Congress Science Information Spirit, St. Petersburg, 2006

HOW DOES GAS DISCHARGE VISUALIZATION TECHNIQUE ASSESS A BODY? EMERGING MODELS OF ENERGY AND CONTROL IN BIOPHYSICS AND PHYSIOLOGY

Williams B.
University of Kansas and University of Integrative Medicine *berneyw@ku.edu*

The Gas Discharge Visualization Technique is well characterized in the physical processes by which it captures and analyzes data.[1,2] This paper explores candidate mechanisms in physiology and biophysics through which GDV data from biological subjects can reflect the state of health in human beings. Increasing numbers of clinical studies show that particular details in GDV data correlate with conditions that can be characterized using standard medical diagnostics, as well as correlating with assessment methods used in a wide range of complementary medicine. For example, post-surgery recovery progress is correlated with GDV parameters. GDV parameters of sportsmen provide an independent diagnostic measure of psychophysical reserves in athletes, directly characterizing their actual psychomotor potential [3]. GDV data also shows a strong correlation with acupuncture electroconductance measurement effects.[4]

Previous discussions [5] have proposed that GDV assessment methods can be understood using quantum biophysical models of entropy and information flows as follows: A main reservoir of free energy in biological processes is electron-excited states of complex molecular systems. This quantum model supports an argument that GDV techniques provide indirect judgment about the level of energy resources at the molecular level in structure-protein complexes. Collections of delocalized excited π-electrons in protein macromolecules provide an energy reservoir for physiological processes. Delocalization means that the collection of π- electrons is distributed in a certain way over the entire structure of a molecular complex. This enables the π-electrons not only to migrate within the limits of their own molecule, but also to transfer from one molecule to another, if the molecules are structurally united into ensembles. The most important mission of π-electrons in biological processes derives not only from their delocalization, but also from the peculiarities of their energy status. The difference between the energies of the main and the excited state is much smaller for π-electrons than for σ-electrons (local electrons). The transformation of electron energy in biostructures is connected not only with transfer of electrons, but also with the migration of electronic excitation energy, which does not include electron detachment from a donor's molecule. Inductive-resonance, exchange-resonance, and excitonic mechanisms for transfer of electronic excitation turn out to be the most important for biological systems. These processes are significant when we consider energy transfers in molecular complexes, which aren't, as a rule, followed by a transfer of charge.

Specific structural-protein complexes within the mass of the skin provide channels of heightened electron conductivity, measurable at acupuncture points on the skin surface. Stimulated impulse emissions from the skin are also developed mainly by transport of delocalized π-electrons. Stimulated by high voltage impulses, optical emissions amplified in gaseous discharge, are registered by optical sensors in the GDV technique. Television capture of the time dynamics of this glow from the skin, with a scale of some millimeters in diameter, and frame-by-frame comparison of these pictures of fluorescence during each voltage impulse show that the emission centers appear approximately from the same skin points. Ion-depolarization processes in the tissue have no time to develop within the short periods of

GDV stimulation of 10 nsec, therefore the current may be resulting from the transport of electrons within structural complexes of skin or other biological tissue under investigation, included in the chain of impulse electrical current flow. Biological tissues are assumed to be divided into dielectrics and conductors (primarily biological conducting liquids). In order to unite the effects of stimulated electron emission, it is necessary to consider electron transport mechanisms along non-conducting structures. Most attention in this sphere has been focused on concepts of electron tunnel transport between separate protein molecules-carriers, separated from one another by energy barriers. The processes of electron tunnel transport are experimentally well studied and modeled by the example of transferring electrons along the protein chain. The tunnel mechanism provides the initial act of electron transfer between donor-acceptor groups in the protein, each being within 0.5 – 1.0 nm distance from one another. There are also many examples, however, where the electron is transferred within the protein for much longer distances. It is thus essential that the transfer can take place not only within the limits of one protein molecule, but may also involve the interaction of different protein structures. The characteristic time of electron transfer ranges between 10-11 and 10-6 sec, which corresponds to the development time for a single emission act in the GDV technique.

