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THE ANOMALOUS ELECTRODYNAMIC CHARACTERISTICS AND POLARIZED-ORIENTED MULTILAYER MOLECULAR STRUCTURE OF MRET-ACTIVATED WATER

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Revised

The anomalous electrodynamic characteristics (dielectric permittivity and electrical conductivity) of MRET water subjected to applied EMF (electromagnetic field) in the area of a very low range of frequencies were discovered during experiments conducted at Moscow State University, Russia. This confirmed the high level of long range dynamic structuring of water molecules in polarized-oriented multilayer formations in activated water produced with the help of the MRET activation process. The similarity of molecular formations of cell water and MRET activated water contributes to their compatibility, easy bioavailability and assimilation of MRET-activated water into biological systems. The introduction of MRET water into biological systems can contribute to the enhancement of the cellular transduction mechanism and the proper functioning of cells in biological systems. The significant positive effect of MRET-activated water regarding tumor resistance in animals was observed in experiments conducted on 500 mice at Kiev Institute of Experimental Pathology, Oncology and Radiobiology, Ukrainian Academy of Science.

Keywords: MRET activated water; dielectric permittivity; electrical conductivity; low frequency range; polarized-oriented multilayer structure.

1. Objectives

MRET-activated water is produced with the help of a patent on the USA Molecular Resonance Effect Technology (MRET). The MRET water activator is the stationary source of a subtle, low frequency, resonant electromagnetic field with a composite structure. The origin of the low frequency composite electromagnetic field is the intensive electrical activity inside the nanocircles formed by linear molecular groups of the MRET polymer compound (volumetric fractal geometry matrix) when the polymeric body is exposed to the external electromagnetic fields of specific frequency and wavelength.[10] The objective of this article is to demonstrate the anomalous behavior of the electrodynamic characteristics (dielectric permittivity and electrical conductivity) of MRET water subjected to applied EMF (electromagnetic field) in the area of a very low range of frequencies, in order to provide some evidence regarding polarized-oriented multilayer structuring of MRET-activated water and the possible effect of MRET water on the proper functioning of cells in biological systems.

The fundamental biophysical theories revealed the scientific paradigm regarding polarized-oriented multilayer structuring of cell water in biological systems.[2–4] The suggested model of polarized-oriented multilayer structuring of cell water due to the interaction of water dipoles with pervasive matrix of fully extended proteins[4] constitutes the basis for the cellular transduction mechanism. Based on this scientific approach, the similarity of molecular formations of cell water and MRET-activated water can contribute to their compatibility, easy bioavailability and assimilation of MRET-activated water, as well as to the enhancement of cellular functions in biological systems. A number of researches have confirmed the ability of MRET water to enhance the morphology of blood cells and to suppress mutated cells *in vitro*,[6–8] the high germicidal activity of MRET water, and the inhibition of growth of *kaluss* tissue (mutated cells of botanical origin) in MRET water. The significant positive effect of MRET-activated water regarding tumor resistance in animals was observed in experiments conducted on 500 mice. This investigation was conducted at Kiev Institute of Experimental Pathology, Oncology and Radiobiology, Ukrainian Academy of Science.[9]

2. Methods

The anomalous behavior of the electrodynamic characteristics (dielectric permittivity and electrical conductivity) of MRET water subjected to applied EMF in the area of a very low range of frequencies was discovered during experiments conducted at Moscow State University, Russia, with the help of the Novocontrol complex of equipment "Turnkey System, Concept 40" in compliance with the standard methodology for this instrumentation.[9] This complex of equipment contains a generator of ac electrical current, a dielectric impedance analyzer (ALPHA) allowing for the range of 3×10^{-6}–3×10^{7} Hz, a measurement unit, a temperature control unit (QUATRO Cryosystem) allowing for the range of -160–$4000°$C, and a data analyzer. The scheme of measurements is presented at Fig. A.

Dielectric permittivity $[\varepsilon'(\omega)]$ and electrical conductivity $[\sigma(\omega)]$ were automatically calculated as functions of the intensity of the applied EMF (U), electric current (I) and phase angle (ϕ) between U and I (Fig. B). In compliance with the Novocontrol methodology, this measurement scheme allows for dependence of exact values of

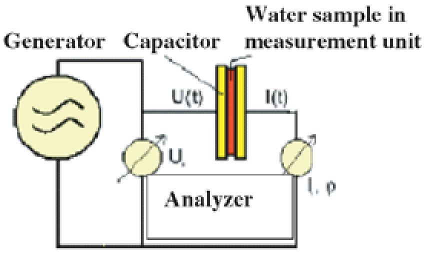

Fig. A.

