

Influence of Faradarmani Consciousness Field on Spatial Memory and Passive Avoidance Behavior of Scopolamine Model of Alzheimer Disease in Male Wistar Rats

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Abstract

Alzheimer's disease (AD) is a growing public health concern, affecting millions of patients worldwide and costing billions of dollars annually. There is a pressing need to find effective treatment strategies for AD. In the 1980s, Mohammad Ali Taheri introduced novel fields with a non-material, non-energetic nature, named Taheri Consciousness Fields (TCFs). One of these fields, Faradarmani Consciousness Field (FCF), has been introduced as a complementary medicine, and its effects can be investigated through reproducible laboratory experiments. In this study, we evaluated the influence of FCF on scopolamine-induced memory impairments in male Wistar rats. Rats were divided into four groups (n=10 each). The scopolamine groups received a single injection of scopolamine (SCP) (5 mg/kg) intraperitoneally one hour before the test. Rats in the FCF groups were exposed to this treatment one day before the administration of scopolamine. The passive avoidance and Morris water maze (MWM) tests were conducted to evaluate memory function in the scopolamine-induced rats. The results of passive avoidance and MWM tests revealed that scopolamine induced a decline in spatial memory and cognitive function. Whereas, rats treated by FCF spent more time in target zone and the step through latency was significantly greater than SCP group without FCF. Moreover, rats had lower velocity which may be related to the reduction in stress under FCF. Overall, FCF could significantly ameliorate scopolamine-induced cognitive impairment. Further experiments are required to investigate how exactly this field influence memory at the molecular level.

Keywords: Alzheimer's disease; Faradarmani; Taheri Consciousness Field; memory; scopolamine; Complementary therapy

Introduction

Alzheimer's disease (AD) is one of the top ten deadly and most expensive diseases, especially in advanced societies. According to WHO, around 55 million people live with dementia worldwide and this number is expected to rise to 78 million in 2030 and 139 million in 2050. AD is a chronic neurodegenerative disease that usually starts slowly and gradually worsens over time. Experimental and clinical studies suggest that the cholinergic system plays an important role in the process of memory and learning (Maurer and Williams, 2017). Studies show that cholinergic degradation leads to changes in the distribution of cholinergic receptors and a decrease in acetyl esterase and acetylcholine transferase levels in the brains of Alzheimer's patients (Contestabile et al., 2008). Some anticholinergic drugs such as scopolamine have shown impairments in animals' memory (Bubser et al., 2012). The application of scopolamine as a non-selective muscarinic receptor can induce cholinergic dysfunction, so it has been frequently used to create animal models of AD (Bartus, 2000; Blokland, 1995; Gallagher and Colombo, 1995).

The Morris water maze (MWM), was first developed in the early 1980s (Morris et al., 1982), and described as a device to investigate spatial learning. It has been widely used in behavioural neuroscience ever since (Bye et al., 2019; D'Hooge and De Deyn, 2001). Inhibitory avoidance test - also called 'passive avoidance' - is another popular paradigm that is commonly used to investigate learning and memory processes in rodents (Gold, 1986; Sadek et al., 2016). In this test, rats receive a single foot shock after stepping from a lighted compartment into a darkened compartment in a straight alley and after 24 or 48 hours. Retention of the training is tested by measuring the rat's latency to enter the former shock compartment when placed in the lighted compartment. Longer latency is an adaptive response to a stressful experience that interprets as a measure of learning and memory (McGaugh et al., 1988).

Extensive studies have examined the efficacy of various chemical drugs and complementary and alternative (CAM) treatment strategies in AD rat models prior to clinical use (Park et al., 2017; Yuede et al., 2007). There is no effective method to delays the onset or slows the progression of AD and its related memory loss (Holtzman et al., 2011; Moss, 2020). It seems that drug therapy can only help to control the temporary symptoms of the disease. At present, the highly viable target for improving Alzheimer's symptoms is cholinesterase inhibitors (ChEIs). Three ChEIs are currently use for mild-moderate AD including donepezil, rivastigmine and galantamine (Long and Holtzman, 2019) which boost the neurotransmitter level at the synapse and thereby increase the cholinergic function. However, these afford palliative relief, and no curative one (Borlongan, 2012).

