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Investigating the Effects of Taheri Consciousness Field 1 on the Enzyme-Like Behavior of Gold Nanozyme

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Abstract

The study of chemical structures with bio-molecular activity that mimic the behavior of biological molecules has always been of interest to researchers in the field of early life as well as in technology and industry. Among these compounds, a type of nanomaterial with enzyme-like activity, called Nanozyme, has comparable performance with endogenous cellular compounds and holds great potential in replacing natural enzymes. T-Consciousness Fields (TCFs) have a non-frequency and non-physical nature, which distinguishes them from known physical fields. The effects of these fields are initiated through the mind of the announcer. It is hypothesized that the information transmitted by these fields may lead to the optimization of the system under study. In this study, we investigated the effects of a type of T–Consciousness Field (TCF1) on the physicochemical structure and function of gold nano-chemical models. Using electron microscopy, dynamic light scattering, and kinetic assays, we observed significant changes in the nanoparticle size distribution (about 20%) and its kinetic constants (about 4%) under the influence of the TCF. The results of this study, in accordance with previous experiments, provide evidence of the effects of these non-physical fields. We suggest that the effects of TCFs on various biomimetic molecules be further investigated to better understand the mechanism of TCFs.

Keywords: Au-Nanozyme, Biomimetic, T–Consciousness Fields, enzyme-like activity

Introduction

Natural enzymes are ubiquitous biocatalysts with high substrate specificity (Nelson et al., 2008) that have attracted enormous attention because of their application and utilization in pharmaceutical processes (Chapman et al., 2018), agrochemical production (Barber, 2009), bio-sensing (Leca-Bouvier et al., 2010), and industry (Araújo et al., 2008; Yushkova et al., 2019). Natural enzymes accelerate the rate of chemical reactions up to 10^{19} times for a specific substrate (Lin et al., 2014). However, these enzymes have several intrinsic drawbacks, which limit their utilization in practical applications. For instance, natural enzymes are proteins or ribonucleic acids, which inevitably require strict physiological conditions for performing their catalytic functions. Other limitations include ease of denaturation and the high cost of synthesis, isolation, and purification (Singh, 2019; Wang et al., 2016). To tackle these drawbacks, tremendous efforts have been made to develop biomimetic catalysts. Over the past two decades, along with advances in nanotechnology, nanozymes have been designed with better catalytic activities under various conditions such as changing temperature, pH, substrate availability, and specificity. Such relatively easy synthesis has attracted considerable attention (Yadav and Singh, 2021).

In 2007, it was reported for the first time that magnetite nanoparticles (Fe_3O_4) possess intrinsic enzyme-mimetic activity similar to natural peroxidases (Gao et al., 2007). Since then, more than 300 types of nanomaterials have been discovered to mimic the intrinsic enzyme-like activities of peroxidase, oxidase, haloperoxidase, catalase, superoxide dismutase, glutathione reductase, and others (Wang et al., 2020). Enzymatic activities partly depend on the function of scavenging free radicals. Nanozyme functions have been divided into two categories, antioxidants and pro-oxidants, depending on the generation of free radicals (Singh, 2019). Gao et al. (2007) found that Fe_3O_4 magnetic nanoparticles exhibited peroxidase activity over a large pH range with improved temperature tolerance compared to natural horseradish peroxidase (HRP). Due to the unique physicochemical properties of nanomaterials, nanozymes have demonstrated a wide range of applications, from in vitro detection to the replacement of specific enzymes in living systems. With the advent of the new branch of "Nanozymology," nanozymes have become a new field of study and application at the interface of nanotechnology and biological science.