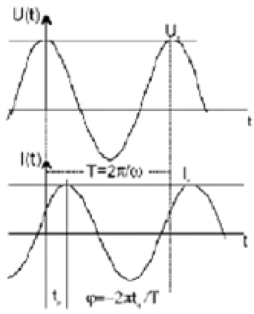

Fig. B.

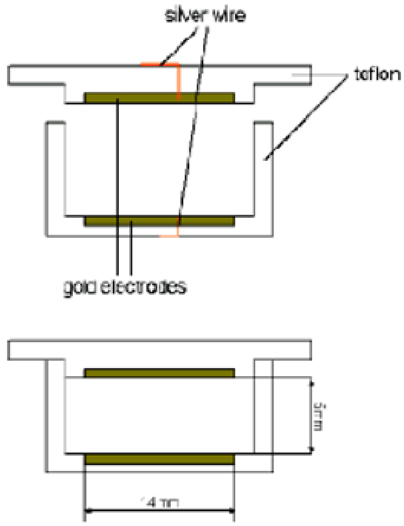

Fig. C.

$\varepsilon'(\omega)$ and $\sigma(\omega)$ of the dimensions of the measurement unit; nevertheless, it shows the same tendencies in the development of these functions not correlated with the dimensions of the measurement unit. The measurement unit is presented at Fig. C.

The gold electrodes and teflon cover were used to exclude any chemical reactions in distilled water that could lead to ionization of the distilled water and as a result to substantial distortion of measurements. In order to exclude the possible distortions due to the air ionization process, the blow with nitrogen gas (very good dielectric) was created around the measurement unit. The required temperatures were maintained during the whole time of experiments (about 20–30 min for each test) with the help of the temperature control unit.

3. Results

Significant modification of the electrodynamic characteristics of distilled water was observed after MRET activation. The electrodynamic parameters of water as functions of applied external EMF frequencies are presented at Fig. 1 (nonactivated water), Fig. 2 (water activated for 30 min), Fig. 3 (water activated for 60 min) and Fig. 4 (30-min-activated water heated up to 72°C).

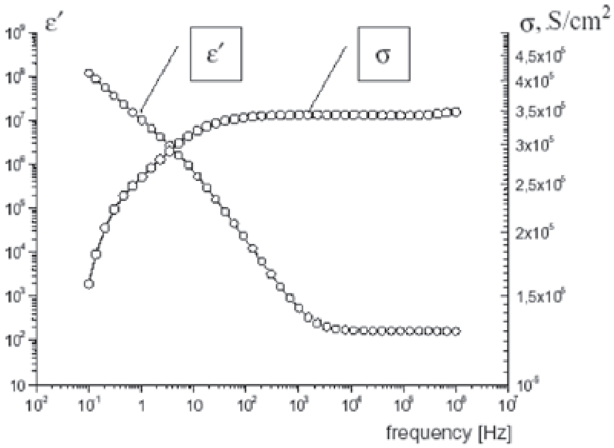

Fig. 1. Electrodynamic characteristics of nonactivated distilled water at 20°C.

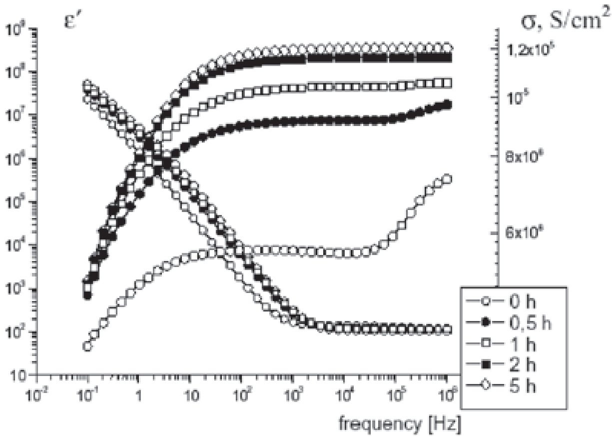

Fig. 2. Electrodynamic characteristics of MRET water (30 min activation) at 20°C and different periods of time of storage: 0 h, 0.5 h, 1.0 h, 2.0 h, and 5.0 h respectively.

