Investigating the effect of Taheri Consciousness Field A on the Behavior of Biomimetic Micellar Supramolecular Models

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Abstract

Supramolecular biomimetic models are assemblies of chemical components capable of mimicking the functions of biological molecules. Biomimetic models have numerous applications in industry and various research fields. In basic biology, biomimetic models can help investigate vital behaviors and the origins of life. T-Consciousness Fields (TCFs) have been introduced as non-frequency-based phenomena, with their effects initiated through the mind of the announcer. It is possible to study the effects of these fields through carefully designed experiments. The effects of TCFs on various subjects, including living systems and materials such as metallic elements, have been investigated prior to this study. In the present study, the effect of one type of TCFs, called T-Consciousness Field A (TCF1), on the structure and function of micellar supramolecular biomimetic models designed to mimic enzymatic behaviors was investigated. To mimic the behavior of heme-containing proteins, such as horseradish peroxidase, this model was designed to contain assemblies of sodium dodecyl sulfate micelles with heme-histidine at their core. The results showed that TCF1 did not alter the intrinsic chemical structure of the biomimetic models. However, the dominant population in the treated model, unlike the control group without field exposure, exhibited a smaller average particle size. Furthermore, the catalytic activity of the biomimetic model showed an 8% increase in efficiency, better mimicking the function of the natural enzyme compared to the control. Additionally, the zeta potential, electrical conductivity, and mobility of the treated model were altered by 40–45% relative to the control. These findings suggest that the TCF1 enhances the stability of the micellar supramolecular biomimetic model and increases its similarity to the structure and function of colloidal solutions of biological molecules in living organisms.

Keywords: Biomimetic, Supramolecular Structure, Peroxidase, Micelle, T-Consciousness Fields

Introduction

Supramolecular models of bio-mimicry are assemblies of components that have the ability to function similarly to biological molecules. Various functions arise from these supramolecular architectures, including micelles for drug delivery, catalysis, molecular recognition, and transport processes (Lehn, 1990; Ortega Lorenzo et al., 2000; Kataoka et al., 2012). The assembly of supramolecular structures, as well as their diversity and functionality, relies on the set of building blocks and subunits. Attractive and repulsive forces—such as hydrogen bonding, ionic interactions, van der Waals forces, or hydrophobic interactions—within and between these molecules lead to non-covalent bonding (Philp and Stoddart, 1996; Zhang, 2003).

Various surfactant-like oligopeptides have been designed to generate supramolecular structures. These molecules typically have two parts: a hydrophobic tail (composed of hydrophobic amino acids such as Gly, Ala, and Leu) and a hydrophilic head (composed of hydrophilic amino acids such as Arg, Lys, and His) (von Maltzahn et al., 2003). Surfactant molecules with dual characteristics exhibit two key features: adsorption at interfaces and self-assembly in bulk solution. Structure-function relationships, as well as the solvent properties of these molecules, have been investigated for various surfactant types in diverse applications (Li, 2017). These studies can provide a model system that mimics the heme environment (Mazumdar et al., 1988; Simplicio et al., 1972). Moosavi-Movahedi et al. (2008) reported that the micelle cavity of sodium dodecyl sulfate (SDS) protects hematin in the presence of histidine and provides a model system for heme enzymes such as HRP. They showed that the triple-component solution of His–hematin–SDS exhibited a unique absorption band in the UV–Vis spectra, suggesting the distinct structure of a hemoprotein-like biomimetic catalyst.

In the models of the present study, we aimed to mimic the behavior of biological enzymes using SDS surfactant with its dual inherent properties. On one hand, the aqueous medium facilitates the formation of spherical micelles, resembling the spherical body of enzymes, with both hydrophilic and hydrophobic surface regions. On the other hand, we positioned the prosthetic group of hematin at the center of the micellar structures, along with coordinated histidine amino acids at the active site of the supramolecular model. This structure closely resembles catalases or peroxidases in the laboratory in terms of both function and structure.

