Applied Biophysics of Activated Water

The Physical Properties, Biological Effects and
Medical Applications of MRET Activated Water

This page intentionally left blank

Applied Biophysics of Activated Water

The Physical Properties, Biological Effects and
Medical Applications of MRET Activated Water

Vladimir I. Vysotskii

Kiev National Shevchenko University, Ukraine

Alla A. Kornilova

Moscow State University, Russia

Igor V. Smirnov

Global Quantech, Inc., USA

Published by

World Scientific Publishing Co. Pte. Ltd.

5 Toh Tuck Link, Singapore 596224

USA office: 27 Warren Street, Suite 401-402, Hackensack, NJ 07601

UK office: 57 Shelton Street, Covent Garden, London WC2H 9HE

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library.

APPLIED BIOPHYSICS OF ACTIVATED WATER

**The Physical Properties, Biological Effects and Medical Applications
of MRET Activated Water**

Copyright © 2009 by World Scientific Publishing Co. Pte. Ltd.

All rights reserved. This book, or parts thereof, may not be reproduced in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system now known or to be invented, without written permission from the Publisher.

For photocopying of material in this volume, please pay a copying fee through the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, USA. In this case permission to photocopy is not required from the publisher.

ISBN-13 978-981-4271-18-9

ISBN-10 981-4271-18-7

Typeset by Stallion Press

Email: enquiries@stallionpress.com

Printed in Singapore.

The Authors

Vladimir I. Vysotskii

Professor

Head of Department of Theoretical Radiophysics

Radiophysical Faculty

Kiev National Shevchenko University

Vladimirskaia, St. 64

Kiev, 01033

Ukraine

Alla A. Kornilova

Ph.D.

Director of Innovation Center

Physical Faculty

Senior Researcher at Solid State Physics Department

Moscow State University

Moscow, 119899

Russia

Igor V. Smirnov

Ph.D.

President of Global Quantech, Inc.

Biotech Research company

San Marcos, CA 92078

USA

Email address: igor@gqusa.com

This page intentionally left blank

Preface

This book presents the results of complex experimental and theoretical studies of the characteristics of water activated by external action. The studied samples of activated water were obtained with the help of Molecular Resonance Effect Technology (MRET). We discuss the results of detailed studies of mechanical, electrodynamic, optical, and other characteristics of activated water itself and various physical phenomena associated with its application. About half of the book is devoted to the comprehensive studies of the specific features of the influence of activated water on various biological objects (plants, microorganisms, animals). These investigations were carried out from year 2004 to 2008 at several scientific institutes and universities of Ukraine, Russia, and USA, with participation from the authors of the book.

Despite the wide spectrum of the performed studies related to various branches of science, the final object of these studies was, eventually, activated water. Both in the process of these studies and in the analysis of the obtained experimental results, the authors did not attach non-distinctive or even mystic sense to the notion of activated water, and considered it always as an ordinary object of studies which has undergone the strictly controlled action of definite physical fields with definite time intervals. These time intervals (the duration of activation) were chosen from preliminary studies, and determined from the range of the most essential action.

First of all, we indicate that our investigations have no connections with extrasensorics, astrology, and other marginal fields. In connection with the existing ambiguity of the interpretation of the notion of activated water, we would like to note that the studied activated water was pure (in particular, distilled) water which had been subjected to a sufficiently long-term treatment by very weak nonionizing electromagnetic fields with definite frequency-related, spatial, and polarization-related properties. These fields were created by several identical unified generators constructed on the basis of the MRET technology. Additionally, we also refer to the use of definite strictly-controlled temperature for the storage of activated water prior to its investigation or prior to its application on biological objects.

The detailed investigations showed that, upon such electromagnetic treatment, significant quasistable changes occur in the spatial structure of water. These changes can be preserved for a very long time interval and, in turn, can lead to changes in the physical properties of activated water and to a significant modification of its biophysical and biochemical actions on living organisms. These changes can be considered as evidence of manifestation of the long-term “memory” of activated water.

