Investigation of the properties of Tc-99m radioisotope and water contaminated with Tc-99m under the influence of Consciousness Fields

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Abstract

The decay constant of radioactive materials is an intrinsic property of radioisotopes and serves as an indicator of their nature. The presence of radioactive materials in the environment, particularly in water resources, leads to radioactive contamination, which poses a serious potential threat to living ecosystems. According to Taheri's theory, T-Consciousness Fields possess a different nature from known physical fields, and previous studies have investigated their efficacy on the magnetic properties of materials and living organisms at various levels. In this study, the effects of two types of T-Consciousness Fields (1 and 2) on the radioactive properties of the technetium-99m (Tc-99m) radioisotope, as well as water contaminated with this nuclear isomer, were examined. The obtained results demonstrated that these fields do not significantly impact the radioactive properties of the Tc-99m radioisotope. However, under conditions where this nuclear isomer causes water contamination, T-Consciousness Field 2 increases the effective decay constant. In conclusion, although these fields did not alter the intrinsic characteristics of the radioisotope, their application resulted in a reduction of radioactive contamination in the aqueous environment. Further studies are recommended to comprehend the mechanism of action underlying these non-physical and non-frequency fields.

Keywords: T-Consciousness Fields, Technetium-99m (Tc-99m), Radioactive Water Contamination, Radioactive Materials, Decay Constant, Effective Half-Life.

Introduction

Radioactivity is defined as the spontaneous transformation of an atomic nucleus that results in the formation of new elements, accompanied by radiation such as alpha particles, beta particles, positrons, or gamma rays. There are two sources of radioactive contamination: 1) natural radioactivity, which originates from radioactive minerals in the Earth's crust or from interactions with atmospheric gases; and 2) artificial radioactivity, which is a byproduct of the development of atomic energy since World War II [1]. Radioactive contamination is hazardous to human life and living organisms. According to one study, the structure of microbial communities is altered under the influence of radioactive contamination. For instance, in soil with a cesium-137 contamination density of 5395.5 kilobecquerels, the number of representatives from the genera *Aeromonas*, *Pseudomonas*, and *Rhodococcus* decreased, whereas the populations of mycobacteria and fungi increased [2].

The radioactive properties of each isotope depend on its nuclear structure and remain unchanged under typical chemical conditions; therefore, every radioactive isotope possesses its own specific and unique characteristics [3]. Different isotopes decay at varying rates, with each isotope having its own specific rate of decay. The time required for the number of radioactive atoms to decrease to half of their initial quantity is termed the half-life of the radioactive isotope. This duration serves as a measure of the decay rate and constitutes one of the defining characteristics of each radioactive isotope. The half-life of a radioactive isotope is an immutable property under normal conditions. Numerous studies have demonstrated that the decay rate of radioisotopes is independent of external conditions such as temperature, pressure, and electric fields [4, 5].

The relative decrease in the number of radioactive atoms per unit of time is referred to as the decay constant of the radioactive isotope and is defined as follows:

$$\lim_{\Delta t \to 0} \frac{\frac{\Delta N}{N}}{\Delta t} = -\lambda \quad (1)$$

where N is the number of radioactive atoms, ΔN represents the number of atoms decaying within the time interval Δt, and λ denotes the decay constant. Radioactivity is equivalent to the number of nuclei decaying per unit of time:

$$A = -\frac{dN}{dt} = \lambda N \quad (2)$$

By integrating Equation 2, it can be demonstrated that the number of radioactive atoms decreases exponentially over time, as shown in the following equation:

$$N = N_0 e^{-\lambda t} \quad (3)$$

where N_0 is the initial population size of radioactive atoms at time t=0. Consequently, radioactivity also decreases exponentially with respect to time, as illustrated in Equation 4:

$$A = A_0 e^{-\lambda t} \quad (4)$$

where A_0 is the initial radioactivity at time t=0. Now, according to the definition, the half-life (τ) can be derived from the decay constant as follows:

$$\frac{A}{A_0} = \frac{1}{2} = e^{-\lambda \tau} \quad \Rightarrow \tau = \frac{ln2}{\lambda} \quad (5)$$

Taking the natural logarithm of both sides of Equation 5 yields Equation 6:

$$\ln\left(\frac{A}{A_0}\right) = -\lambda t \quad (6)$$

Equation 6 demonstrates that if the natural logarithm of the relative radioactivity of a radioactive isotope is plotted against time and a line is fitted to the data, the slope of this line will be equal to the decay constant, λ.