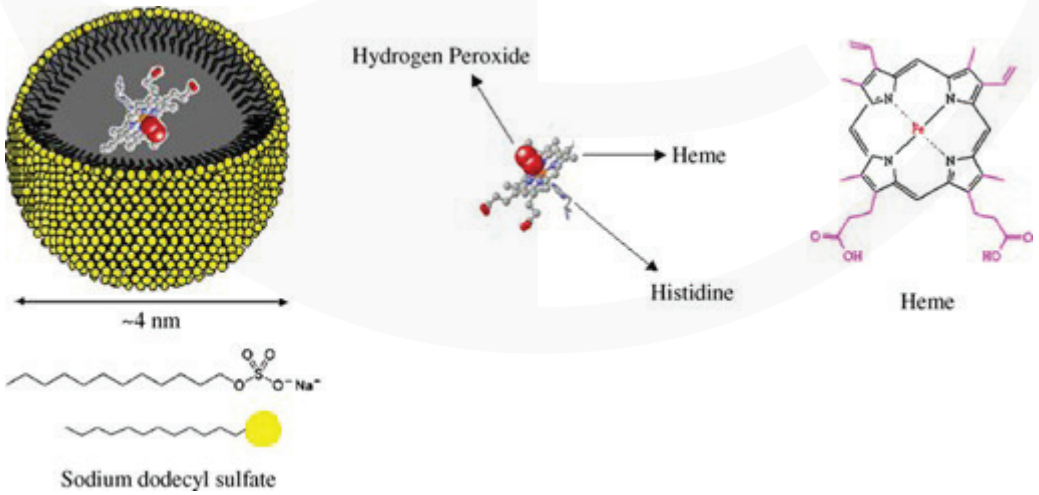


Figure 1. Micellar histidinate hematin as an enzymatic biomimetic system previously reported (Moosavi et al., 2008). The authors have obtained permission to use this figure in the present article.

Humans have always been curious to understand the world around them. Numerous efforts have been made to discover and explain various physical laws. For example, gravity, electromagnetic fields, electric fields, and so on. The concept of a field is often used in physical theories. Mohammad Ali Taheri has introduced diverse T-Consciousness Fields (TCFs) with a non-frequency nature, which are considered a subset of the Cosmic Consciousness network (Taheri, 2013). The effects of these fields are initiated through the mind of the announcer, called the Faradarmangar (a trained individual). It is hypothesized that information transmitted through these fields can induce changes in the subjects under study. To investigate these effects, multiple experiments have been conducted on materials (Taheri et al., 2021a), cancer cell lines (Taheri et al., 2020), microorganisms (Taheri et al., 2021b), and plants (Torabi et al., 2020).

A model system that mimics the function of biological molecules under *in vitro* and non-cellular conditions can be useful for studying the influence of TCFs on the formation of biological behaviors. Prior to this experiment, the effect of TCF 1 on the behavior of gold nanozyme biomimetic models had been demonstrated (Taheri et al., 2021c). The aim of the present study was to investigate the effect of this TCF1 on the behavior of micellar supramolecular biomimetic models.

Material and Methods

Porcine hematin, sodium dodecyl sulfate, and histidine were obtained from Sigma Ltd., UK. Other analytical grade chemicals were from Merck Ltd., India, and were used without further purification. Doubly distilled water was used as the solvent for all experiments. Hematin solutions were prepared daily, and guaiacol solutions were refreshed every 2 h. All solutions were stored in an ice bath during the experiments.

Application of T-Consciousness Field 1

T-Consciousness Field was applied to the samples according to the protocol established at the Cosmointel Research Center[1]. Further details are provided in the General Considerations section of this issue.

Structural analysis

Absorption spectra were collected with a Model Varian Cary Bio 100 spectrophotometer using 1-cm path-length cells. Additionally, the particles were characterized by dynamic light scattering (DLS) using a 90 Plus PALS (Brookhaven Instruments Corp., USA) and PALS zeta-potential analyzer software.

Kinetic assay

Steady-state kinetics of guaiacol oxidation by hydrogen peroxide, catalyzed by model catalysts, were obtained at 470 nm (colored product of the reaction) (Beck et al., 1992) in 50 mM phosphate buffer solution, pH 7.4 (PBS). Progress curves of the reactions were measured at various guaiacol concentrations (0.1–2 mM), and the initial rates were used to construct the Michaelis–Menten graphs. The concentration of H_2O_2 was kept constant at 1.2 mM to ensure pseudo-first-order kinetics. During a period of 120 seconds, in which the progress curves were recorded, guaiacol (0.2–10 mM) and hydrogen peroxide (0.25 mM) were added to the reaction vessel. The initial rate of the reaction was calculated from the 45th second, when the curve was still linear. To reach the steady-state condition, a lag time of 7 seconds was applied. H_2O_2 stock solutions were prepared by appropriate dilutions of 30% (v/v) H_2O_2 in deionized water. The concentrations of hydrogen peroxide were measured by recording its absorbance at 240 nm using $\varepsilon 240 = 43.6\ cm^{-1}\ M^{-1}$ (George, 1953). All diluted solutions were freshly prepared.

