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WEAK AMPLITUDE-MODULATED RF EM FIELDS FOR CANCER TREATMENT: COMMENTS AND IMPLICATIONS FROM THE VIEWPOINT OF QUANTUM-INFORMATIONAL MEDICINE

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Abstract. In past several years a team of scientists from the US, Brazil, France and Switzerland reported of their usage of low-intensity amplitude modulated radiofrequency (RF) electromagnetic (EM) fields to treat cancer patients in trials which they say could lead to the development of a new type of anti-tumor therapy. This news attracted much publicity by the beginning of this year, as reported in The Guardian. In this communication we provide some information on their research, and consider wider implications from the viewpoint of quantum-informational medicine.

Keywords: cancer treatment, radiofrequency electromagnetic fields, tumor-specific modulation frequencies, quantum-informational medicine implications.

1. Weak Amplitude-Modulated RF EM Fields for Cancer Treatment

In past several years a team of scientists from the US, Brazil, France and Switzerland reported of their usage of low-intensity amplitude modulated RF EM fields to treat cancer patients in trials which they say could lead to the development of a new type of anti-tumor therapy [1-3]. Patients hold a spoon-shaped antenna in their mouths – 60-min three times a day – to deliver a very low-intensity tumor-specific modulated RF EM field in their bodies. Different cancers responded to RF EM fields of different modulation frequencies.

In 2009, their team published results in the *Journal of Experimental and Clinical Cancer Research* which showed that low-level RF EM fields at precise modulation frequencies – ranging from 0.1 Hz to 114 kHz – halted cancer cell growth in small numbers of patients [1]. Two years later, in August 2011 they reported in the *British Journal of Cancer* on trials with advanced liver cancer, which resulted in long-term survival for a small number of patients [2]. Subsequently, in December 2011, they published in the *British Journal of Cancer* results of recent experiments by the team – using cancer cell cultures in the laboratory – suggesting that low-intensity tumor-specific modulated RF EM fields interfere with the activity of genes in cancer cells [3] (in specific cases, this affected the ability of cancer cells to grow and divide, the spread of tumors halted and in some cases they began to shrink). [On this line, results of Mexican scientists reporting that application of 4.5 mT / 120 Hz ELF-EMF inhibits preneoplastic lesions chemically induced in the rat liver through the reduction of cell proliferation, without altering the apoptosis process - should be mentioned as well [4].]

This news attracted much publicity as reported in The Guardian, 8 January 2012, http://www.guardian.co.uk/science/2012/jan/08/electromagnetic-fields-could-stop-cancer:

"This is a truly novel technique," said team's leader, Professor Boris Pasche of the University of Alabama, Birmingham. "It is innocuous, can be tolerated for long periods of time, and could be used in combination with other therapies." Pasche added that he had obtained permission from the US Food and Drug Administration to carry out trials on large

groups of patients and was talking to companies in the US, Asia, South America, Russia and Europe about raising funds for future research.

The use of EM fields was also welcomed, cautiously, by Eleanor Barrie of Cancer Research UK: "This research shows how specific low frequencies of EM radiation can slow the growth of cancer cells in the lab. It's still unclear why the cancer cells respond in this way, and it's not yet clear if this approach could help patients, but it's an interesting example of how researchers are working to find new ways to home in on cancer cells while leaving healthy cells unharmed."

Although results of the experiments on cancer cell cultures in the laboratory suggest that low-level amplitude modulated RF EM fields interfere with the activity of genes in cancer cells [3], the exact biophysical mechanism for this process is still open [1,5,6]. Also, it would be highly desireable to improve reported clinical effects of these fields in treating cancer patients [1,2]. Therefore, further on we shall consider implications of these results and some hints for their possible improvement from the viewpoint of quantum-informational medicine.

2. Implications from the Viewpoint of Quantum-Informational Medicine

Contemporary medicine has put its emphasis on „alopatic-dosed non-economic“ highly pharmaceutic-oriented medicine technologies. On the contrary, in the past years more attention is payed to bioadequate „homeopatic-dosed economic“ bioresonant quantum-informational medicine technologies, related to usage of such values of the field energy, appearing in normal functioning of human organism [7–28]. On these lines, contemporary investigations of stress-induced psychosomatic diseases imply the necessity of application of holistic methods, with focus on body's acupuncture system and consciousness – which have quantum-informational structure of quantum-holographic Hopfield-like attractor associative neural network (within the Feynman propagator version of Schrödinger equation [29]) – with significant quantum-holographic psychosomatic implications [7-17]. [In this context, it should be noted that Resonant Recognition Model (RRM) of biomolecular recognition implies that on the biomolecular level information processing is going on in the inverse space of Fourier spectra of the primary sequences of biomolecules [30-32] (with current advances and novel approaches in experimental and computational drug discovery and design, including potential therapeutic agents for future cancer treatment [33,34]), similarly to (quantum) holographic ideas that cognitive information processing is going on in the inverse space of Fourier spectra of the perceptive stimuli [35,36], thus supporting idea on quantum-holographic fractal coupling of various hierarchical levels in biological species.]