The present publication is a natural and logical sequel to our preceding book (Vysotskii, Smirnov and Kornilova, 2005), where we considered some theoretical aspects of the influence of nonionizing and ionizing fields on water.

Below, we give briefly the organization of the book for the readers' convenience.

The first chapter includes the analysis of the well-known characteristics of ordinary water. In addition, we consider a number of established and new models of water structure. Here, we touch the problem of the memory of water and study some specific models of such memory. Particular attention is paid to the clathrate model of water memory, for which we performed specific calculations of the time intervals with different types of relaxation and at various temperatures (Vysotskii and Kornilova, 2004). The results of these calculations agree sufficiently well in a wide range of variation in temperature, with the data of the experiments obtained by the authors and analyzed in the subsequent chapters in detail.

The second chapter is devoted to the analysis of the main concepts of the process of water activation with the help of US patented MRET water activation technology, which is based on the effect of specific subtle, low frequency, nonionizing electromagnetic field generated by MRET activator. Written by the patent holder Dr. Igor Smirnov, this chapter describes the mechanisms of formation of volumetric fractal matrix in a polymeric compound produced in compliance with MRET technology. Dr. Smirnov also presents the brief results of scientific investigations supporting his theoretical concepts regarding the character of anomalous electromagnetic processes running in the volume of fractal matrix of MRET polymer compound following its excitation by defined external electromagnetic fields of special structure. He also analyzes the reasons for the existence of quasi-stable structural defects in the volume of water and the formation of long-range water molecular structures following the process of its activation. Then, based on the scientific investigation of the anomalous viscosity of MRET water, the author shows the compatibility of long-range polarized oriented

multilayer structuring of MRET Activated Water with the analog structuring of cell water in biological systems presented in numerous theoretical studies of famous scientist such as Dr. Ling (2003) and Dr. Drost-Hansen (1991). All biological and physical studies described in this manuscript were conducted on activated water produced with the help of MRET water activator.

The third chapter of the book is related to the description of the procedure of complex studies of the physical characteristics of activated water and the analysis of the results of these studies. In the performed experiments, we show that the activation of water causes very essential changes in the electromagnetic, mechanical (including viscosity-related), and spectral properties of water. Several important experiments were conducted with participation of Prof. N. D. Gavrilova and Dr. E. Malyshkina, from Lomonosov Moscow State University, and Dr. L. N. Nikitin from Russia Academy of Science. We studied the dependence of the manifestation and the existence of these specific features of the properties of activated water on the water-activation duration, temperature, and the duration of storage after the activation. We note that some of these changes in the properties of water are so paradoxical in nature and great in magnitude that they can be undoubtedly referred to as anomalous. The dependence of changes in the properties of water on time after the completion of the activation of water is also uncommon and has no analogs in the literature. We discovered that at a low temperature, the anomalous properties of water can be preserved for many days. Some of the parameters of activated water (in particular, the hydrogen index pH) are characterized by spontaneous oscillations with a great amplitude and with the period of oscillations ranging from several hours to several days.

The fourth chapter presents the study of the influence of various types of activated water on higher plants. These investigations were conducted under the supervision of Dr. N. A. Matveeva from the Institute of Cell Biology and Gene Engineering of the National Academy of Science of Ukraine (NASU). In this chapter, we study the conditions under which activated water renders stimulating action on the growth of higher plants and, in particular, vegetable crops. We investigated the influence of the activation of water on the growth of sterile plants and callus tissue. It is shown that activated water produced in a certain mode of activation can very strongly (by hundreds of times) inhibit nonspecific growth of callus tissue. This unusual result allows one to forecast the possibility of the effective utilization of such water for the therapy of a number of diseases (in particular, psoriasis).