Preparation of biomimetic supramolecular models

The Critical Micelle Concentration (CMC) was reached using SDS surfactant at a concentration of 8.5 mM in 50 mM phosphate buffer (Mousavi et al., 2008). To maintain the maximum and stable number of SDS micelles, a concentration of 90 mM (in 50 mM phosphate buffer, pH 7.4) was used. This

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concentration is 10 times higher than the reported CMC of SDS micelles.

The Micellar Hematin Model (MH model) refers to hematin when it is located in the core of a spherical SDS micelle. The MH model was obtained at a concentration higher than the CMC (90 mM) along with the hematin titer.

The Micellar Histidine Hematin Model (MHH model) refers to hematin when it binds to histidine amino acids at the center of the SDS micelles. This model was obtained by titrating histidine into the MH model.

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.

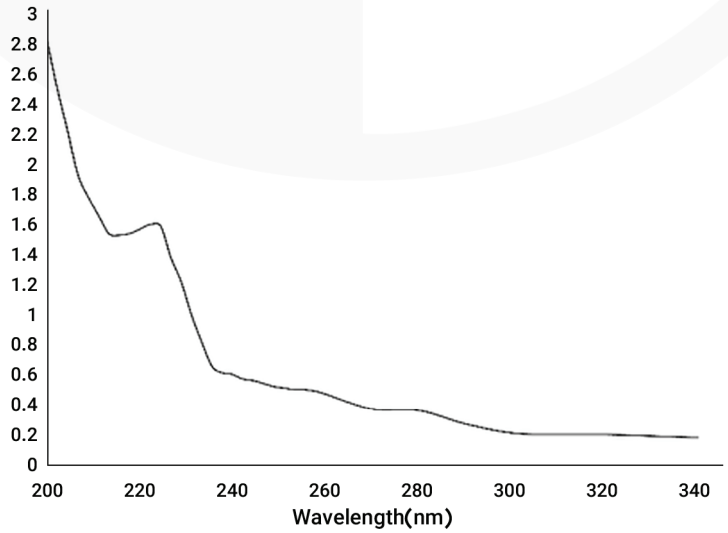
Results

Figure 1 presents the spectrophotometric spectra, which characterize the colloidal solutions of the synthesized supramolecular models. As shown in Figure 1a, a λmax at 220 nm indicates the formation of SDS micelles. A hematin concentration of 10 mM was optimal for producing the MH model in a 90 mM SDS solution (Figure 1b). Furthermore, at a histidine solution concentration of 80 mM (in 50 mM phosphate buffer, pH 7.4), the MHH models were formed (Figure 1c).

As shown in Figure 1c, the MHH supramolecular model exhibits distinct peaks at 430 and 535 nm. In fact, the Soret band of the previous MH model, upon the addition of histidine to the solution and the engagement of hematin at the center of SDS micelles, created a more hydrophobic environment, separating the aggregated hematins encapsulated within the micelles. This resulted in a bathochromic shift (from 400 to 430 nm) in the hematin peak bound to histidine. Furthermore, the 530 nm band, observed in both models, closely resembles the corresponding band in hemoglobin, confirming that the MHH model (the final model of this study) is similar to heme proteins of eukaryotic origin.

The steps for preparing the MH and MHH models (Figures 1a–c) were carried out in two separate test sets: (1) without the influence of TCF 1 (control) and (2) under the influence of TCF1 in the reactant solution (sample). The λmax and the intensity of the spectrophotometric spectra of both MH and MHH models (as presented in Figure 1) showed no differences between the field-exposed sample and the untreated control. In other words, the application of this consciousness field did not induce any changes in the fundamental structure of the prepared MH and MHH models.

(a)