Accordingly, this presumably implies the stress-induced quantum-informational origin of cancers, characterized by tumor-specific memory attractors – with nonlinear coupling of different frequency modes in the organism having a tendency to destroy quasi-periodic movements with three and more frequencies – and to replace them with chaos [12]. Really, it was reported that patients had numerous tumor-specific modulation frequencies (thus, one patient with thyroid cancer metastatic to the lung was examined 14 times over the course of the preceding three years and this led to the discovery of even 112 frequencies) [1].

In the context of acupuncture-based and consciousness-based approaches and techniques of quantum-informational medicine [7–28,37-56], their goal would be a bioresonant excitation of the EM microwave / ultralowfrequency-modulated psychosomatically disordered (acupuncture palpatory-painful or psychologically traumatic) state (as one of hundreds possible disordered states) thus enabling that its initial memory attractor is resonantly excited (similar to annealing procedure in artificial neural networks [57]) becoming more shallower and wider on the account of deepening of the (energy-dominating) attractor of healthy (acupuncture palpatory painless or psychologically traumatic-free) state – which is then

altogether quantum-holographically projected on the lower quantum-holographic cellular level, thus changing the expression of genes [7-15]. Thus, all these holistic approaches and techniques might be considered as quantum-informational therapies, via imposing new boundary conditions in the energy-state space of the acupuncture system / consciousness.

However, when this process is hindered by transpersonal entangled blockages in the EM field-related energy-state space (on numerous laboratory tests revealing the evidence of entangled minds i.e. extrasensory experiences in a quantum reality, see ref. [58]) – then memory attractors of quantum-holographic network of field-related collective consciousness should be removed as well (via prayer or circular psychotherapies from all relevant meta-positions included in the problem [7–15,46-56]). This transpersonal holistic procedure, alongside with working on all levels of EM microwave / ultralowfrequency-modulated therapies [1–28] and non-circular (psycho / energy) therapies [37-56], might be the holistic clue for imposing healing boundary conditions in the energy-state space of the acupuncture system / consciousness of the patients.

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SLABA AMPLITUDNO-MODULISANA RF EM POLJA ZA TRETMAN KANCERA: KOMENTARI I IMPLIKACIJE SA GLEDIŠTA KVANTNO-INFORMACIONE MEDICINE *

Apstrakt. U poslednjih nekoliko godina tim naučnika iz SAD, Brazila, Francuske i Švajcarske je objavio rezultate korišćenja slabih amplitudno modulisanih radiofrekventnih (RF) elektromagnetnih (EM) polja u tretiranju pacijenata obolelih od kancera, koji bi prema njihovom rečima mogli dovesti do razvoja novog tipa anti-tumorske terapije. Te novosti su dobile veliki publicitet početkom ove godine, kako prenosi Gardijan. U ovom saopštenju dajemo neke informacije o njihovom otkriću, i razmatramo šire implikacije sa gledišta kvantno-informacione medicine.

Ključne reči: tretman kancera, radiofrekventna elektromagnetna polja, tumor-specifične frekvencije modulacije, implikacije za kvantno-informacionu medicinu.

References

1. Barbault A, Costa F, Bottger B, Munden R, Bomholt F, Kuster N, Pasche B. Amplitude-modulated electromagnetic fields for the treatment of cancer: discovery of tumor-specific frequencies and assessment of a novel therapeutic approach. J Exp Clin Cancer Res 2009; 28(1): 51.
2. Costa FP, de Oliveira AC, Meirelles R, Machado MCC, Zanesco T, Surjan R, Chammas MC, de Souza Rocha M, Morgan D, Cantor A, Zimmerman J, Brezovich I, Kuster N, Barbault A, Pasche B. Treatment of advanced hepatocellular carcinoma with very low levels of amplitude-modulated electromagnetic fields. British J Cancer 2011; 105: 640–648.
3. Zimmerman JW, Pennison MJ, Brezovich I, Yi N, Yang CT, Ramaker R, Absher D, Myers RM, Kuster N, Costa FP, Barbault A, Pasche B. Cancer cell proliferation is inhibited by specific modulation frequencies. British J Cancer 2012; 106: 307–313.