The fifth chapter is devoted to the study of the influence of activated water on pure microbiological cultures and on their natural associations, including

a very large number of different cultures with multifunctional connections of the symbiosis type. The investigations were carried out under aerobic and anaerobic conditions. It is demonstrated that the use of water activated in certain modes increases sharply the reductase activity of microorganisms and very significantly changes the specific features of the influence of various types of antibiotics on microorganisms (enhancing such an influence or weakening it). It is also shown that, under definite conditions, activated water possesses very strong bactericidal properties and can inhibit the development of pathogenic microbiological cultures by tens and hundreds of times. These detailed investigations were conducted under the supervision of Dr. A. B. Tashyrev from Zabolotny Institute of Microbiology and Virology of NASU (Kiev). Such properties allow one to forecast the possibility of the use of a definite mode of the activation of water for its sterilization.

In the sixth chapter, we consider comprehensively the specific features of the influence of water activated in different modes on the prophylaxis and treatment of some types of oncologic diseases. In the experimental studies performed on mice, we have shown that the intake of water activated for a definite time decelerates sharply the development of tumors of two types (*Ehrlich carcinoma* and *Sarcoma 37*) in inoculated mice, and increases very significantly the lifetime of sick animals. We have found that, by the efficiency of antitumoral action, the intake of optimally activated water corresponds approximately to the methods of chemotherapy or radiation antitumoral therapy, but, contrary to them, renders no negative side action on the other organs and systems of animals. In particular, we prove that the intake of activated water increases significantly the immunity of animals, antitumoral activity of lymphocytes with natural killing properties, and the index of cytotoxic activity. Here, we have also studied the dependence of the antitumoral action of activated water on both the time and the mode of its intake (prior to the appearance of a tumor, i.e. in the mode of antitumoral prophylaxis or thereafter, which corresponds to the mode of therapy). It is demonstrated that the factor concerning the duration of the intake of water and the mode of the intake are very important circumstances which affect the treatment. These fundamental investigations were conducted under supervision and participation of Dr. Yu. V. Yanish and Dr. S. Olishesky from Kavetsky Institute of Experimental Pathology, Oncology, and Radiology of NASU (Kiev).

In the seventh chapter, the effect of activated water on staphylococcal infection *in vivo* in animal model (on the cells of immune system) and *in vitro* on the culture of *Staphylococcus aureus* was investigated. The investigation

was conducted in two steps. The experiments *in vivo* were conducted on mice infected with *Staphylococcus* culture after preventive consumption of MRET Activated Water (including the effect of activated water on the development of the local acute inflammation, on the death rate of animals in the case of intra-peritoneal staphylococcal infection, on staphylococcal infected mice, on the cellularity and the weight of lymphoid organs, and on functional activity of cells of the phagocytic system). In the *in vitro* experiments, the growth of identical staphylococcal culture was studied on meat-peptone agar treated with MRET activator. These investigations were conducted under the supervision of Prof. L. S. Kholodna from Biological Department of Kiev National Shevchenko University.

The eighth chapter is related to the analysis of some possible biophysical mechanisms of the influence of activated water on biological objects. In this chapter, we consider possible phenomena and processes, with the help of which the consumption of activated water of certain types stimulates the immunity, enhances the antitumoral activity of lymphocytes, inhibits the growth of tumors, increases the lifetime of sick animals, inhibits the growth of callus tissue, and ensures the bactericidal properties concerning the development of pathogenic cultures. All the above-mentioned consideration is carried out on the cell level of the organization of organism and is closely related to the results of the physical and biological experiments presented in this book.

In the ninth chapter, we present the total generalizing analysis of all the obtained experimental and theoretical results, some conclusions, and a number of proposals for the possible utilization of activated water in solving the applied problems of medicine, biology, biotechnology, and agriculture.

The preface, Chapters 1, 3, 4, 5, 6, 8, 9 and part of Chapter 7 were written by Prof. V. I. Vysotskii and Dr. A. A. Kornilova on the basis of their own theoretical studies and experiments carried out with their participation at the laboratories of several leading scientific institutes and universities of Ukraine and Russia. Chapter 7 was written under the supervision of Prof. L. S. Kholodna.

