' condition within the same individuals, was restricted to gamma activity, and the waves were localized to regions associated with the brain's default state. Furthermore, during this Connection, an increase in intrinsic brain activity related to overall brain function (DMN), which consumes more than 90% of brain energy, was notable [32].

Gamma waves are considered the fastest brain activity and are associated with cognitive functions, learning, information processing, attention, concentration, multisensory integration (olfactory, visual, and auditory), consciousness, problem solving, mental processing, and perception. It has also been reported that gamma waves may serve as a biomarker for depression, and both pharmacological and non-pharmacological antidepressant treatments can affect gamma activity [33]. Increased gamma activity has been suggested as a therapeutic approach in the treatment of several conditions, including Alzheimer's disease [34].

On the other hand, the functions of the two activated brain regions in the frontal lobe—the frontal gyrus (BA6) and the paracentral region (BA31)—in the *Faradarmangar* population during the FCF connection have previously been identified in various conscious experiences. The first region, BA6, is mainly associated with multiple functions related to movement sequencing and motor planning [35]. The involvement of BA6 in memory, attention, and executive functions may be due to the activation of a broader brain network that sometimes recruits this region [36].

The second region, BA31, is known for its primary role in emotion as well as its involvement in different types of memory (e.g., topographical memory, episodic memory, etc.) [37,38]. This region is also one of the areas included in the DMRSN (default mode resting state network) [39].

Based on the results of this study, although the use of Faradarmani in terms of mental mediation and being placed in the present moment during task performance is similar to various mind–body interaction methods, the increase in gamma wave power in the frontal lobe, medial frontal gyrus (BA6) and paracentral lobule (BA31), and the absence of increased low-frequency waves (as typically observed in mind–body interaction methods), in addition to supporting the effectiveness of the Faradarmani Consciousness Field, indicate that the manifestations of the Faradarmani Connection are completely different and distinct from known meditation and mind–body methods. It is hypothesized that information transferred from T-Consciousness Fields leads to changes in the treated subjects. In this study, the increase in gamma power and activity in regions associated with memory, attention, perception, and motor functions provides evidence for this effect. Further investigations on obtaining brain electrical and metabolic activity patterns during the Faradarmani Connection in a Faradarmangar population compared to a non-Faradarmangar population are planned by the authors. Additionally, studies on patient populations with disorders related to the activated regions and frequency bands observed in this study will be of particular importance.

**Acknowledgement**

The authors of this work would like to express their gratitude to the National Brain Mapping Lab (NBML) of Tehran, Iran, for providing the data collection services for this research work.

**References**

1. Hameroff, S., & Penrose, R. (2014). Consciousness in the universe: A review of the 'Orch OR'theory. *Physics of life reviews*, *11*(1), 39-78.

2. LeDoux, J. E., Michel, M., & Lau, H. (2020). A little history goes a long way toward understanding why we study consciousness the way we do today. *Proceedings of the National Academy of Sciences*, *117*(13), 6976-6984.

3. Millett, D. (2001). Hans Berger: From psychic energy to the EEG. *Perspectives in biology and medicine*, *44*(4), 522-542.

4. Crick, F., & Koch, C. (1990, January). Towards a neurobiological theory of consciousness. In *Seminars in the Neurosciences* (Vol. 2, No. 263-275, p. 203).

5. Meador, K. J., Ray, P. G., Echauz, J. R., Loring, D. W., & Vachtsevanos, G. J. (2002). Gamma coherence and conscious perception. *Neurology*, *59*(6), 847-854.

6. Golledge, H. D., Hilgetag, C. C., & Tovée, M. J. (1996). Information processing: A solution to the binding problem?. *Current Biology*, *6*(9), 1092-1095.

7. Landau, A. N., Esterman, M., Robertson, L. C., Bentin, S., & Prinzmetal, W. (2007). Different effects of voluntary and involuntary attention on EEG activity in the gamma band. *Journal of Neuroscience*, *27*(44), 11986-11990.

8. Jensen, O., Kaiser, J., & Lachaux, J. P. (2007). Human gamma-frequency oscillations associated with attention and memory. *Trends in neurosciences*, *30*(7), 317-324.

9. Abhang, P. A., Gawali, B. W., & Mehrotra, S. C. (2016). *Introduction to EEG-and speech-based emotion recognition*. Academic Press.

10. Clarke, E., Dewhurst, K., & Aminoff, M. J. (1996). *An illustrated history of brain function: imaging the brain from antiquity to the present*. Norman Publishing.

11. Tortora, G. J., & Derrickson, B. H. (2018). *Principles of anatomy and physiology*. John wiley & sons.

12. Koch, C., Massimini, M., Boly, M., & Tononi, G. (2016). Neural correlates of consciousness: progress and problems. *Nature reviews neuroscience*, *17*(5), 307-321.

13. Shulman, G. L., Fiez, J. A., Corbetta, M., Buckner, R. L., Miezin, F. M., Raichle, M. E., & Petersen, S. E. (1997). Common blood flow changes across visual tasks: II. Decreases in cerebral cortex. *Journal of cognitive neuroscience*, *9*(5), 648-663.

14. Raichle, M. E., MacLeod, A. M., Snyder, A. Z., Powers, W. J., Gusnard, D. A., & Shulman, G. L. (2001). A default mode of brain function. *Proceedings of the national academy of sciences*, *98*(2), 676-

682.