Technetium (Tc) is a transition metal with the atomic number 43, a standard atomic weight of 98, and a density of 11.5 g/cm³. Tc-99m is extensively used in nuclear medicine for diagnostic studies [6], while Tc-99 is applied in academic research [7]. The use of radioisotopes in industrial production, medicine, and energy generation has been increasing in recent years; if improperly managed, this can lead to the contamination of the environment and surface waters, and consequently, the surrounding soil, plants, and animals. Furthermore, nuclear weapons testing, radioactive accidents, and the intentional or improper disposal of radioactive waste are considered other sources of radioactive contamination [8]. The disposal of nuclear waste represents one of the most serious environmental challenges. In the past, some primary and improper methods for disposing of this waste included shallow or semi-shallow land burial, which in many cases led to the leakage of toxic materials into water resources and residential areas. Consequently, these methods are now considered unsafe and obsolete [9]. In response to this challenge, a remediation technology known as bioremediation has been developed. In this method, microorganisms, particularly bacteria, are used for biological purification, such as *Deinococcus radiodurans*, which has garnered attention due to its high radiation resistance [10, 11]. Additionally, it has been reported that microalgae and aquatic plants can remove radioactive cesium, iodine, and strontium from aqueous environments contaminated with radioactive materials [12].

According to Taheri's theory, there are various T-Consciousness Fields with a non-frequency and non-physical nature that function as subsets of the Cosmic Consciousness Network. The influence of these fields is initiated through the mind of the announcer (*Faradarmangar*). Although T-Consciousness Fields cannot be measured directly using quantitative instruments, their effects can be observed in a laboratory setting [13]. This characteristic has prompted researchers to investigate the impacts of these fields by designing diverse experiments. Previous studies have reported the effects of these fields on numerous subjects, such as plants, animals, and microorganisms [14-16]. The objective of this experiment is to investigate the properties of pure Tc-99m and Tc-99m-contaminated water under the influence of T-Consciousness Fields.

Materials

The equipment used in this experiment is shown in Figure 1. This setup includes a Technetium-99m generator produced by the Atomic Energy Organization of Iran (AEOI), a CAPINTEC CRC-15R dose calibrator with a measurement accuracy of 0.8%, and vials containing radioactive materials



Figure 1. Equipment used in this study.

Methods

Application of T-Consciousness Fields

In this study, two types of T-Consciousness Fields (1 and 2) were separately applied to the Tc-99m radioisotope and samples of water contaminated with it. The application of these fields was carried out according to the protocol established by the Cosmointel Research Center[1]. Further details are provided in the shared considerations section of this issue. The duration of the T-Consciousness Fields application during the experimental period was less than 7 hours.

Test 1: Measurement of the decay constant of the Technetium-99m radioisotope

The activity of a specific quantity of the radioactive material Tc-99m is measured at various time intervals, both with and without the influence of T-Consciousness Fields Type 1 and 2. The natural logarithm of the relative activity measured over time is plotted, and the slope of the fitted line is used to calculate the half-life of the radioactive materials. Subsequently, potential changes in the half-life are monitored and evaluated.

In this experiment, vials containing Tc-99m are prepared with approximately equal initial activities, according to the experimental setup shown in Figure 1. One of the samples, serving as the control, is placed in a lead shield and receives no treatment. The second and third samples are both kept without shielding and are subjected to T-Consciousness Fields Type 1 and 2, respectively. All three samples are measured at different time intervals using the CAPINTEC CRC-15R model with a measurement accuracy of 0.8%. Next, the natural logarithm of the calculated data is plotted against time. Finally, a line is fitted to each dataset, and the slope of the line is utilized as the decay constant to calculate the half-life.

Test 2: Measurement of effective decay of Technetium-99m in contaminated water

A specific quantity of municipal water was contaminated with the radioactive material Tc-99m. Similar to Test 1, changes in the activity levels of the samples during the experimental period were measured by sampling the contents of the contaminated water containers. By examining and evaluating changes in the half-life, the effect of T-Consciousness Fields on the behavior of water contaminated with radioactive materials was measured. To this end, a specific amount of Tc-99m was first poured into a container of municipal water and stirred thoroughly to create a homogeneous mixture. Subsequently, three separate samples of equal volume were taken from the main container and placed in individual vials. The vials were labeled and numbered for subsequent tests. A 1-milliliter sample was taken from each of the vials (1 to 3), and the activity of each sample was measured using a CAPINTEC CRC-15R dose calibrator.