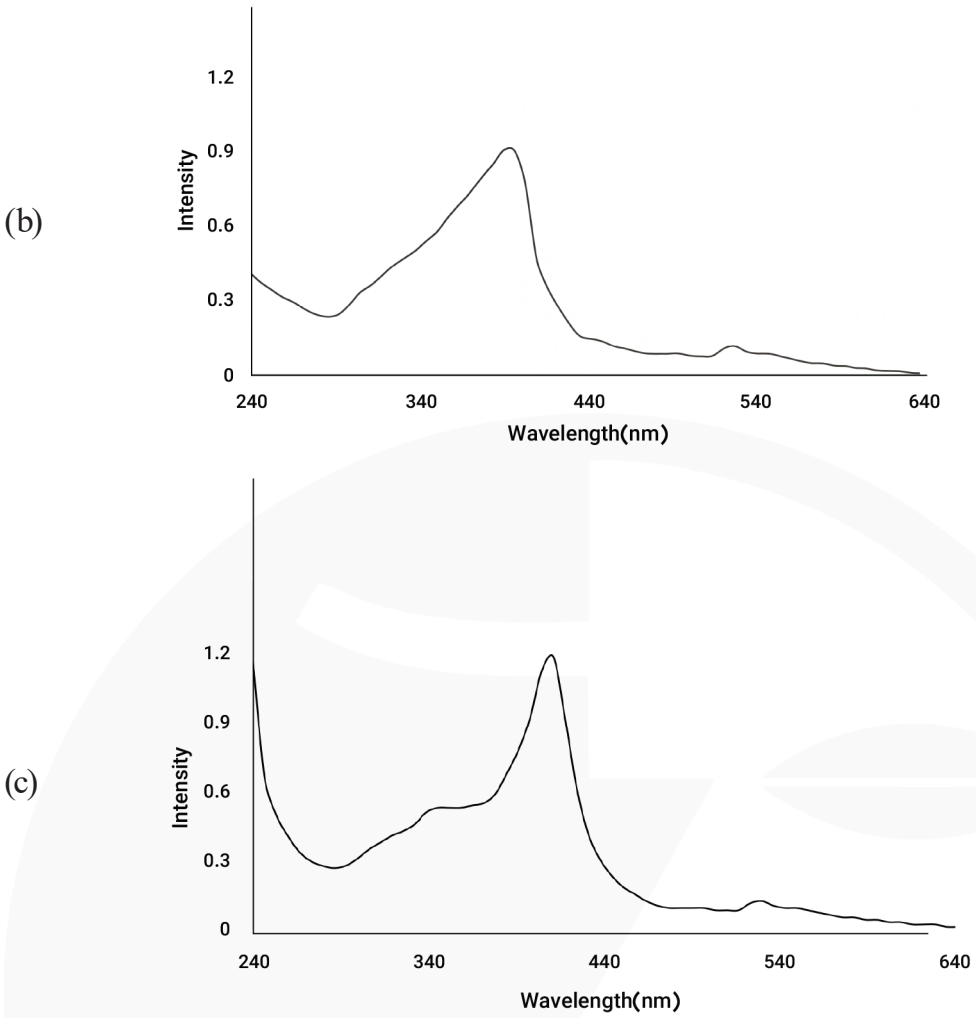


Figure 1. Spectrophotometry of the supramolecular models synthesized in the present study; (a) formation of spherical SDS micelles, (b) Micellar Hematin Model (MH) model and (c) Micellar Histidine Hematin model (MHH) Model.

On the other hand, measurements of several colloidal parameters of the MHH model (the final model in the present study) using DLS revealed differences between the control samples and the samples exposed to the TCF1, as shown in Table 1. As indicated in this table, the zeta potential, mobility, and electrical conductivity of the MHH model increased by 41–45% under the influence of the consciousness field compared to the control groups.

Table 1. Comparison of structural parameters of the control supramolecular MHH model (Micellar Histidine Hematin) and the sample exposed to T-Consciousness Field 1 (sample) obtained using DLS (zeta measurement time: 30 seconds).

Parameter	Control	Sample	Diff. relation to control (%)
Zeta Potential	10.8 mv	15.2 mv	+40.7
Polarity	Negative	Negative	-
Mobility at 25°C	0.84u/s/V/cm	1.19u/s/V/cm	+41.6
Conductivity	721 uS/cm	1048 uS/cm	+45.3
Field Strength (Req/Act)	10 / 9.5 kV/m	10 / 9.3 kV/m	-2.1

Figure 2 shows the size distribution of the synthesized MHH model in both the sample and control. Furthermore, the data from Figure 2 were compared between the T-Consciousness Field 1–exposed sample and the control, as presented in Table 2. Approximately 86% of the MHH population in the control samples (PDI = 0.1751) consisted of spherical particles with a diameter of 2.34 µm, while a smaller fraction (about 15%) consisted of spherical particles with a diameter of 0.291 µm. On the other hand, the MHH model exposed to the consciousness field resulted in 66% of smaller particles with a diameter of 0.874 µm and 34% of larger particles with a diameter of 4.560 µm (PDI = 0.6231). The dominant population in the untreated control MHH model was three times higher than the dominant population in the field-exposed MHH model. Conversely, the smaller particle population in the field-exposed MHH model was 16 times greater than the same population in the control MHH model.

