AMERICAN JOURNAL OF INDUSTRIAL AND SCIENTIFIC RESEARCH

ISSN: 2153-649X

The comparative analysis of the effect of MRET treatment on morphology of HeLa cancer cells and PBMC normal cells

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ABSTRACT

This particular article relates to a fundamental nature on how MRET Activated Water with the modified molecular structure, physical and electrodynamic characteristics may affect molecular mechanisms in living cells. The research regarding the physical parameters of water confirmed that MRET treatment of distilled water leaded to substantial modification of basic physical-molecular properties of water. The anomalous viscosity of MRET water (subject to very low tangent pressure) and electrodynamic characteristics of MRET water (subject to applied electromagnetic field of low frequency range) confirm the high level of long-range dynamic structuring of water molecules in polarized-oriented multilayer formations in activated water produced with the help of MRET activation process. The similarity of molecular formations of cell water and MRET activated water contributes to compatibility and easy assimilation of MRET activated water in living cells. The introduction of MRET water to biological systems may contribute to the enhancement of the cellular transduction mechanism and proper function of cells in biological systems. The *in vitro* study conducted at AltheaDx Technology confirmed that MRET activated water based medium did not affect the living cells on genetic level; it affected the morphology of normal PBMC cells in a positive way increasing their viability and on the other hand promoted significant inhibition of growth of HeLa cancer cells.

Keywords: MRET Activated Water, HeLa cells, PBMC cells, Viability, Viscosity, Electrical Conductivity, Dielectric Permittivity.

INTRODUCTION

This particular article relates to a fundamental nature on how MRET activated water with the modified molecular structure, physical and electrodynamic characteristics may affect specific molecular mechanisms in living cells. The goal of this investigation was to study *in vitro* the effect of MRET activated water based medium on growth and viability of HeLa cancer cells and normal PBMC cells.

MRET Activated Water is produced with the help of patented in the USA Molecular Resonance Effect Technology (MRET). MRET water activator is the stationary source of subtle, low-frequency, resonant electromagnetic field with composite structure. The origin of the low-frequency composite electromagnetic field is the intensive electrical activity inside the nano-circles formed by linear molecular groups of MRET polymer compound (volumetric fractal geometry matrix) when polymeric body is exposed to the external electromagnetic fields of specific frequency and wavelength (Vysotskii *et al*.2005). The research regarding the physical parameters of water confirmed that MRET treatment of distilled water leaded to substantial modification of basic physical-molecular properties of distilled water. The level of modification of properties of MRET water depends on the duration of the process of activation. The results also confirmed the ability of MRET activated water to keep its anomalous characteristics for several hours or days at room temperature and especially at low temperature (known in physics as the “long-term water memory” phenomenon (Vysotskii *et al*.2004).

The experiment conducted on MRET activated water subjected to the tangential pressure revealed that at very low velocity of motion of water (tangential pressure in the range of 0.004 – 0.005 Pa, temperature 20˚C) the viscosity of water activated for 60 minutes decreased about 200 – 250 times compare to non-activated water from the same source. The most significant phenomenon of anomalous low viscosity of activated water, the decrease about 300 – 500 times, was observed for water activated for 30 minutes. These results confirm the hypothesis regarding the modification of molecular structure in MRET activated water. Particularly, the anomalously 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 high level

of long-range molecular coupling (hydrogen bonding) inside the "layer" and very low level of molecular coupling between the "layers."

The significant modification of electrodynamic characteristics of distilled water subjected to applied electromagnetic field in the range of low frequencies was observed after MRET activation. The electrical conductivity of MRET activated water at 20˚C in the range of frequencies of 0.1 Hz – 100 kHz decreased by 80 – 90% in 30 minutes activated water, and by 66 – 70% in 60 minutes activated water respectively compare to non-activated distilled water. The dielectric permittivity in the very low frequency range of 0.1 – 1000 Hz decreased by 80 – 90% and in the range of frequencies of 1 – 100 kHz it decreased by 18% in 30 minutes activated water; the decrease by 70 – 85% was observed in the range of 0.1 – 1000 Hz in 60 minutes activated water compare to non-activated water from the same source. It is reasonable to admit that in the range of very low frequencies 0.1 – 1000 Hz the long-range multilayer molecular structures of MRET water (with high level of molecular coupling inside the "layers" and extremely low level of hydrogen bonding between the "layers") create 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% compare to non-activated water. This substantial decrease of dielectric permittivity also confirms the direct correlation between viscosity and dielectric permittivity of water in the range of low frequencies of applied EMF (Drost, 1971).