Following this, the first vial was placed inside a lead shield as a control and received no treatment. The second and third vials were both kept without shielding and were subjected to T-Consciousness Fields Type 1 and 2, respectively. A 1-milliliter sample was taken from each of the three vials at various time intervals, and its activity was measured with the dose calibrator. Then, the natural logarithm of the measured data was calculated and plotted against time. Finally, a line was fitted to each dataset, and the slope of the line was used as the decay coefficient to calculate the half-life. The above experiment was repeated twice, and the T-Consciousness Field treatment was performed once at the beginning of the study.

Statistical Analysis

The data obtained in this study were analyzed using a one-way ANOVA statistical test, with a significance threshold set at 0.05.

Results and Discussion

Test 1

1. www.cosmointel.com

In Figure 2, the results of the natural logarithm of the measured relative activity are plotted against time, and the slope of the line fitted to the data has been used to calculate the half-life of the radioactive materials. The calculated half-life for the Tc-99m radioisotope under various conditions is presented in Table 1. As observed, the values obtained for the Tc-99m half-life show a difference of less than 1.5% compared to the nominal half-life of this radionuclide, which is 6.01 hours.

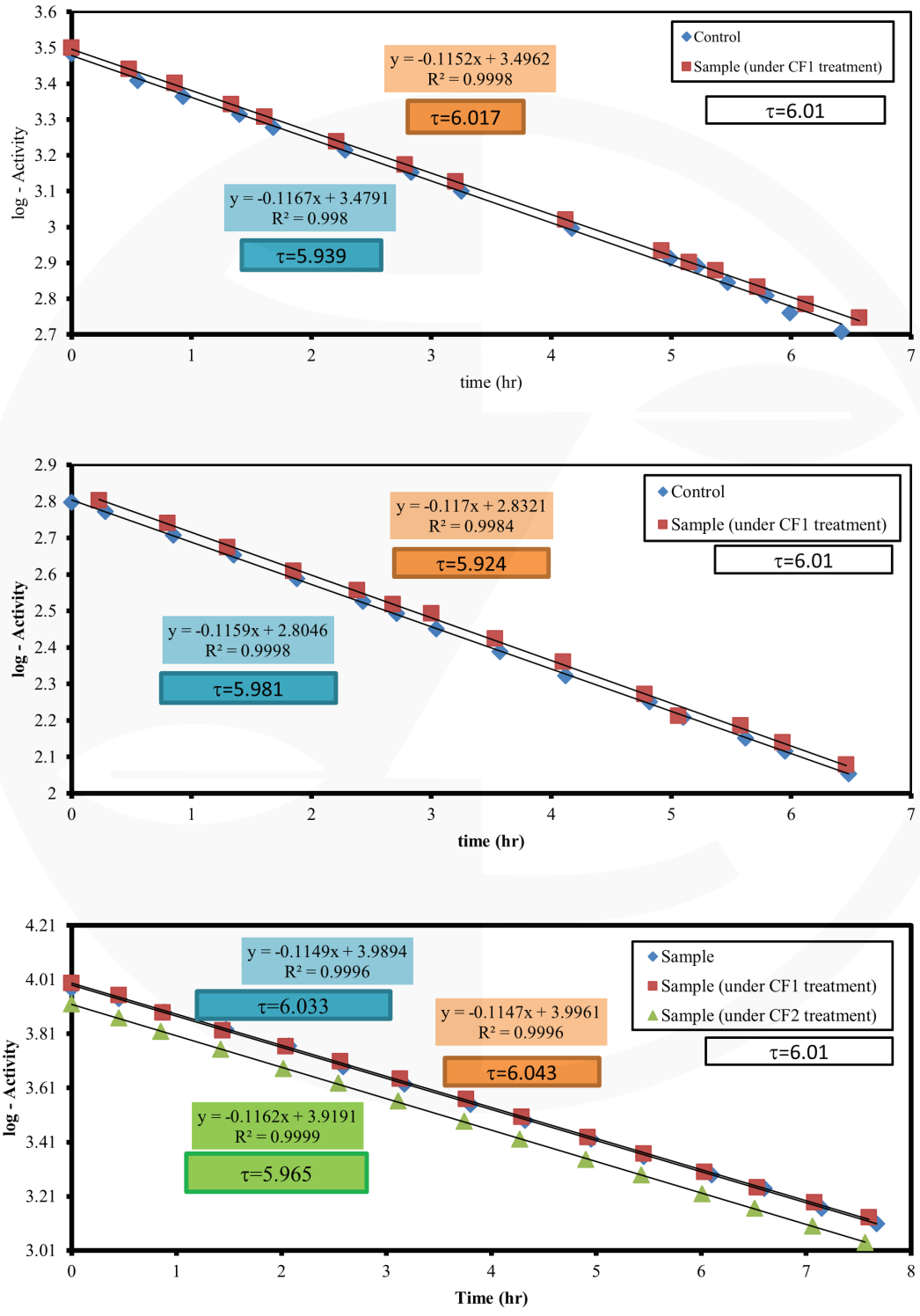


Figure 2. Logarithm of the relative activity measured over time in the control sample and the sample under the influence of T-Consciousness Fields 1 (CF1) and 2 (CF2).

Table 1. Calculation of the radioactive half-life of Tc-99m under various conditions.

Tests	Control		Sample under treatment of CF1		Sample under treatment of CF2	
	Half life (hr)	Error relative to nominal value	Half life (hr)	Error relative to nominal value	Half life (hr)	Error relative to nominal value
1	5.94	1.16	6.02	0.17	-	-
2	5.98	0.50	5.92	1.50	-	-
3	6.03	0.33	6.04	0.50	5.97	0.67

Test 2

Figure 3 illustrates the results of the natural logarithm of the measured relative activity plotted against time, where the slope of the line fitted to the data was used to calculate the half-life of the radioactive materials. The calculated half-life for the Tc-99m radioactive material under various conditions is presented in Table 2.