Consciousness is one of the most complex topics discussed in science. Although various theories have been proposed regarding it, a single definition cannot be established. In particular, conducting practical experiments and providing laboratory evidence remains one of the major challenges in this field of research. According to Taheri's theory, consciousness is a fundamental component of the universe, from which matter, energy, and information arise (Taheri, 2013). In this framework, various T-Consciousness Fields (TCFs) are also introduced as subsets of the Cosmic Consciousness Network. These fields have no physical or frequency-based nature, and their effects are initiated through the mind of the announcer, referred to as the Faradarmangar (a trained individual). It is possible to record the effects of these fields in the laboratory through carefully designed experiments. For example, numerous studies have reported the effects of these fields on various subjects, ranging from materials and microorganisms to plants and cell lines (Torabi et al., 2020, Taheri et al., 2020, Taheri et al., 2021a, Taheri et al., 2021b). The present study was conducted to investigate the enzymatic behaviors of gold nanoparticles and to analyze their structural and functional status under the influence of a type of T-Consciousness Fields, called T-Consciousness Field 1 (TCF1), using optical spectroscopy, electron microscopy, and dynamic light scattering (DLS) techniques.

Materials and Methods

Application of T-Consciousness Field 1

The TCF1 was applied to the samples according to the protocol established by the Cosmointel Research Center[1]. Further details are provided in the general considerations section of this issue. In this study, the TCF1 was applied at three stages: during sample

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preparation (nanoparticle synthesis), during the kinetic activity assay, or at both stages.

Materials

$HAuCl_4 \cdot 3H_2O$, 30% H_2O_2, and 3,3',5,5'-Tetramethylbenzidine (TMB) were purchased from Sigma Co. Ltd, UK. All reagents and chemicals were of at least analytical reagent grade. Double-distilled water was used throughout the experiments.

Instrumentation

The UV/Vis spectra of gold nanoparticles were recorded using a Varian Cary Bio 100 spectrophotometer. Images of AuNPs were obtained with a transmission electron microscope (TEM) (JEOL, Tokyo, Japan) operating at 80 keV. The particles were characterized by dynamic light scattering (DLS) using a 90 Plus PALS (Brookhaven Instruments Corp., USA) and PALS zeta-potential analyzer software.

Preparation of Gold Nanoparticles

Gold nanoparticles were synthesized by the reduction of $HAuCl_4$ with $NaBH_4$ as the sole reducing agent. Briefly, $HAuCl_4$ solution (500 mL, 1%) was diluted in water (39.5 mL), while $NaBH_4$ solution (1 mL, 1%) was injected under vigorous stirring over approximately 5 minutes. An immediate color change from pale yellow to wine red was observed, indicating the formation of gold nanoparticles. The gold nanoparticles remained stable against aggregation in aqueous solution when stored at 4°C in a refrigerator for at least two months.

Peroxidase-Mimetic Activity of Au Nanoparticles

The assays were carried out in 1.5-mL tubes containing AuNPs (5 µg), reaction buffer (0.2 M NaAc, pH 3.5), different concentrations of TMB (0.094, 0.122, 0.188, 0.241, 0.31, and 0.38 mM), and 1 M H_2O_2. The colorimetric changes were determined by recording the absorbance at 652 nm.

Kinetics Parameters

We calculated the kinetic constants Vmax and Km by fitting the reaction velocity values and substrate concentrations to the Michaelis–Menten equation as follows:

$$V = (Vmax \times [S]) / (Km + [S])$$

Where V is the initial reaction velocity, Vmax is the maximal reaction rate observed at saturating substrate concentrations, [S] is the substrate concentration, and Km is the Michaelis constant. In all steps, two containers were used: one as a blank and the other as a sample, each with different labels.

Statistical Analysis

In this study, each sample had three replicates, and no data were excluded. Comparisons between the test and control samples were analyzed using the t-test in SPSS software, version 17, and a confidence level of 95% was considered statistically significant.

Results

Investigation of Gold Nanozyme Structure

The graphs in Figure 1 show the electron microscopy images of the structures synthesized in this study. As observed in the electron microscopy images, the size distribution of the synthesized nanozymes differs under the influence of T-Consciousness Field 1 (a) and without it (b). The differences between untreated structures and those treated with TCF1 were measured using dynamic light scattering (DLS), which is explained in the following section.