Building on this prior discussion, the present paper explores further possible mechanisms for communication of internal physiological states to the skin surface, where stimulated emissions provide GDV information. New ideas about the role of biophotonic resonance processes for maintaining coordinated metabolic action, [6] and the role of water and reactive oxygen species (ROS) in providing information flow, energy reservoirs and energy pumping, [7,8] all emphasize the potential for extended models of physiological communication and control. Recent biophysical research reveals a wide range of properties that enable the body to use sound, light, electricity, magnetic fields, heat, elasticity, torsion and other forms of vibration as signals for integrating and coordinating diverse physiological activities [9].

James Oschman has explored concepts of communication and coordination in physiological processes, connecting all levels of physical organization through what he calls a "Living Matrix," reaching from processes in the nuclei of cells through the intracellular dynamics mediated by the cellular cytoskeleton and communicating through the cell membranes to connective tissues ramifying throughout the body. Key innovations have been the recognition of processes involved with the intracellular cytoskeleton and the connective tissues in physiology at extra-cellular levels. Historically biochemistry developed along lines focused on chemical processes of molecular formation, emphasizing the energy economy of reduction/oxidation reactions, with enzyme catalysis and hormone regulation as main sources of coordination and modulation. Newly developing perspectives are going beyond these processes, examining electronic semi-conduction and quantum electronic processes involving resonant states of complex molecular systems. Enzyme catalysis is now being explored as a process regulated by quantum tunneling [10] and Luca Turin has proposed a model in which the olfactory sense identifies molecules by detecting interior molecular bonding structures using electron tunneling "spectroscopy." [11] Hameroff was one of the first to propose information processing along the microtubules in cells using quantum coherence processes.[12]

A striking aspect of GDV data is the strong correlation with signal and energy flows associated with the acupuncture meridians. Various models have been explored for the mechanisms of acupuncture. Strong evidence exists for the reality and physiological character of acupuncture processes. Histological studies have identified unique tissue arrangements at acupuncture points, involving a lymphatic trunk entwined by an arteriol and an associated small vein. The lymph and blood vessels are surrounded by networks of unmylenated cholenergic autonomic nerves. The entire complex at each acupuncture point is embedded in a column of loosely arranged connective tissue, enclosed in a boundary of more densely packed connective tissue. The interaction of these anatomical processes make acupuncture points a network of nodes interfacing between the body's matrix of connective tissues and the major circulatory and neural regulatory systems.[13,14,15] And new evidence is gathering for signal and energy flows along the "Living Matrix" of the connective tissues and cellular cytoskeleton. Strong evidence previously was seen for ion flow along lamina in tissue as part of the acupuncture processes. Evidence has recently also been found for ultra-high speed signal flow associated with acupuncture systems an order of magnitude faster than neurological signals.[16]

Mae-Wan Ho proposes a multilayed physiological energy and information system: "The extracellular, intracellular, and nuclear matrices together constitute a noiseless excitable electronic continuum for rapid intercommunication and energy flow permeating the entire organism, enabling it to function as a coherent and sentient whole."[17] Her insights focus on coordination and communication processes across multiple levels of physiology, with the tissues of the entire organism acting as a liquid crystal continuum, passing information and energy up and down within systems and subsystems, coordinated throughout the Living Matrix.[18] Testing with the GDV perturbs an organism with stimulating voltage pulses, creating miniature displacements of the holistic regulatory system. Similar to holographic processes, this transaction with a small part reveals the responsiveness of the whole. Any maladjusted organ system shows a disordered sector in the corona discharge at the associated fingertip. Analysis in the frequency domains of GDV data could reveal subtle multi-layered systemic resonance. The potential for such frequency domain analysis has been seen in an assessment of GDV data that correctly identified the driving frequency profile in an acoustic binaural beat entrainment stimulus during a single subject session at the Monroe Institute in Virginia. We have also seen fruitful correlations in GDV data with heart rate variability measures.[3]

References

[1] K. Korotkov and D. Korotkin, "Concentration dependence of gas discharge around drops of inorganic electrolytes," J. of Applied Physics, American Institute of Physics, New York, 2001, V. 89, N 9, pp. 4732-4737.