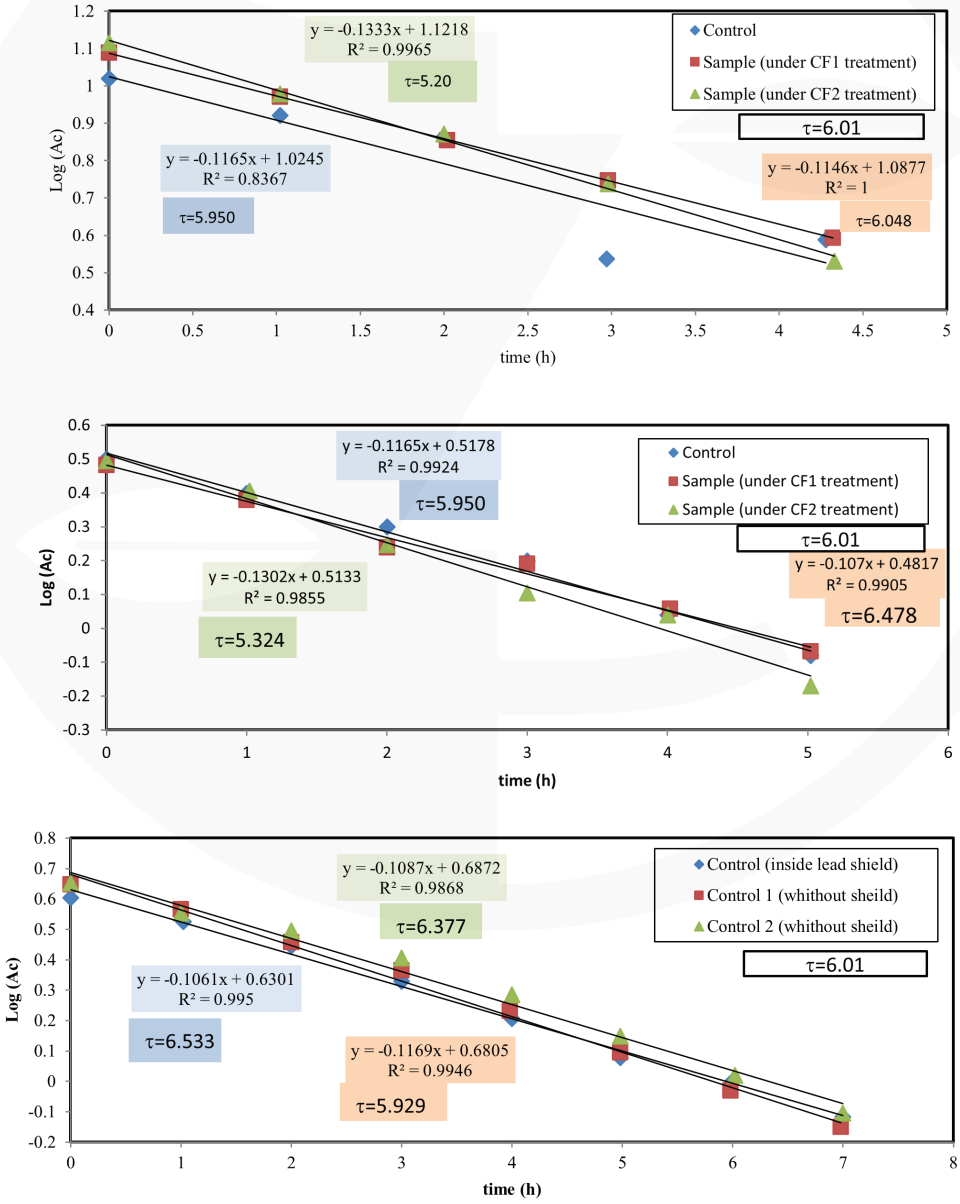


Figure 3. Logarithm of the relative activity measured in contaminated water samples over time in the control and under the influence of T-Consciousness Fields 1 (CF1) and 2 (CF2).

Table 2. Calculated half-life for the radioactive material Tc-99m in various contaminated water conditions.

Treat	Control		Sample under CF1 treatment		Sample under CF2 treatment	
	Line slope	Half-life (hr)	Line slope	Half-life (hr)	Line slope	Half-life (hr)
1	0.1165	5.95	0.1146	6.05	0.1333	5.20
2	0.1165	5.95	0.107	6.48	0.1302	5.32
3	0.1061	6.53	-	-	-	-
	0.1169	5.93	-	-	-	-
	0.1087	6.38	-	-	-	-

As observed, the contaminated water samples under the influence of T-Consciousness Field Type 2 demonstrate a shorter half-life (at least 13% and an average of 17%) compared to the other samples. A comparison of the significance of these test results is presented in Tables 3 and 4.

Table 3. Summary of the comparison between the control group and the sample under the influence of T-Consciousness Field Type 2 in the ANOVA test.

Groups	*Count*	*Sum*	*Average*	*Variance*
Control	5	30.73858532	6.147717064	0.08172
Sample under CF2 treatment	2	10.19710223	5.098551117	6.33E-05

Table 4. Results of the comparative test between the control group and the sample under the influence of T-Consciousness Field 2.

Source of Variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	1.572498836	1	1.572498836	24.0485	0.004459	6.607891
Within Groups	0.326943226	5	0.065388645			
Total	1.899442062	6				