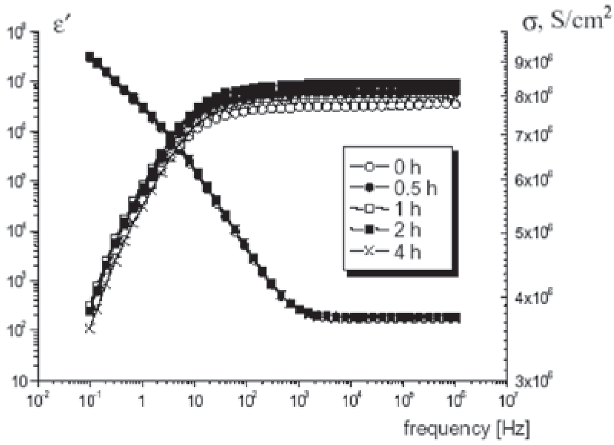

Fig. 3. Electromagnetic characteristics of MRET water (60 min of activation) at 20°C and different periods of time of storage: 0 h, 0.5 h, 1.0 h, 2.0 h, and 4.0 h respectively.

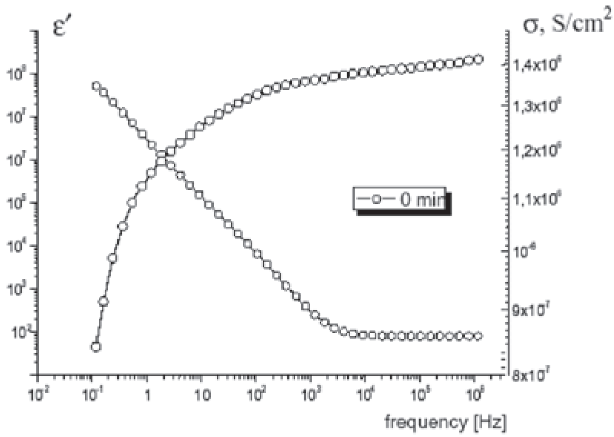

Fig. 4. Electrodynamic characteristics of MRET water (30 min of activation) at 72°C.

The electrical conductivity of MRET-activated water at 20°C in the range of frequencies 0.1 Hz–100 kHz decreased by 77–90% in 30-min-activated water and by 66–70% in 60-min-activated water respectively compared to nonactivated distilled water. The dielectric permittivity in the very low frequency range 0.1–1000 Hz decreased by 80–90%, and in the range of frequencies 1–100 kHz it decreased by 18% in 30-min-activated water; a decrease by 70–85% was observed in the range 0.1–1000 Hz in 60-min-activated water compared to nonactivated water. The significant reduction of values of electrical conductivity and dielectric permittivity confirms the relatively high, long range dynamic structuring of water molecules in activated water produced with the help of the MRET activation process.

The investigation regarding the electrodynamic characteristics of MRET water also revealed that the long term storage of activated water (up to 5 h at 20°C) did not significantly affect the modified electrodynamic characteristics of 30-min-activated water (the conductivity had the level of decrease 66–70% and the dielectric permittivity had the level of decrease 50–55% in the range 0.1–1000 Hz, and 18% in the range 1–100 kHz respectively). The storage of 60-min-activated water under the same conditions practically did not affect its electrodynamic characteristics (the maximum difference is 2%). These results confirm the ability of MRET-activated water to keep its anomalous properties for rather long periods of time (known in physics as the "long term water memory" phenomenon[10,11] in the case of 30 min of activation, and an even higher level of this phenomenon in the case of 60 min of activation.

The significant level of reduction of dielectric permittivity and electrical conductivity kept by MRET water activated for 30 min after it was heated to 72°C confirms its stability to thermal effect. The reduction of the dielectric permittivity of MRET water by 50–75% in the range of 0.1–1000 Hz (compared to nonactivated water at 20°C) provides confirmation of the phenomenon of the stability of MRET water to heating effect. According to Chaplin[1], the reduction of dielectric permittivity due to the increase in water temperature is about 4.3% per 10°C. This means that the reduction of dielectric permittivity due to the increase in water temperature was about 22% and the reduction of the extra 38–43% was most likely related to the effect of the MRET activation process. Such anomalous behavior of dielectric permittivity confirms the stability of MRET water to thermal effect. There is no direct correlation between the electrical conductivity of water subjected to applied EMF and the water temperature due to a number of factors that affect this correlation. On one hand, the increase in temperature leads to the increase of the process of dissociation of water molecules; on the other hand, at the same time, there is an opposite effect of increased resistance to the current of ions in the heated media, with increased chaotic Brownian movement of molecules. Further, the scheme of measurement used in Novocontrol equipment allows the measurement of effective electrical conductivity, which is defined with the help of two types of conductivity: regular ionic conductivity and electrical conductivity of displacement electric current $d\mathrm{D}/d\mathrm{t}$, where D is the induction of EMF which has nonlinear correlation with the complex value of dielectric permittivity ε. The significant decrease in the electrical conductivity of MRET water at 72°C in the range of frequencies 0.1 Hz–100 kHz by 95–96% (compared to nonactivated water at 20°C) cannot be explained in detail within the scope of this research and is subject to further investigation.