The nature of consciousness and its place in science have garnered much attention in the current century, leading to the proposal of many philosophical and scientific theories. According to Taheri, there are various T-Consciousness Fields (TCFs) with different functions, which are subcategories of a networked universal internet called the Cosmic Consciousness Network (CCN). One of these fields, the Faradarmani Consciousness Field (FCF) has been introduced as a complementary therapy. The major difference between the theory of TCFs and other theoretical concepts about consciousness lies in the practical application of TCFs. TCFs can be applied to all living and non-living entities, including plants, animals, microorganisms, and materials (Taheri, 2013).

Previously, the effects of TCFs have been investigated on the brain during the connection to the CCN (Taheri et al., 2021; Taheri et al., 2022c; Taheri et al., 2022d). In the present study, the effect of Faradarmani Consciousness Field (FCF) on an AD rat model has been investigated with the general aim of investigating the efficacy of this treatment as a complementary therapy. Regardless of its mechanism(s), we report evidence of the ameliorative effect of FCF on

scopolamine-induced memory impairment in the AD rat model.

Materials and Methods

In this study, a total of 80 male Wistar rats obtained from Pasteur Institute of Iran (10 rats in each sample and control group of each test) with a weight range of 240-280 g were used. The weekly age of the rats was 12 to 16 weeks. The light conditions were 12 hours of light and 12 hours of darkness and the rats were kept at a controlled ambient temperature (22 ± 2 °C). All these and following animal experiments were approved by the Laboratory Animal Ethics Committee of Pasteur Institute of Iran and complied with NIH Guide for the Care and Use of Laboratory Animals.

FCF application

FCF was applied to the samples according to the protocols regulated by the COSMOintel research center and based on the description provided in the general considerations of this issue. In this study, FCF treatment is applied through human mind which plays a part by fleeting attention to the subject of study. In other words, this short attention occurred every day for those rats that were kept in the sample (treatment) cages. Moreover, the daily water consumed by rats was under the influence of T-Consciousness Charge, during the whole study time. As it was mentioned above, all the procedures were conducted through the mind with a brief attention to the water or sample cage.

Animal groups

The animals had adequate access to water and food except during behavioural experiments and were divided into the following groups:

1. The control group (PBS): The group that received only PBS (Phosphate Buffer Saline) intraperitoneally one hour before the test.

2. Scopolamine group (SCP): one hour before the test, a dose of 5 mg/kg scopolamine (Sigma Aldrich Company) was injected intraperitoneally.
3. Treatment group (FCF + PBS): The animals were under influence of FCF one day before the test and received PBS intraperitoneally one hour before the test.
4. Treatment group and scopolamine (FCF + SCP): The animals were under influence of the FCF one day before the test and received 5 mg/kg intraperitoneally one hour before the test.

A week later, a recall test was performed for all the aforementioned groups.

MWM test

The Morris water maze includes a black water tank with a diameter of 155 cm and a depth of 70 cm. The maze is physically divided into four quarters of a circle, and a rescue platform is placed in the middle of one of these four quarters so that it is approximately 1.5 cm below the water surface and is not visible from the outside. The water temperature was controlled to remain at 20 to 22°C. The maze was in a room with various spatial signs that were fixed during the experiments and were visible to the animal in the maze. Swimming activity of the rat was monitored and recorded by a camera that was suspended over the center of the pool.

Training related to MWM

During this stage, the animal was slowly released from one of the four quarters of the water maze into the water and the rat was allowed to find a hidden platform underwater for 60 seconds. After the animal found the platform, the rat was allowed to remain on the platform for 15 seconds to identify its position in the environment. If the rat could not find the platform, it was guided to the platform and after 15 seconds it was removed from the platform and returned with a dry towel to the cage. After 10 minutes, the rat was placed

into the water from another four quarters of the water maze. Every rat was released into the water daily from four separate quarters in the water maze tank and this training was repeated for three consecutive days.

Probe test with MWM

This step was performed 24 hours and one week after the last training session. In this way, the platform was removed from the maze and the animal was slowly released into the water from the opposite quarter of the platform position. If the rats had learned well, they would spend most of their time in the target quadrant where the platform was located. Staying time and distance traveled, speed and distance of swimming from the hidden platform position were recorded and analyzed by EthoVision software version 7.

Inhibitory or passive avoidance test

The shuttle box consists of two separate parts (chambers) that are separated by a guillotine valve. The walls and floor of one of these rooms are white (light) and the other is black (dark). The floor of the darkroom has metal rods parallel to the width and with a distance of one centimeter, which can be used to apply an electric shock to the animal's feet with the intensity of 1.5 mA for 1.5 seconds by using a stimulator device. This step was performed for two consecutive days.