In the writing of the book, we used experimental results obtained over the duration of four years from the studies carried out jointly with Prof. V. I. Vysotskii and Dr. A. A. Kornilova at the Kiev National Shevchenko University (Ukraine), Lomonosov Moscow State University (Russia), Zabolotny Institute of Microbiology and Virology of the National Academy of Sciences of Ukraine (NASU), Institute of Cell Biology and Gene Engineering of NASU, Kavetsky Institute of Experimental

Pathology, Oncology, and Radiology of NASU, and Institute of Elementoorganic Compounds of Russian Academy of Science (RAN). The authors express their deep gratitude to Dr. N. A. Matveeva, Dr. A. B. Tashyrev, A. A. Tashyreva, Dr. Yu. V. Yanish, Dr. S. Olishevsky, Prof. L. S. Kholodna who performed the experiments on the study of the influence of activated water on plants, microbiological cultures, oncologic cells, animals with inoculated oncologic tumor, and on staphylococcal infection. We also sincerely thank our colleagues Prof. N. D. Gavrilova and Dr. E. Malyshkina from the Physical Department of Lomonosov Moscow State University (Russia), and Dr. L. N. Nikitin from the Institute of Elementoorganic Compounds of Russian Academy of Science who measured the viscosity, dielectric properties, and IR- and UV-spectra of activated water.

We are sincerely obliged to many colleagues and friends (especially to Dr. I. I. Samoilenko and Prof. V. D. Rusov) for useful and stimulating discussions on the above-mentioned problems.

Chapter 2 was written by Dr. I. V. Smirnov. It is substantiated by his US patented technology "Method and Device for Producing Activated Liquids and Methods of Use Thereof" (Patent number 6002479) and by numerous scientific investigations conducted in certified research institutions and universities worldwide for several years.

The authors express their deep sincere thanks to the President of the MRET Technology Corporation, Diana Suk, for her support of our studies.

Contents

The Authors	v
Preface	vii
Overview	xix
1. Introduction to the Theory of Water Memory and General Principles of Water Activation	1
1.1. Water Structure and the Paradoxes of Water Memory . . .	1
1.2. The Clathrate Model and a Water Memory Cell	11
1.3. Program, Equipment, and Research Techniques for the Investigation of Activated Water	30
2. Molecular Resonance Effect Technology as the Basic Method for Activation of Liquid Substances	36
2.1. Introduction to the Theory of Fractal Matrix	36
2.2. The Fractal Matrix Characteristics of MRET Polymer Material	39
2.2.1. Results and discussions	45
2.3. Method and Device for the Production of Activated Liquids	47
2.3.1. Testing of device for production of activated liquids	49
3. Study of the Physical Properties of MRET Activated Water	61
3.1. Methods and Equipment to Study the Dielectric Permittivity and the Conductivity of Activated Water . . .	61
3.2. Anomalous Electrodynamical Characteristics of Activated Water	66
3.3. Procedure and Results of the Measurement of the Viscosity of Activated Water	91
3.4. Influence of the Activation of Water on Hydrogen Index pH	99

4.	Influence of MRET Activated Water on the Growth of Higher Plants	104
4.1.	General Principles and Methods of the Study of the Influence of Activated Water on Plants	104
4.2.	Influence of MRET Activated Water on the Germination of Seeds of Vegetable Crops	108
4.3.	Influence of MRET Activated Water on the Growth of Stalk and Leaves of Vegetable Crops	112
4.3.1.	Radish "Red giant"	116
4.3.2.	Radish "Krasa rannyaya"	118
4.3.3.	Peas "Alpha"	121
4.3.4.	String beans "Valentino"	121
4.3.5.	Cabbage "Dymerskaya"	125
4.3.6.	Pumpkin "Zhdana"	126
4.4.	Influence of MRET Activated Water on the Growth of Plants in a Sterile Cultural Medium	131
4.5.	Feature and Paradoxes of the Influence of Activated Water on Shaping and Growth of Callus Tissue	135
5.	Effects of MRET Activated Water on Microbial Culture and Natural Microbial Associations	148
5.1.	The Problem and Methods of Studying the Influence of Activated Water on Microbial Cultures and Microbial Associations	148
5.1.1.	General statement of the problem and initial biological test-objects	148
5.1.2.	Methods of microbiological studies and equipment	149
5.1.3.	Method of activation of nutrient media and means of registration of the processes of vital activity of microbiological cultures	152
5.2.	Effect of the Activation of the Aqueous Medium on Metabolic Parameters of the Microbiological Culture <i>Escherichia coli</i>	158
5.2.1.	Effect of the duration of activation on the metabolic parameters of culture <i>Escherichia coli</i> grown under aerobic conditions	158