The experiment conducted at Moscow State University on MRET-activated water subjected to tangent pressure revealed that at a very low velocity of motion of water (tangent pressure in the range of 0.004–0.005 Pa, temperature 20°C), the viscosity of MRET water activated for 60 min decreased by about 200–250 times compared to nonactivated water from the same source. The most significant phenomenon of anomalous low viscosity of activated water, a decrease by about 300–500 times, was observed for water activated for 30 min. These results confirm the hypothesis regarding the alteration of the molecular structure of MRET-activated water. The anomalous low viscosity of MRET-activated water in the area of very low tangent pressure confirms the polarized-oriented multilayer molecular structuring of MRET water: the relatively high level of long range molecular coupling (hydrogen bonding) inside the "layers" and the very low level of molecular coupling between the "layers."

Below is presented the theoretical basis allowing for the explanation of the modification of the dielectric permittivity of MRET water related to its multilayer structuring Chaplin.[1] Under the influence of applied EMF, polar molecules tend to align themselves with the field. Although water has polar molecules, its hydrogen bonding network tends to oppose this alignment. The level to which a substance does this is called its dielectric permittivity. Depending on the frequency of applied EMF, the dipole may move in time to the field, lag behind it or apparently remain unaffected. The ease of the movement depends on the viscosity and mobility of the electron clouds. In the wide range of EMF frequencies lower than the GHz frequency level (corresponding to microwave thermal effect), the water dipoles move in time to the field. In the range of extremely low frequencies 0.1–1000 Hz (corresponding to the extremely low velocity of movement), the dynamic viscosity of water and the resistance of water dipoles to the alignment (dielectric permittivity) are extremely high (up to 10^8 at 0.1 Hz), due to hydrogen bonding between molecules (molecular coupling). In the higher frequency range of kHz to

GHz (the high velocity of movement corresponding to the normal dynamic viscosity of water), the reorientation process, may be modeled using a "wait and switch" process where the water molecule has to wait until favorable orientation of neighboring molecules occurs and then the hydrogen bonds switch to new molecules. This range of frequencies of applied EMF is related with the ease of the movement of water dipoles and the consequent relative stability of the dielectric permittivity (about 80) and viscosity (about $1\text{cP} = 0.001\text{Pa·s}$) of water at 20°C.

It is reasonable to admit that in the range of very low frequencies 0.1–1000 Hz the long range multilevel molecular structures of MRET water (with a high level of molecular coupling inside the "layers" and an extremely low level of hydrogen bonding between the "layers") create a lower level of resistance of water dipoles to the alignment and, as a result the dielectric permittivity of MRET water is substantially lower by 70–90% compared to non-activated water. This substantial decrease in dielectric permittivity also confirms the direct correlation between the viscosity and the dielectric permittivity of water in the range of low frequencies of applied EMF.[1]

4. Conclusions

The significant reduction of values of electrical conductivity and dielectric permittivity confirms the relatively high, long range dynamic structuring of water molecules in activated water produced with the help of the MRET activation process. The long-term storage of activated water (upto 5 h at 20°C) did not significantly affect its modified electrodynamic characteristics, thus confirming the ability of MRET-activated water to keep its anomalous properties for rather long periods of time in the case of 30 min of activation, and an even higher level of the "long term water memory" phenomenon in the case of 60 min of activation. The significant level of reduction of dielectric permittivity and electrical conductivity kept by MRET water activated for 30 min after it was heated to 72°C confirms its stability to thermal effects.

It is well known that cellular processes in biological systems are driven by the low energy of biochemical reactions inside and between the cells and cellular structures. Consequently, such processes create subtle low frequency electromagnetic fields and low tangent pressures along water surfaces and the membranes between the cells. The anomalously low viscosity, dielectric permittivity and electrical conductivity of MRET water in the range of very low frequencies that exists in biological systems can contribute to the enhancement of the cellular transduction mechanism and result in improved intracellular/extracellular water exchange and the proper functioning of cells in biological systems.

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