15. Buckner, R. L., Andrews-Hanna, J. R., & Schacter, D. L. (2008). The brain's default network: anatomy, function, and relevance to disease. *Annals of the new York Academy of Sciences*, *1124*(1), 1-38.

16. Gusnard, D. A., & Raichle, M. E. (2001). Searching for a baseline: functional imaging and the resting human brain. *Nature reviews neuroscience*, *2*(10), 685-694.

17. Mason, M. F., Norton, M. I., Van Horn, J. D., Wegner, D. M., Grafton, S. T., & Macrae, C. N. (2007). Wandering minds: the default network and stimulus-independent thought. *science*, *315*(5810), 393-395.

18. Li, J., Curley, W. H., Guerin, B., Dougherty, D. D., Dalca, A. V., Fischl, B., ... & Edlow, B. L. (2021). Mapping the subcortical connectivity of the human default mode network. *Neuroimage*, *245*, 118758.

19. Berkovich-Ohana, A., Glicksohn, J., & Goldstein, A. (2012). Mindfulness-induced changes in gamma band activity–implications for the default mode network, self-reference and attention. *Clinical neurophysiology*, *123*(4), 700-710.

20. Berkovich-Ohana, A., Glicksohn, J., & Goldstein, A. (2014). Studying the default mode and its mindfulness-induced changes using EEG functional connectivity. *Social cognitive and affective neuroscience*, *9*(10), 1616-1624.

21. Kaur, C., & Singh, P. (2015). EEG derived neuronal dynamics during meditation: Progress and challenges. *Advances in preventive medicine*, *2015*(1), 614723.

22. Desai, R., Tailor, A., & Bhatt, T. (2015). Effects of yoga on brain waves and structural activation: A review. *Complementary therapies in clinical practice*, *21*(2), 112-118.

23. Lomas, T., Ivtzan, I., & Fu, C. H. (2015). A systematic review of the neurophysiology of mindfulness on EEG oscillations. *Neuroscience & Biobehavioral Reviews*, *57*, 401-410.

24. Garrison, K. A., Zeffiro, T. A., Scheinost, D., Constable, R. T., & Brewer, J. A. (2015). Meditation leads to reduced default mode network activity beyond an active task. *Cognitive, Affective, & Behavioral Neuroscience*, *15*(3), 712-720.

25. Brewer, J. A., Worhunsky, P. D., Gray, J. R., Tang, Y. Y., Weber, J., & Kober, H. (2011). Meditation experience is associated with differences in default mode network activity and connectivity. *Proceedings of the National Academy of Sciences*, *108*(50), 20254-20259.

26. Braboszcz, C., Cahn, B. R., Levy, J., Fernandez, M., & Delorme, A. (2017). Increased gamma brainwave amplitude compared to control in three different meditation traditions. *PloS one*, *12*(1), e0170647.

27. Cahn, B. R., Delorme, A., & Polich, J. (2010). Occipital gamma activation during Vipassana meditation. *Cognitive processing*, *11*(1), 39-56.

28. Cahn, B. R., & Polich, J. (2006). Meditation states and traits: EEG, ERP, and neuroimaging studies. *Psychological bulletin*, *132*(2), 180.

29. Taheri MA: “Human from another outlook” Interuniversal Press; 2nd Edition (September 26, 2013). ISBN-13: 978-1939507006, ISBN-10: 1939507006 2013.

30. Pascual-Marqui, R. D., Michel, C. M., & Lehmann, D. (1994). Low resolution electromagnetic tomography: a new method for localizing electrical activity in the brain. *International Journal of psychophysiology*, *18*(1), 49-65.

31. Talairach, J., & Tournoux, P. (1988). *Co-planar stereotaxic atlas of the human brain: 3-dimensional proportional system: an approach to cerebral imaging*. G. Thieme; New York: Thieme Medical Publishers.

32. Raichle, M. E., & Snyder, A. Z. (2007). A default mode of brain function: a brief history of an evolving idea. *Neuroimage*, *37*(4), 1083-1090.

33. Fitzgerald, P. J., & Watson, B. O. (2018). Gamma oscillations as a biomarker for major depression: an emerging topic. *Translational psychiatry*, *8*(1), 177.

34. McDermott, B., Porter, E., Hughes, D., McGinley, B., Lang, M., O’Halloran, M., & Jones, M. (2018). Gamma band neural stimulation in humans and the promise of a new modality to prevent and treat Alzheimer’s disease. *Journal of Alzheimer’s Disease*, *65*(2), 363-392.

35. Shah, K. B., Hayman, L. A., Chavali, L. S., Hamilton, J. D., Prabhu, S. S., Wangaryattawanich, P., ... & Kumar, A. J. (2015). Glial tumors in brodmann area 6: spread pattern and relationships to motor areas. *Radiographics*, *35*(3), 793-803.

36. Catalan, M. J., Honda, M., Weeks, R. A., Cohen, L. G., & Hallett, M. (1998). The functional neuroanatomy of simple and complex sequential finger movements: a PET study. *Brain: a journal of neurology*, *121*(2), 253-264.

37. Berthoz, A. (1997). Parietal and hippocampal contribution to topokinetic and topographic memory. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, *352*(1360), 1437-1448.

38. Krause, B. J., Horwitz, B., Taylor, J. G., Schmidt, D., Mottaghy, F. M., Herzog, H., ... & Mueller-Gaertner, H. W. (1999). Network analysis in episodic encoding and retrieval of word-pair associates: A PET study. *European Journal of Neuroscience*, *11*(9), 3293-3301.