5.2.2.	Metabolic parameters of <i>Escherichia coli</i> on its growth in the activated water-containing nutrient medium under anaerobic conditions	165
5.3.	Cultural-Physiological Parameters of <i>Escherichia coli</i> Culture Grown on the Activated Meat-Peptone Agar Under Aerobic Conditions	182
5.3.1.	Effect of different fractions of activated water on the survivability of cells and the growth of colonies on meat-peptone agar under aerobic conditions	182
5.3.2.	Peculiarities of the morphology and division of cells of <i>Escherichia coli</i> in activated meat-peptone agar under aerobic conditions	193
5.4.	Influence of Activated Water on the Stability of the Microbiological Culture <i>Escherichia coli</i> to the Action of Antibiotics Under Aerobic Conditions . .	196
5.5.	Effect of the Nutrient Medium Activation on the Metabolic Parameters of Microbial Associations . .	202
6.	Examination of the Influence of MRET Activated Water on Prophylaxis and Treatment of Oncology	217
6.1.	Procedures of Examinations of the Influence of Activated Water on Oncology, Objects of Investigation, and Facilities	217
6.2.	Study of the Antitumor Effects of Different Fractions of MRET Activated Water <i>in vivo</i> in the Modes of Prophylactic and Therapeutic Treatment Tested on the Tumor Model of Ascitic <i>Ehrlich carcinoma</i>	222
6.2.1.	Materials, methods, and experimental results	222
6.2.2.	Results and discussion	228
6.3.	Study of Antitumor Effects of the Application of Activated Water on the Experimental Tumor Model of Ascitic <i>Sarcoma 37</i>	233
6.3.1.	Materials and methods	233
6.3.2.	Results and discussion	241
6.4.	Research of the Influence of Activated Water on the Cytotoxic Activity of Murine Lymphocytes	243

7. Effect of MRET Activated Water on Staphylococcal Infection <i>in vivo</i> in Animal Model (on the Cells of Immune System) and <i>in vitro</i> on the Culture of <i>Staphylococcus aureus</i> Wood-46	252
7.1. Immune Response and the Purpose of Investigation	252
7.2. Functional Activity of Cells of the Immune System of Mice Infected with Staphylococcal Culture Following Preventive Consumption of MRET Water	254
7.2.1. The methodology of investigation	254
7.2.2. The examination of functional activity of cells of the phagocytic system	256
7.2.3. Statistical calculations	258
7.3. Results and Discussion	259
7.3.1. The effect of MRET water on the development of the local acute inflammation	259
7.3.2. The effect of activated water on the death rate of animals in the case of intra-peritoneal staphylococcal infection	260
7.3.3. The preliminary examination of the effect of activated water on staphylococcal infected mice	260
7.3.4. The effect of activated water on the cellularity and the weight of lymphoid organs	261
7.3.5. The effect of activated water on functional activity of cells of the phagocytic system	263
7.3.6. Conclusions to the section	274
7.4. The Effect of MRET Activation on the Process of Growth of Staphylococcal Culture in Nutrient Medium	277
7.4.1. Materials and methods of examinations	277
7.4.2. Results and discussion	278
7.4.3. Conclusions to the section	280
8. The Possible Mechanisms of Effects of Activated Water on Biological Systems	284
8.1. General Regularities of the Action of MRET Activated Water on Biological Objects	284