4. Jiménez-García MN, Arellanes-Robledo J, Aparicio-Bautista DI, Rodríguez-Segura MÁ, Villa-Treviño S, Godina-Nava JJ. Anti-proliferative effect of extremely low frequency electromagnetic field on preneoplastic lesions formation in the rat liver. BMC Cancer 2010; 10: 159.
5. Adey WR. Biological effects of electromagnetic fields. J Cell Biochem 1993; 51: 410-416.
6. Lai HC, Singh NP. Medical applications of electromagnetic fields. In: Electromagnetic Phenomena and Health - A Continuing Controversy? IOP Conf. Series: Earth and Environmental Science 2010; 10(1): 012006.
7. Zhang Y. ECIWO Biology and Medicine: A New Theory of Conquering Cancer and Completely New Acupuncture Therapy. Beijing: Neimenggu People Press, 1987.
8. Raković D. Holistic quantum-holographic framework for psychosomatics. Medical Data Rev 2011; 3(2): 211-214, Invited paper.
9. Raković D. Quantum-holographic framework for consciousness and acupuncture: Psychosomatic-cognitive implications. Medical Data Rev 2011; 3(3): 303-313, Invited paper; also presented at Knowledge Federation Dialog Belgrade 2011.
10. Raković D, Dugić M, Plavšić M, Keković G, Cosic I, Davidović D. Quantum decoherence and quantum-holographic information processes: From biomolecules to biosystems. Mater Sci Forum 2006; 518: 485-490.
11. Raković D, Arandjelović S, Mićović M, eds. Symp. Proc. Quantum-Informational Medicine QIM 2011: Acupuncture-Based and Consciousness-Based Holistic Approaches & Techniques. Belgrade: QUANTTES & HF & DRF, 2011, http://qim2011.org
12. Raković D. Fundamentals of Biophysics. 3rd ed. Belgrade: IASC & IEFPG, 2008, in Serbian.
13. Raković D. Integrative Biophysics, Quantum Medicine, and Quantum-Holographic Informatics: Psychosomatic-Cognitive Implications. Belgrade: IASC & IEPSP, 2009,
14. Raković D, Škokljev A, Djordjević D. Introduction to Quantum-Informational Medicine, With Basics of Quantum-Holographic Psychosomatics, Acupuncturology and Reflexotherapy. Belgrade: ECPD, 2009, in Serbian.
15. http://dejanrakovicfund.org; website of Dejan Raković Fund (DRF) for Promoting Holistic Research and Ecology of Consciousness, with available relevant author's books, proceedings, papers, communications, and links to recommended websites.
16. Jovanović-Ignjatić Z. Quantum-Holographic Medicine: Via Acupuncture and Microwave-Resonance (Self)Regulatory Mechanisms. Belgrade: Quanttes, 2010, in Serbian.
17. Group of authors. Anti-Stress Holistic Handbook, With Fundamentals of Acupuncture, Microwave Resonance Therapy, Relaxation Massage, Airoionotherapy, Autogenic Training, and Consciousness. Belgrade: IASC, 1999, in Serbian.
18. Djordjević D. Influence of Magnetic Fields on Mechanisms of Neurohumoral Regulation. PhD Thesis. Belgrade: Faculty of Medicine, University of Belgrade, 2008, in Serbian.
19. Devyatkov ND, Betskii O, eds. Biological Aspects of Low Intensity Millimetre Waves. Moscow: Seven Plus, 1994.
20. Sit'ko SP, Mkrtchian LN. Introduction to Quantum Medicine. Kiev: Pattern, 1994.
21. Grubnik BP, Sitko SP, Shalimov AA. Experience of using Sit'ko-MRT technology for rehabilitation of III-IV stage oncologic patients. Physics of the Alive 1998; 6: 97-115.
22. Potehina YuP, Tkachenko YuA, Kozhemyakin AM. Report on Clinical Evaluation for Apparatus EHF-IR Therapies Portable with Changeable Oscillators CEM TECH. Nizhniy Novgorod: CEM Corp., 2008.