Figure 2 shows the DLS graphs of the control and treated samples. The gold nanozymes synthesized under the influence of TCF1 have an average effective diameter approximately 20% smaller than the control and are more uniform in particle size (Figure 2, Table 1).

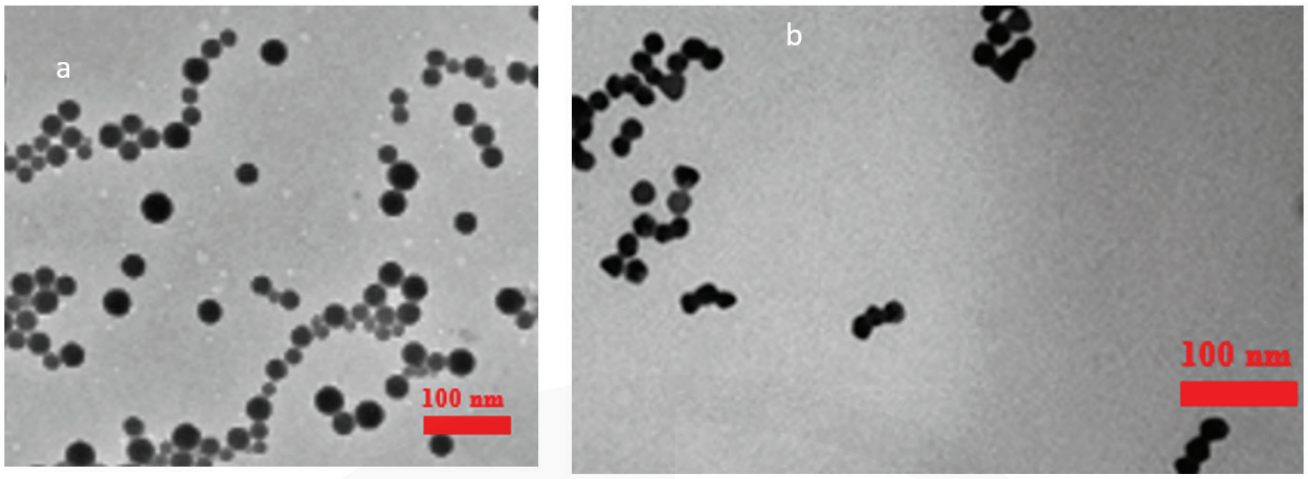


Figure 1. Gold nanozymes synthesized (a) with and (b) without treatment by the T-Consciousness Field1.