Adaptation and Training Session

At this point, each rat was gently placed inside the light chamber and after 10 seconds the guillotine lid was removed and the rat was allowed to enter the dark chamber. The latency time until the rats entered the dark chamber was recorded. The criterion for the animal to enter the dark part was the rat legs entering the dark room. The guillotine door was then closed, and the rat was returned to its box after 20 seconds. After two minutes, the same rat was placed in the light part of the chamber and as soon as the animal entered the dark chamber, the guillotine door closed and the rat was shocked through the metal rods of the dark chamber floor (50 Hz,

1.5 s and 5 mA). After 20 seconds, the rat was removed from the device and transferred to its box. After two minutes, the same rat was placed in a lighted chamber and the guillotine door was opened. The rat was returned to his box but would be shocked if it entered a darkroom within 120 seconds. If the rat received more than three shocks, it was excluded from the experiment.

Retention stage

This step was performed twenty-four hours and one week after training. By placing each rat in the light chamber and opening the guillotine door after 10 seconds, the latency for entering each rat into the dark chamber was determined as a measure of memory and recorded as step-through latency (STL). The total time spent in the darkroom as well as the numbers of round trips between the two rooms in 600 seconds were recorded.

Statistical analysis

The results of this experiment were statistically analyzed using GraphPad Prism software version six. Results of Shuttle Box, MWM training and Probe Water Maze Test were analyzed using "one-way ANOVA", "two-way ANOVA and Bonferroni Post-Test", "one-way ANOVA and Tukey test", respectively. p-values less than 0.05 were considered significant.

Results

MWM test

The results of the Morris water maze test between 4 groups (PBS, scopolamine (SCP), FCF + PBS and FCF + SCP) on training days (three consecutive days) showed no significant difference between groups in a delay time in finding a platform (Escape latency). It should be noted that none of the groups were treated during the training phase.

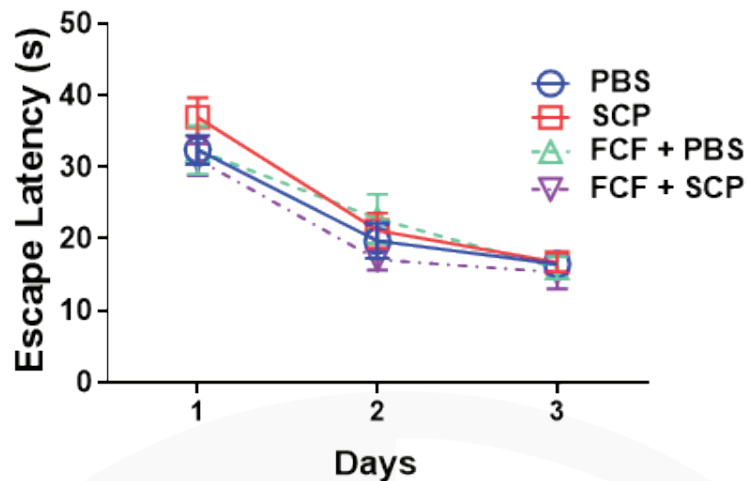


Figure 1. Morris water maze test to find the platform on training days (FCF: Faradarmani Consciousness Field treatment. SCP: Scopolamine. PBS: Phosphate Buffer Saline).

24 hours after the last training session, a memory test or probe was performed. One hour before the probe test, the control and FCF + PBS groups were treated with PBS and other groups

were treated with scopolamine. The effects of scopolamine and PBS on animal performance at the probe stage are shown in Figure 2.