Given that the half-life of the Tc-99m radioisotope in Test 1 was not affected by the T-Consciousness Fields, it appears that in this test, the effective half-life of the radioisotope in contaminated water decreased under the influence of T-Consciousness Field 2. Furthermore, the effects of this field may have led to the precipitation of the water-soluble radioisotope, a hypothesis that requires supplementary experiments.

According to Taheri's theory, it is possible to apply T-Consciousness Fields to numerous subjects, ranging from living organisms to inanimate matter. In this perspective, matter consists not only of a physical aspect—comparable to hardware—but also of a subtle, non-physical or 'software' dimension that defines the nature and properties of the physical section [13]. This software component, possessing precise information indices, directs the behavior and performance of the hardware section. As mentioned in the introduction, the application of T-Consciousness Fields is carried out without any physical intervention and through the mind of the announcer, requiring only a few seconds. Following this, changes in the control samples (without the field's effect) can be compared with the treated samples. In fact, the observation of changes in the samples under the influence of T-Consciousness Fields is attributed to the information received through these fields.

In summary, it can be stated that this study provided evidence of the influence of T-Consciousness Fields on the properties of the Tc-99m radioisotope. Since

the effects of these fields on half-life changes varied under contaminated water conditions, it appears that T-Consciousness Fields conveyed different information depending on the environmental circumstances. Further studies are required to elucidate the mechanisms of influence for these non-frequency fields.

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