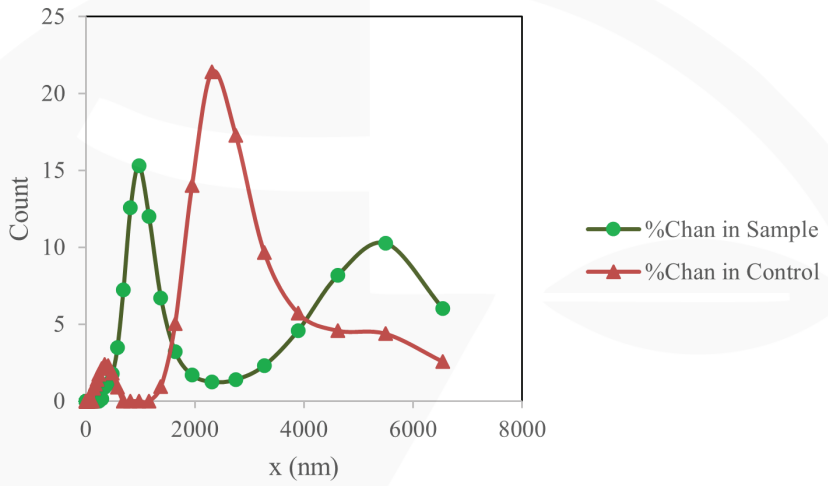


Figure 2.Size distribution of the control compared to the MHH biomimetic model (Micellar Histidine Hematin) under the influence of the T-Consciousness Field 1.

Table 2. Size distribution of the final supramolecular model in the control and the sample exposed to T-Consciousness Field 1.

	Diameter (nm)	Vol%	Width
Control	2340	85.5	1792
	291.4	14.5	240.6
Sample	4560	33.9	2215
	874	66.1	548

Activity of the supramolecular model

As shown in Table 3, under the influence of the T-Consciousness Field, the MHH model exhibited a small but significant increase of approximately 6–8% in both the maximum reaction rate and catalytic efficiency

Table 3. Kinetic constants of the Micellar Histidine Hematin (MHH) model.

	Km (µM)	STD	Vmax (μMs^{-1})	STD	kcat (s^{-1})	Catalytic efficiency ($\mu M^{-1}s^{-1}$)×10^{-3}
Control	3.42	0.03	1.153	0.04	0.0230	6.72
Sample	3.40	0.02	1.23	0.02	0.0246	7.23

Discussion

One of the characteristics that enables cells and living systems to proliferate early in life is hierarchical self-organization, and many chemical and biological molecules are known to possess this ability (Halley and Winkler 2006). Self-organization is a process in which components, through their mutual interactions, spontaneously arrange themselves to form higher-order structures (Kumar, 2006). Micelles are self-assembled aggregates of amphiphilic compounds—containing both apolar hydrophobic (lipophilic) and polar (hydrophilic) groups. In bioinorganic chemistry, interactions between micelles and other hydrophobic and hydrophilic components are used to create supramolecular structures capable of exhibiting biological behaviors (Owen and Butler 2011).

In the present study, we used the surfactant SDS because it has the ability to form spherical micelles similar to enzymes and globular proteins. In addition, placing hematin as a prosthetic group bound to histidine at the center of micellar structures generates a structure that, in the laboratory, more closely resembles natural enzymes and proteins such as catalase, peroxidase, and hemoglobin. These models were constructed in two conditions: under the influence of the TCF1 and without it. We then examined the structural and functional properties of the constructed models in colloidal solutions during substrate catalysis.

According to the theory of T-Consciousness Fields, it is possible to apply them to living organisms and materials, and to record and examine their effects. Theoretically, this influence is attributed to the information transmitted from these fields to the components of the system. Consequently, it may enable the repair and restoration of system components and the optimization of their behavior. In a previous experiment on the gold nanozyme, it was observed that this Consciousness Field led to uniform particle size and improved enzymatic catalytic performance (Taheri et al., 2021c).

In the present experiment, no change in the chemical structure of the synthesized models was observed under the influence of the TCF 1; however, the field caused changes in particle size distribution and catalytic strength, which is consistent with the previous study. Moreover, the TCF1 resulted in a significant increase in zeta potential (41%), electrical conductivity (45%), and mobility (42%) of the sample molecules compared to the control groups. These results indicate higher stability of the samples, an increase in charged particles on the surface of the biomimetic structures, and consequently greater mobility of these structures in the colloidal medium.

It has been shown that increased mobility and stability of biological structures such as proteins and ribonucleic acids are factors involved in the formation of biological systems (Tabaka et al., 2014; Ball, 2017). Based on the observations of this experiment, it appears that applying the TCF 1 may influence the behavior of biological models. To better understand the potential role of these fields in the emergence of life and the self-organization of molecules, further studies in this area are recommended.

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