[2] K. G. Korotkov, Human Energy Field; Study with GDV Bioelectrography, Backbone, Fair Lawn, NJ, USA, 2002.

[3] K. Korotkov editor, Measuring Energy Fields: State of the Science, Backbone, Fair Lawn, NJ, USA, 2004.

[4] N. Rizzo-Roberts, Parallel Investigation of the Meridian Stress Assessment (MSA-21) and the Gas Discharge Visualization Devices, Holos University Graduate Seminary, 2002.

[5] K Korotkov, B. Williams and L. A. Wisneski, "Assessing Biophysical Energy Transfer Mechanisms in Living Systems: The Basis of Life Processes," J. of Alternative and Complementary Medicine, Mary Ann Liebert, Inc., V 10 N 1, 2004, pp. 49-57.

[6] F. A. Popp, "Some Remarks on Biological Consequence of a Coherent Biophoton Field," in F. A. Popp, K. H. Li and Q. Gu, editors, Recent Advances in Biophoton Research and its Applications," Singapore/ River Edge, NJ/London, 1992, pp. 357-373

[7] V. Voeikov, "Mitogenetic radiation, biophotons, and non-linear oxidative processes in aqueous media," in Integrative Biophysics, Biphotonics, F. A. Popp, L. Beloussov, editors, Kluwer Academic Publishers, Dordrecht/Bosont/London, 2003 pp. 331-360.

[8] V. L. Voeikov, "Processes Involving Reactive Oxygen Species are the Major Source of Structured energy for Organismal Biophotonic Field Pumping," in L. Beloussov, F-A. Popp, V. Voeikov, and R. Van Wijk, editors, Biophotonics and Coherent Systems, Proceedings of the 2nd Alexander Gurwitsch Conference and Additional Contributions, Moscow University Press, Moscow, 2000.

[9] J. Oschman, Energy Medicine in Therapeutics and Human Performance, Butterworth Heinemann, 2003.

[10] A. Kohen and J. P. Klinman, "Protein Flexibility Correlates with Degree of Hydrogen Tunneling in Thermophilic and Mesophilic Alcohol Dehydrogenases," J. of the American Chemical Society, 2000, V 122, pp. 10738-10739.

[11] L. Turin, "Structure-odor relations: a modern perspective," in R. L. Doty, editor, Handbook of Olfaction and Gustation 2nd ed. Marcel Dekker, New York, NY, 2003.

[12] S. R. Hameroff,"Coherence in the cytoskeleton: Implication for biological information processing," in H. Frohlich H., editor, Biological Coherence and Response to External Stimuli, Springer-Verlag, Berlin, 1988, pp. 242-263.
[13] O. Auziech, Etude Histologique des Points Cutane de Moindre Resistance Electrique et Analyse de Leurs Implications Possibles Dans la Mise en Jeu des Mecanismes Acupuncturaux, These de Medecine, Montpellier, 1984.
[14] C. Vallette and J. -E. -H. Niboyet, Gynecologie-Obstetrique: Therapeutique par Acupuncture, MEDSI (Medecine et Sciences International), Paris, 1981
[15] R. Senelar, Caracteristiques morphologiques des points chinois, in J. -E, -H. Niboyet, editor, Nouveau Traite d'Acupuncture, Maisonneuve, Moulins-les-Metz, 1979, pp. 247-277.
[16] Z. H. Cho, S. C. Chung, J. P. Jones, J. B. Park, H. J. Park, H. J. Lee, E. K. Wong and R. I Min, "New findings of the correlation between acupoints and corresponding brain cortices using functional MR," Proceedings of the National Academy of Sciences of the USA, V 95 N 5, 1998, pp. 2670-2673.
[17] M. W. Ho, "Quantum coherence and conscious experience," Kybernetics, 1997, V 26, pp. 265-276.
[18] M. W. Ho, The Rainbow and the Worm: The Physics of Organisms, 2nd ed, World Scientific, Singapore, 1998.