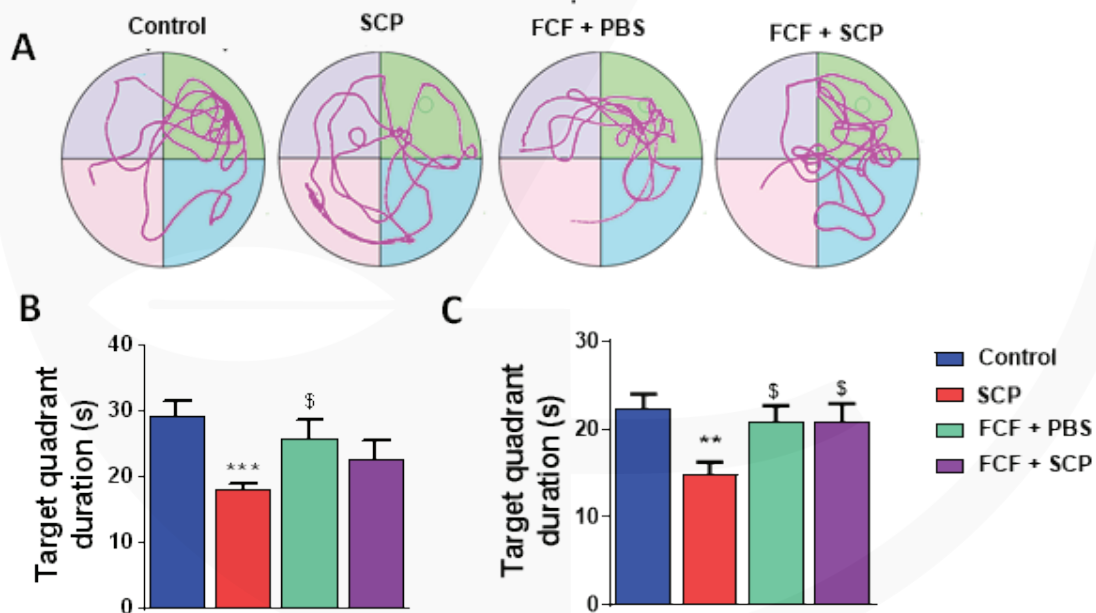


Figure 2. Scopolamine impaired spatial memory. A) Representative swimming trace of rats in the Morris tank during the second probe test (one week after the last training session). B) 24 hours after the last training session. C) One week after training, the recall test (Probe 2). (** and ***: differences with control group $p < 0.01$ and $p < 0.001$, respectively. \$: Difference with scopolamine group $p < 0.05$. FCF: Faradarmani Consciousness Field treatment. SCP: Scopolamine. PBS: Phosphate Buffer Saline). All values are presented as means \pm standard error (mean \pm S.E).

Swimming trace of rats in Morris tank showed various pattern in each group (Fig, 2A). Also, spatial memory in SCP group remarkably impaired in both probes 1 ($p < 0.001$) and 2 ($p < 0.01$) in comparison with the control. In the second probe test scopolamine-induced memory deficit was significantly reversed under the influence of FCF ($p < 0.05$) (Fig, 2C).

Figure 3 indicates the speed of movement of animals in experimental groups. The FCF + SCP group has lower velocity in probes 1 and 2 than the SCP group. In probe 2, the velocity of the FCF + SCP group was significantly lower than the control group ($p < 0.05$).

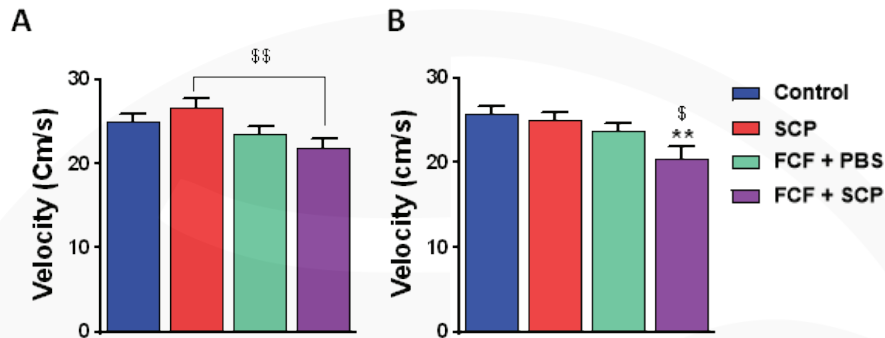


Figure 3. Speed of animals in probes 1 and 2. FCF reduced the speed of movement of animals in the scopolamine-treated group (**: Difference with control group $p < 0.01$. \$ and \$\$: Difference with scopolamine group $p < 0.05$ and $p < 0.01$, respectively. FCF: Faradarmani Consciousness Field treatment. SCP: Scopolamine. PBS: Phosphate Buffer Saline). All values are presented as means \pm standard error (mean \pm S.E).

Passive avoidance learning and memory test results

Figure 4 shows that no significant difference was observed in the initial latency to enter the dark chamber (A). Note that at this stage, the experimental groups have not yet received any treatment. Animals treated with scopolamine showed impaired avoidance memory 24 hours after training (Fig, 4B). There was no significant

difference between FCF treatment (FCF + PBS) and the control group (PBS). However, the application of FCF in scopolamine-treated groups (FCF + SCP) prevented memory impairment and restored the ability to recall in this group. Interestingly, the time delay in entering the dark chamber one week after the training increased to a great extent as compared to the SCP group (Fig, 4C).