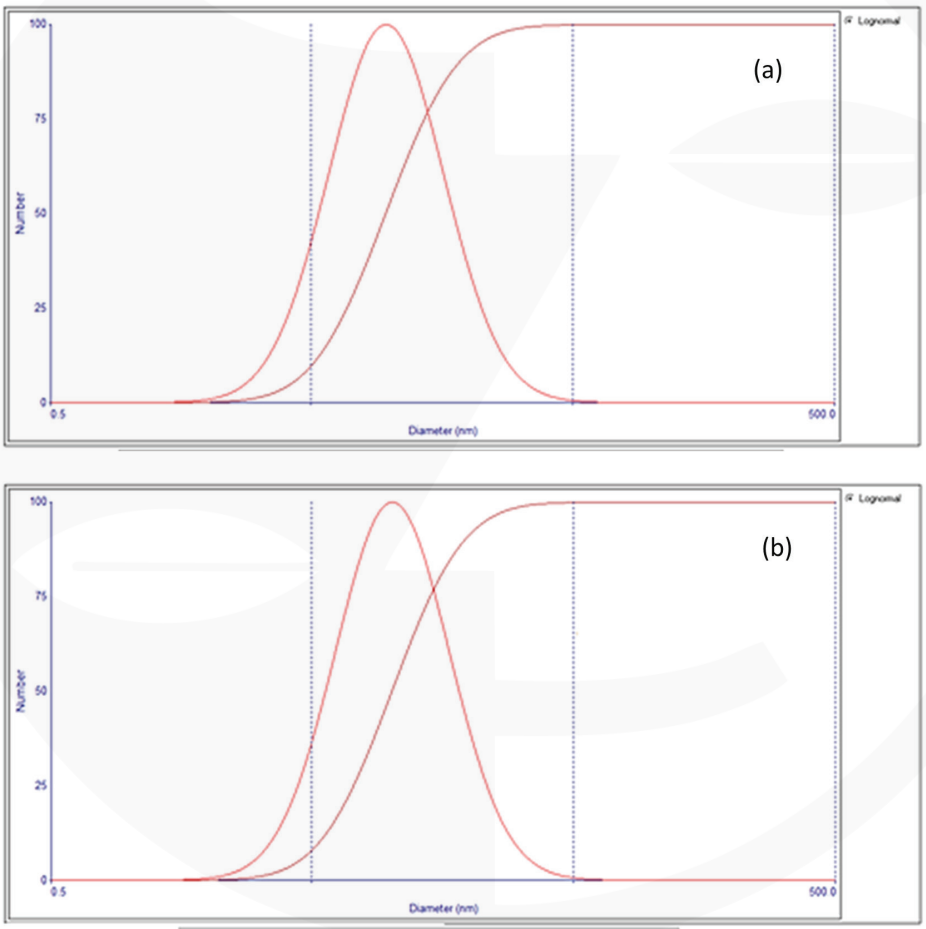


Figure 2. Particle size distribution of gold nanoparticles in the control (a) and treated sample (b).

Table 1. Particle size distribution of synthesized nanozymes under the influence of the T-Consciousness Field 1 (TCF1) compared with the control.

Nanozyme	Effective diameter (nm)	STD	Polydispersity	STD
Control	49.7	6.7	0.309	0.003
Preparation + TCF1	40.1	0.2	0.306	0.002

Analysis of Gold Nanoparticle Function

The catalytic activity of the Au nanozymes under the influence of this field was assessed in comparison with the control (without the field) and plotted using the Lineweaver–Burk graph, as shown in Figure 3. In addition, the calculated kinetic constants are presented in Table 2.