The investigation regarding the electrodynamic characteristics of MRET water also revealed that the long-term storage of activated water (up to 5 hours at 20˚C) did not substantially affect the modified electrodynamic characteristics of 30 minutes activated water (the reduction of conductivity still kept the level of 66 – 70% and dielectric permittivity kept the level of decrease by 50 – 55% in the range of 0.1 Hz – 1 kHz and by 18% in the range of 1 – 100 kHz respectively). The storage of 60 minutes activated water under the same conditions practically did not affect its electrodynamic characteristics (maximum difference is 2%). These results confirm the ability of MRET activated water to keep its anomalous properties for rather long period of time (known as "long-term water memory" phenomenon) in case of 30 minutes activation and even higher level of "long-term water memory" phenomenon in case of 60 minutes activation.

Thus, the anomalous viscosity of MRET water (subject to very low tangent pressure) and electrodynamic characteristics of MRET water (subject to applied electromagnetic field of low frequency range) 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 MRET activation process. The fundamental biophysical theories revealed the scientific paradigm regarding polarized-oriented multilayer (PM) structuring of cell water in biological systems [4]. According to the PM theory, the assumption of the formation of distinctive dynamic structure by the cell water results from its interaction with some intracellular proteins. More specifically, the dynamic structure of cell water results from its direct or indirect interaction with the positively-charged CO groups (P sites) and negatively-charged NH groups (N sites) on the "backbones" of a pervasive matrix of fully-extended proteins. These P and N-site-bearing proteins and the water molecules with which they interact constitute what is called a NP-NP system. Electrical polarization and directional orientation of multiple layers of water molecules may occur under the influence of one or two (juxtaposed) checkerboard(s) of alternatively positive and negative sites. Parenthetically, water molecules may also be polarized and oriented in "layers" by a NO system or a PO system, in which electrically-neutral O sites replace properly-spaced electrically-charged P or N sites of a classic NP system respectively. The aggregate physical impacts of the NP sites on the bulk-phase water may be somewhat arbitrarily divided into three components: to enhance the average water-to-water interaction of (all) the water molecules in the system (Component 1); to reduce the translational as well as rotational motional freedom of the water molecules (Component 2); and to prolong the stay or *residence time* of each water molecule at a specific preferred location (Component 3). (Ling, 2005).

The interaction of water dipoles with pervasive matrix of fully-extended proteins 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 bio-availability and assimilation of MRET activated water, as well as to the enhancement of cellular functions in biological systems.

The anomalous electrodynamic characteristics and viscosity of MRET Activated water provide some evidence regarding the possible effect of MRET water on the proper function of cells in biological systems. It is well known that cellular processes in biological systems are driven by the low energy of bio-chemical reactions inside and between the cells and cellular structures. Consequently, such processes create subtle low frequency electromagnetic field 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 function of cells in biological systems.

MATERIALS AND METHODS

The *in vitro* investigations on normal PMBC cells (peripheral blood mononuclear cell) and on HeLa cancer cells (cell line ATCC # CCL-2 cervical adenocarcinoma) were conducted under the supervision of Patrick Pezzoli, Ph.D. at AltheaDx Technologies, San Diego, USA. The experiments analyzed: cells lysed at 0 hour, cells cultured for 24 hours in untreated medium and cells cultured for 24 hours in medium treated with MRET activator for 30 minutes. DNA samples from each batch were processed and the resultant data was analyzed using Affymetrix Genotyping Console 3.0 to obtain genotype calls and copy number calls. Cell counts and % viability were obtained using the Trypan Blue exclusion technique.

RESULTS

The Affymetrix Genotyping technique data revealed no difference between the zero hour (control), MRET treated and untreated samples in term of genotypes and copy number calls. Thus, MRET activation of water based medium did not induce any changes in cells on genetic level.

The studies showed that in MRET activated water based medium the viability of normal cells (PBMC) was higher (Table 1), and the viability of cancer cells (HeLa) was lower (Table 2) compared to the viability in untreated water based medium.

Table 1: PBMC cell counts and % viability

Sample	Cell Count	% Viability	Viable cells
0 hour	$3.27x10^6$	91.5	$2.99x10^6$
Untreated	$0.27x10^6$	83.4	$0.73x10^6$
Treated	$0.77x10^6$	88.8	$0.69x10^6$

Table 2: HeLa cell counts and % viability

Sample	Cell Count	% Viability	Viable cells
0 hour	$3x10^6$	92	$3.27x10^6$
Untreated	$7x10^6$	97	$6.79x10^6$
Treated	$5x10^6$	92	$4.60x10^6$

For normal cells (PBMC) the changes in cell counts were similar for untreated and MRET treated medium (Fig 1). Thus, MRET treatment did not affect the growth of normal cells. For cancer cells (HeLa) the experimental data revealed significant inhibition of cancer cells growth in MRET treated medium. The growth of viable cancer cells was inhibited by 54% in MRET treated medium compared to untreated medium (Fig 2).