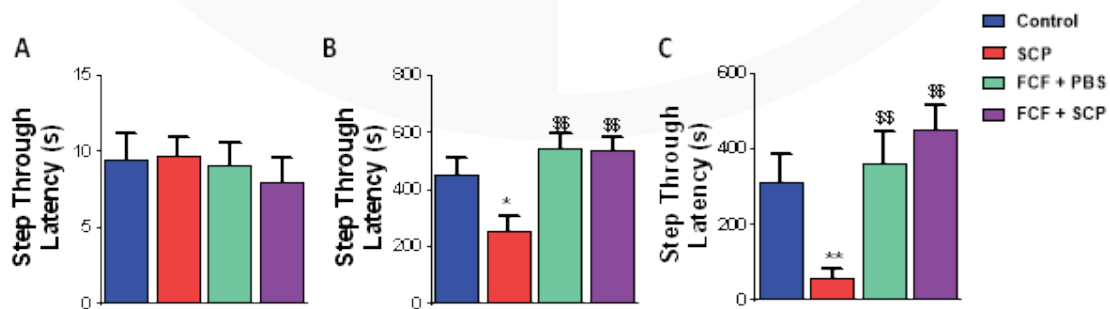


Figure 4. Passive avoidance memory test. A) Delay time in entering the darkroom on the first encounter with the device. B) The delay time in entering the dark compartment 24 hours after the training. C) The time delay in entering the dark chamber one week after the training (* and **: differences with control group $p < 0.05$ and $p < 0.01$, respectively. \$\$: Difference with scopolamine group $p < 0.01$. FCF: Faradarmani Consciousness Field treatment. SCP: Scopolamine. PBS: Phosphate Buffer Saline). All values are presented as means \pm standard error (mean \pm S.E).

As Figure 5A presents, scopolamine significantly increased the time spent in the dark compartment (where the shock was received 24 hours ago). No significant difference was observed between the control and FCF + PBS group. Whereas, in SCP group under FCF treatment the time spent in the dark chamber notably reduced when compared with the SCP without FCF. Figure 5B presents

the time spent in the darkroom one week after receiving the shock. The scopolamine-treated group spent more time in the darkroom than the control group and FCF treatment reduced this time significantly.

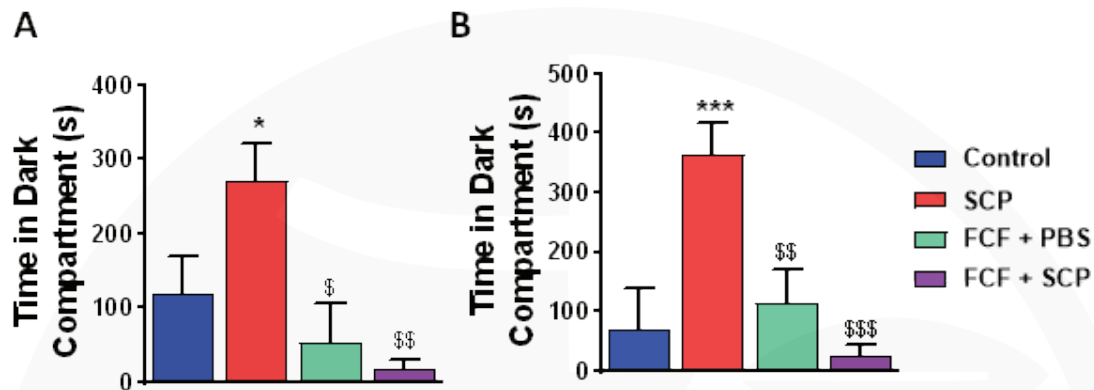


Figure 5. Time spent in the dark chamber. A) Avoidance memory test 24 hours after receiving electric shock. B) Avoidance memory test one week after receiving the electric shock. (* and ***: differences with control group $p < 0.05$ and $p < 0.001$, respectively. \$, \$\$ and \$\$\$: Difference with scopolamine group $p < 0.05$, $p < 0.01$ and $p < 0.001$, respectively. FCF: Faradarmani Consciousness Field treatment. SCP: Scopolamine. PBS: Phosphate Buffer Saline). All values are presented as means \pm standard error (mean \pm S.E).