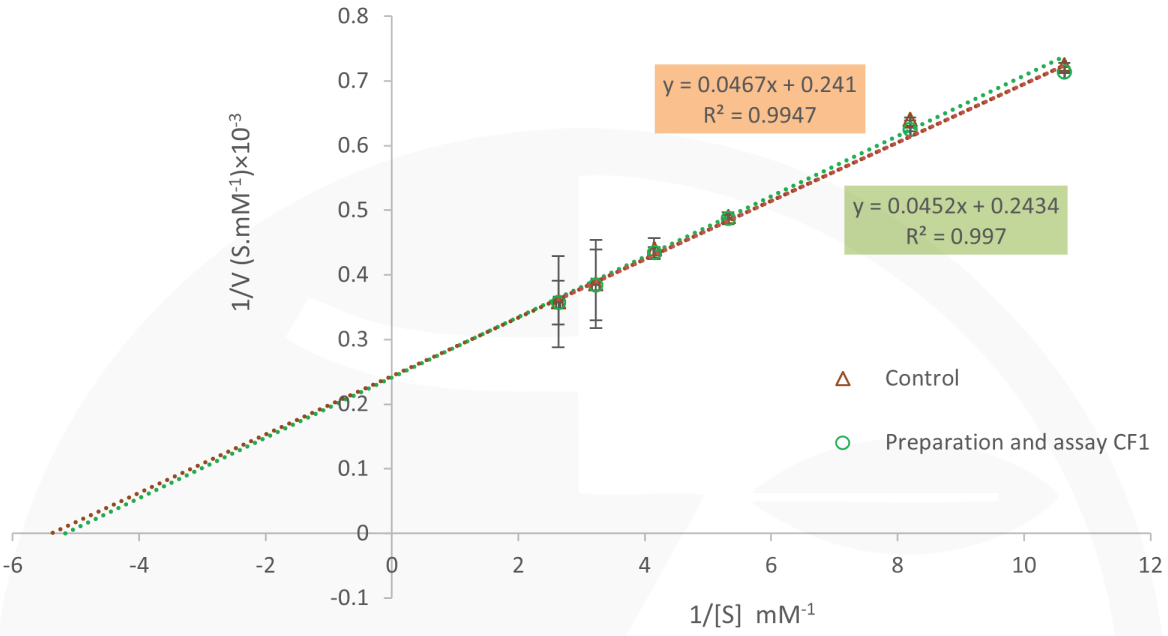


Figure 3. Changes in the Lineweaver–Burk plot of gold nanozyme activity in the sample treated with the T-Consciousness Field 1 (the sample was exposed to the field during both preparation and activity assay) and the control (without field).

Table 2. Comparison of the kinetic constants of samples treated with the T–Consciousness Field 1 and the control (without field) in the present study.

Test No.	Nanozyme	Vmax (mM/s)×10^{-3}	Km (mM)	Rate (s^{-1})	% Δ Vmax	% Δ Km	% Δ Rate
1	Control (none)	4.14	0.193	490.01	-	-	-
2	Preparation + TCF1	4.16	0.193	471.25	0.5	0	-3.8
3	Assay + TCF1	4.14	0.192	488.78	0	-0.5	-0.2
4	Preparation and assay + TCF1	4.10	0.185	486.80	-0.9	-4.1	-0.6

As observed from the comparison of the data in Table 2, applying TCF1 during nanozyme preparation (Test 2), compared to no TCF1 application during the kinetic assay, resulted in an approximate 4% decrease in the catalytic rate of gold nanoparticles. On the other hand, TCF1 treatment during the kinetic assay of the same sample (Test 4) led to a 4% increase in substrate affinity (decrease in Km) without a significant change in the reaction rate compared with the control. Interestingly, in Test 4, the reduction in reaction rate observed in Test 2 did not occur. Other changes listed in Table 2 are negligible.

Discussion

Studying the biological behaviors of chemical systems is an important and fundamental step in understanding the origin of life. According to Mohammad Ali Taheri's theory of Consciousness Fields, these fields have been studied in various disciplines, including physics, biology, and medical sciences, and their results have been previously reported, some of which are mentioned in the Introduction of the present study. Considering the definition of T-Consciousness as the fundamental element of the Universe, and the introduction of TCFs with a non-frequency nature (Taheri, 2013), investigating their effects is of great importance, as it can shed light on the possible role of Consciousness in the emergence of life and help to understand the mechanisms contributing to this process.

In the previous study on horseradish peroxidase (HRP) presented in this issue, it was found that the application of the Consciousness Field under physiological conditions led to increases in Km and Vmax by approximately 40% and 6%, respectively, compared to the control.(Taheri et al., 2022).

In the present study, the changes in these parameters were observed under the influence of the TCF1, consistent with the previous findings. According to the theory of TCFs, the behavior observed in a system treated with TCFs arises from the transfer of data and information from these fields to the system under study, aiming to optimize its function. It is noteworthy that in an experiment on wheat under salinity stress, the TCF led to increased activity of antioxidant enzymes compared to the control group without field exposure (Torabi et al., 2020). Further studies are needed to better understand how non-frequency Consciousness interacts with the matter and energy component with frequency properties and to clarify the potential role of this component in evolution and the emergence of life. It has been reported that during evolution, fluctuations in Km values are often observed in biological enzymes (Pettersson, 1989).

In summary, two optimizations induced by the TCF1 were observed: (1) the formation of more homogeneous nanoparticle sizes, and (2) a decrease in Km values, indicating increased substrate specificity. Overall, this study suggests the influence of TCFs on the biomimetic behavior of gold nanozymes, considering parameters such as particle size, homogeneity, and substrate selectivity. Based on these findings, we propose that other biomimetic models be investigated under the influence of TCFs to better explain the behaviors of these chemical systems that serve as precursors to vital processes.

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