23. Gotovskiy MYu, Petrov YuF, Chernecova LV. Bioresonance Therapy. Moscow: IMEDIS, 2010.
24. Voll R. Twenty years of electroacupuncture diagnosis in Germany. A progress report. Am J Acup 1975; 3: 7-17.
25. Bellavite B, Signorini A. The Emerging Science of Homeopathy: Complexity, Biodynamics and Nanopharmacology. Berkeley: North Atlantic Books, 2002.
26. Todorović B. Scientific Bases of Homeopathy: Bioinformatics and Nanopharmacology. Novi Sad: Prometej, 2005, in Serbian.
27. http://www.energy-medicine.info; Inergetix website with contemporary critical review of technologies in the wider field of quantum-informational medicine, including information on Rife's early research in the field of bioresonance medicine in 1930ies, which was not recognized at that time.
28. http://www.issseem.org; official website of The International Society for the Study of Subtle Energies and Energy Medicine (ISSSEEM), founded by the end of 1980ies.
29. Peruš M. Neuro-quantum parallelism in mind-brain and computers. Informatica 1996; 20: 173-183.
30. Cosic I. Macromolecular bioactivity: Is it resonant interaction between macromolecules? – Theory and applications. IEEE Trans Biomed Eng 1994; 41(12): 1101-1114.
31. Cosic I. The Resonant Recognition Model of Macromolecular Bioactivity: Theory and Applications. Birkhauser Verlag, Basel, 1997.
32. Keković G, Raković D, Tošić B, Davidović D, Cosic I. Quantum-mechanical foundations of Resonance Recognition Model. Acta Phys Polon A 2010; 17: 756-759.
33. Pirogova E, Istivan T, Gan E, Cosic I. Advances in methods for therapeutic peptide discovery, design and development. Curr Pharm Biotechnol 2011; 12: 1117-1127.
34. Istivan TS, Pirogova E, Gan E, Almansour NM, Coloe PJ, Cosic I. Biological effects of a de novo designed myxoma virus peptide analogue: Evaluation of cytotoxicity on tumor cells. PLoS ONE 2011; 6(9): e24809.
35. Pribram K. Languages of the Brain: Experimental Paradoxes and Principles in Neuropsychology. New York: Brandon, 1971.
36. Pribram K. Brain and Perception: Holonomy and Structure in Figural Processing. Hillsdale: Lawrence Erlbaum, 1991.
37. Brennan B. Hands of Light. New York: Bantam, 1988.
38. Lee Rand W. Reiki The Healing Touch. Southfield: Vision, 1998.
39. Pearl E. The Reconnection: Heal Others, Heal Yourself. Carlsbad: Hay House, 2001.
40. Stibal V. Theta Healing: Go Up and Seek God, Go Up and Work With God. Idaho Falls: THInK, 2006.
41. Bartlett R. Matrix Energetics: The Science and Art of Transformation. Hillsboro: Beyond Words Publ., 2009.
42. Kinslow FJ. The Secret of Instant Healing. Carlsbad: Hay House, 2008.
43. Paramhansa Yogananda. Autobiography of a Yogi. New York: The Philosophical Library, 1946.
44. Chopra D. Quantum Healing: Exploring the Frontiers of Mind/Body Medicine. New York: Bantam, 1989.
45. Callahan RJ, Callahan J. Thought Field Therapy and Trauma: Treatment and Theory. Indian Wells: 1996.
46. Mihajlović Slavinski Ž. PEAT and Neutralization of Primeival Polarities. Belgrade: 2001.
47. Tart C, ed. Transpersonal Psychologies. 2nd ed. San Francisco: Harper, 1992.

48. http://www.atpweb.org; official website of The Association for Transpersonal Psychology (ATP), concerned from early 1970ies with the study of humanity's highest potential, and with the recognition, understanding, and realization of unitive, spiritual, and transcendent states of consciousness (making transpersonal psychology the fourth force in psychology, alongside with psychoanalysis, behaviorism, and humanistic psychology, after one of its founders, A. Maslow).
49. Milenković S. Values of Contemporary Psychotherapy. Belgrade: Narodna knjiga–Alfa, 1997, in Serbian.
50. Jerotić V. Individuation and (or) Deification. Belgrade: Ars Libri & Priština: National and University Library, 1998, in Serbian.
51. Vlahos J. Orthodox Psychotherapy: Holy Fathers Science. Belgrade: Missionary School of St. Alexander Nevskiy Church, 1998, Serbian translation from Greek.
52. Dossey L. Healing Words: The Power of Prayer and the Practice of Medicine. San Francisco: Harper, 1993.
53. Markides KC. Fire in the Heart. Healers, Sages and Mystics. New York: Paragon, 1990.
54. Talbot M. The Holographic Universe. New York: Harper Collins, 1991, and refs therein.
55. Harris WS, Gowda M, Kolb JW, Strychacz CP, Vacek JL, Jones PG, Forker A, O'Keefe JH, McCallister BD. A randomized, controlled trial of the effects of remote, intercessory prayer on outcomes in patients admitted to the coronary care unit. Arch Intern Med 1999; 159: 2273-2278.
56. Bedričić B, Stokić M, Milosavljević Z, Milovanović D, Ostojić M, Raković D, Sovilj M, Maksimović S. Psycho-physiological correlates of non-verbal transpersonal holistic psychosomatic communication. In: Jovičić S, Subotić M, eds. Verbal Communication Quality Interdisciplinary Research I, Belgrade: LAAC & IEPSP, 2011.
57. Hecht-Nielsen R. Neurocomputing. New York: Addison-Wesley, 1990.
58. Radin D. Entangled Minds: Extrasensory Experiences in a Quantum Reality. New York: Paraview, 2006.

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