Discussion

In this experiment, using scopolamine-induced memory impairment in male Wistar rat, we investigated whether Faradarmani as a non-material/non-energetic field could alleviate cognitive dysfunction in rats. One of the main characteristics of AD is the basal and hippocampus degeneration of cholinergic neurons specifically in the nucleus basalis of Meynert (Al-Shaikh et al., 2020). Scopolamine is frequently used *in vivo* models for mimicking those observed in AD (San Tang, 2019). The use of animal models to evaluate the effectiveness of various drugs and treatments for AD, with all the limitations of these models, is an inevitable and invaluable experimental need (Neff, 2019). Passive and active behavioural avoidance and spatial memory tests have been utilizing to evaluate the effectiveness of different neuroprotective agents against AD (Komaki et

al., 2019; Schmidt et al., 2017; Scuderi et al., 2014).

Conventional treatments such as donepezil or galantamine lead to an increase in acetylcholine levels and cognitive improvement in individuals with AD (Bezerra da Silva et al., 2016; Li et al., 2019). However, these drugs are supportive rather than curative, and they cannot increase the lifespan of AD patients. Meanwhile, cholinesterase inhibitors may worsen cognition at early stage and may not improve the cognitive course in mild AD dementia (Han et al., 2019). Therefore, identification of the therapeutic substitutes for the treatment of AD is of crucial importance.

The field concept is used frequently in physical theories and there have been many attempts to explore and explain physical laws, such as gravity, electromagnetic and electric field. When

it comes to therapeutic effects, the relationship between AD and electromagnetic field has been investigated (Dasdag et al., 2020). According to a number of experiments, this field may increase the risk of AD (Jalilian et al., 2018; Sobel and Davanipour, 1996) by inducing an enhancement in Amyloid-beta, which is known as a common marker of AD in the brain (Davanipour and Sobel, 2009). Conversely, it has been reported that extremely low frequency electromagnetic fields can improve cognitive disorder signs of AD rat model (Akbarnejad et al., 2018). About forty years ago Mohammad Ali Taheri introduced novel fields (TCFs) (Taheri, 2013) that are completely different from all known physical fields (Taheri et al., 2021). As explained in the introduction, FCF has been introduced with a therapeutic effect, and it is possible to examine its effects through reproducible experiments.

According to the obtained results from MWM, FCF had an alleviative effect on SCP-treated rats. The reduction in the speed of swimming in FCF treated rats may suggest an overall reduction in the rat stress. According to a study stressed-out rats have higher movement speed and show longer path in MWM (Gehring et al., 2015). The results of this study align with previous research showing that FCF treatment reduces tau protein concentration in AD neuronal cells under aging stress, stabilizes microtubules, and decreases amyloidopathy. It was reported that FCF prominently suppressed neurodegeneration in cultured neurons, leading to the elimination of tau protein accumulation (Taheri et al., 2021).

TCFs are neither matter nor energy and their influence initiate with a brief attention to the samples through the human mind. Therefore, the main limitation of this study is that there is no possibility to measure FCF, as a non-physical field, directly with scientific tools. However, it is possible to investigate their effects indirectly through designing various experiments.

As a matter of fact there are many different kinds of complementary therapies based on mind-body interaction such as meditation (Danucalov et al., 2013) and mindfulness

(Russell-Williams et al., 2018). It is impossible to measure their level of stimulation quantitatively, but their effects can be evaluated by applying them to treatment groups and comparing the observed outcomes with control groups. Other experiments worth mentioning include mind-matter interactions in random number generators, which similarly investigate the effects of the mind on data transfer (Radin and Patterson, 2007). Although FCF and meditation both affect the body through the mind, there are significant differences between them. In meditation, the individual's mind plays an active role, whereas in FCF treatment, the mind acts as an intermediary to transmit information from the Cosmic Consciousness Network (CCN) to the subject under study. This approach allows the examination of FCF's influence on various subjects, ranging from plants and animals to molecules and materials. To our knowledge, however, there is no animal testing in meditation and other mind-body therapies.

The practical application of TCFs allows researchers to design various experiments within their fields, aiming to explore the existence of T-consciousness as a third element of the universe, distinct from matter and energy. It means that the effects of TCFs can be investigated on different subjects even if they are not alive. For example, it was found that FCF alleviated adverse effects of salinity stress on wheat plant (Torabi et al., 2021), death and survival of cancer cell line changed under FCF treatment (Taheri, 2022). Moreover, the properties of the materials changed significantly after being exposed to the TCFs (Taheri et al., 2022a, 2022b; Taheri et al., 2021).

In conclusion, this experiment provides evidence of the effects of FCF on an AD rat model. The observed results in this study warrant further research to elucidate the mechanism(s) of FCF and its protective effect against cognitive disorders.

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