8.2. Possible Superficial Viscosity-Based Mechanism of the Influence of MRET Activated Water on the Division of Cells	286
8.3. Electrodynamic Dispersive and Viscosity-Related Mechanical Principles of the Influence of Activated Water on the Vital Activity of Biological Objects	294
9. Conclusions and Recommendations	300
References	311
Index	315

This page intentionally left blank

Overview

The book presents the results of complex experimental and theoretical studies of the characteristics of activated water obtained under controlled action of the specific nonionizing, low-frequency, electromagnetic emission on ordinary water. This emission was produced by a special generator (activator), whose operation principle is based on the Molecular Resonance Effect Technology (MRET technology).

We discussed a number of mechanical, electrodynamic, optical, and other characteristics of activated water. It is shown that the activation of water is associated with very significant (by several and tens of times) changes in these characteristics. These changes are preserved after the completion of the activation for a long period (up to many months for the storage of activated water at a low temperature), which allows us to say about the presence of distinctive long-term memory of water.

The results of the theoretical analysis of a possible mechanism of the water memory and methods of its stimulation are given, and the comparison of the duration of existence of this memory with experimental results is made. Particular attention is paid to the clathrate model of water memory, for which specific calculations were carried out for different temperatures. It is shown that the results of the theoretical analysis and the data of physical experiments are in good agreement.

The results of specific experiments on the study of the influence of activated water on various biological objects (plants, microorganisms, animals) are thoroughly described and discussed.

The presented results demonstrate the significant influence of MRET Activated Water on higher plants (vegetable crops), sterile plants, and callus tissue. In particular, it is shown that activated water can very strongly (by tens and hundreds of times) inhibit nonspecific growth of callus tissue. This result allows one to forecast its use for the therapy of a number of diseases (for example, psoriasis).

We describe the results of experiments which study the influence of activated water on pure microbiological cultures and their natural associations. The studies were carried out under both aerobic and anaerobic conditions.

A significant influence of such water on the reductase activity of cultures and on the efficiency of action of various antibiotics on these cultures is discovered. It is also shown that the activation of water under definite conditions gives rise to the appearance of very strong bactericidal properties: activated water inhibits the development of pathogenic microbiological cultures by tens and hundreds of times more strongly, and this can be used for sterilization.

In this book, we present the results of studies of the use of activated water in the prophylaxis and treatment of oncologic tumors of two types (*Ehrlich carcinoma* and *Sarcoma 37*) in inoculated mice. It is shown that, in the certain mode of activation (with optimal duration) and use of this water (in particular, prophylaxis), the growth rate of tumor in inoculated mice decreases by several times, and the lifetime increases by 50–60%. By the efficiency of the antitumoral action, the optimal intake of activated water corresponds approximately to the methods of chemotherapy or radiation therapy, yet renders no negative action on other organs. It is also shown that the prophylactic intake of activated water increases significantly the immunity of animals, the antitumoral activity of lymphocytes possessing the natural killing properties, and the index of cytotoxic activity. The dependence of the antitumoral action of activated water on the time interval of its storage after the activation is demonstrated.

The effect of activated water on staphylococcal infection *in vivo* in animal model (on the cells of immune system) and *in vitro* on the culture of *Staphylococcus aureus* was investigated. In the experiments *in vitro*, the growth of identical staphylococcal culture was studied on meat-peptone agar treated with the same MRET activator. In this case, the highly-significant bacteriostatic effect of 70–100% was observed at optimal conditions of activation for different initial concentration of staphylococcal culture cells.

We also consider the possible biophysical molecular mechanisms of the direct influence of activated water on biological objects, and made a number of justified proposals for the possible use of activated water to solve the actual fundamental and applied problems of medicine, biology, biotechnology, and agriculture.