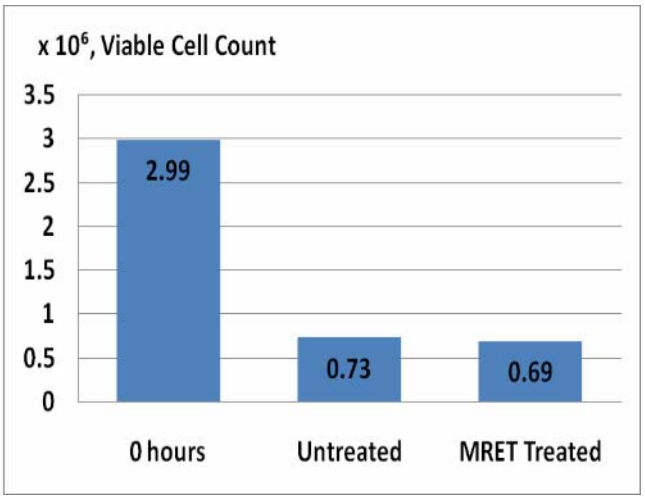

Fig 1: Viable PBMC cell counts after 24 hours of incubation.

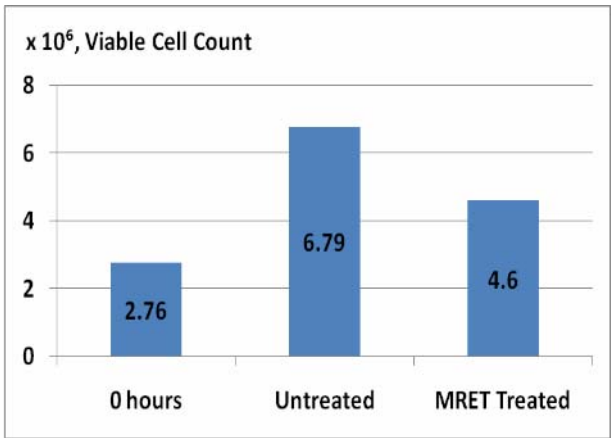

Fig 2: Viable HeLa cell counts after 24 Hours of incubation

DISCUSSION

The results of AltheaDx research on HeLa cancer cells *in vitro* support the results obtained earlier in the investigation regarding the effects of MRET water on tumor resistance in animal model. The study on 500 mice was conducted under the supervision of Professor V. Vysotskii, S. Olishevsky, Ph.D. and Y. Yanish, Ph.D. at Kyiv Institute of Experimental Pathology, Oncology and Radiobiology of Ukrainian Academy of Science. It showed substantial inhibition of growth of viable tumor cells following the consumption of MRET water. In the course of this investigation the groups of mice in "preventive regime" ingested MRET water for 2 weeks prior to the inoculation of Ehrlich carcinoma cancer cells and for 3 weeks after the inoculation. The groups of mice in "therapeutic regime" ingested MRET water only during 3 weeks after the inoculation of Ehrlich carcinoma cancer cells. Following the consumption of MRET water activated for 30 minutes (the optimal time of activation) the growth of viable tumor cells was inhibited by 76% in "preventive regime" and by 55% in "therapeutic regime."[6]

CONCLUSION

It is possible to conclude that the studies conducted at AltheaDx Technology confirm that MRET activated water based medium did not affect the cells on genetic level; it affected the morphology of normal PBMC cells in a positive way increasing their viability and promoted significant inhibition of growth of HeLa cancer cells.

REFERENCES

Vysotskii,V.I., Smirnov, I.V. and Kornilova, A.A. (2005) "Introduction to the Biophysics of Activated Water," Universal Publishers, USA

Vysotskii,V.I., Kornilova,A.A. (2004) "The Physical Basis of Long-term Water Memory Effect," Moscow University Physics Bulletin, 59(3): 58-62, Russia

Chaplin, M. (2005) "Water Dielectric and Microwave Radiation" London South Bank University, http://www.lsbu.ac.uk/water/microwave.html

Drost-Hansen, W. (1971) "Chemistry of the Cell Surface" , Academic Press, New York, pp.1

Drost-Hansen, W. and Singleton, J.L. (1991) "Our Aqueous Heritage: Evidence for Vicinal Water in Cells", Fundamentals of Medical Cell Biology, Vol.3A, Chapter 5, JAJ Press, Inc.

Ling, G.N. (2001) "Life at the Cell and Below-Cell Level: The Hidden History of a Fundamental Revolution in Biology" Pacific Press, New York

Ling, G.N. (2003) "A New Theoretical Foundation for the Polarized-Oriented Multilayer Theory of Cell Water and for Inanimate Systems Demonstrating Long-range Dynamic Structuring of Water Molecules", Physiol. Chem. Phys. & Med. NMR 35: 91-130, USA

Smirnov, I.V., (2007) "MRET Activated Water and its Successful Application for Prevention Treatment and Enhanced Tumor Resistance in Oncology", Eur J Sci Res, 16(4): 575-583