its enzymes. Which remedy of those has to be chosen depends on the individual symptoms of the patient.

For the first time it is shown that a homeopathic therapy can be performed reproducibly by applying high potencies of substrates, enzymes of the ill biochemical pathways, and by their inhibitors. Furthermore all that can be controlled by laboratory-values. Until healing was achieved the mentioned homeopathic remedies had to be given daily and simultaneously. This form of homeopathic therapy points the way to the future in order to cure chronical diseases.

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10. INFLUENCE OF MAGNETIC FIELD ON RHEOLOGICAL PROPERTIES OF BLOOD

A. Marcinkowska – Gapińska

Rheological Laboratory, Department of Neurology, Karol Marcinkowski University of Medical Sciences in Poznan, Przybyszewskiego 49, 60 – 355 Poznan, Poland

Magnetostimulation is one of the methods used in physiotherapy, however not all mechanism of its action have been clarified so far [1]. The Viofor JPS instrument is applied in cases of pain related to arthrosis, migraine or other impairments in the organism, such as impaired bone healing, soft tissues healing, circulation impairment, stress [1 – 4]. Other studies related to the direct influence of magnetic field on blood and its rheological properties have also been carried out [3, 5 – 8]. The aim of this study is the analysis of the effect of magnetic field on the rheological blood properties on the basis of my own research and literature data.

Blood viscosity measurements were carried out by means of an rotary-oscillatory rheometer Contraves LS40 performing both rotary measurements of the flow curve at descending shear rate γ' in the range from 100 to 0.01 s^{-1} within a 5 minute period and oscillatory measurements at a constant frequency f = 0.5 Hz with descending shear amplitude γ_0 which allowed for estimation of the complex viscosity η^* and its real and imaginary components, η' and η'', respectively. Analysis of the influence of magnetic field on the hemorheological properties of blood was performed both *in vivo* and *in vitro* conditions. In the case of *in vivo* stimulation, blood samples were taken from patients suffering from pain who started the therapy with the use of the large applicator Viofor JPS and different programs "P" and applications "M" offered by the manufacturer with various magnetic field intensities. Each of patients donated blood samples twice: before and after the therapy. All blood and plasma viscosity measurements were performed at 37°C. Rotary measurements were performed to obtain plasma viscosity and whole blood flow curves. For each blood sample hematocrit value was measured using the standard method. In the case of *in vitro* stimulation only blood samples were subjected to magnetic field stimulating applied by means of the small applicator (pillow) and using a single program and a single application method. The results obtained from the rotary measurements were analyzed by means of Quemada rheological model in order to obtain a quantitative description of red cells agreeability and deformability [9, 10]. The parameters chosen for evaluation were: hematocrit value, plasma viscosity, whole blood viscosity at four chosen shear rates, Quemada model parameters: k_0 (measure of red cells agreeability), k_∞ (measure of red cells stiffness) and γ_c (measure of red cells tendency to aggregate), as well as the components of the complex viscosity η^*: viscous (η') and elastic (η'').

It was found that the influence of magnetic field on blood rheological parameters depended on the method and program of application. In order to perform a thorough statistical analysis, a larger group of patients would have to be studied by means of *in vivo* stimulation.

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11. THE MATHEMATIC OF BIOLOGICALLY EFFECTIVE EMFs: ARE MAXWELL'S, SCHRÖDINGER'S AND PAULI'S FORMALISMS COMPATIBILE AND COMPLETE?

W. H. Medinger

International Institute for Research on Electromagnetic Compatibility (IIREC), Ringstr. 64, 3500 Krems an der Donau, Austria.

For the development of physical science (with biophysics being a segment thereof), the application of proper mathematical tools has had an enormous impact. In the theoretical elaboration of his concept of electromagnetism, Maxwell used Hamilton's quaternions which were a recent discovery in his days, but are replaced by the more convenient vector representation in contemporary physics. Schrödinger's famous equation is based on a complex valued wave function (with the correspondence principle of classical physical magnitudes and imaginary quantum operators being no way arbitrary). Pauli, in turn, introduced the matrices named after him as constituents of a 2-component wave function in a squared complex space in order to represent 2-valued elctron spin. At that point, the circle is closed, for it turns out that, apart from a unity matrix, Pauli's matrices are the exact match of a matrix representation of quaternions. So, we notice that all these formalism are indeed compatible, but their formal variety remains unsatisfactory.

A most challenging issue in biophysics is the *identification of the physical fields and/or potentials that provoke a biological response*. It is not at all a matter of course that the fields handled in classical electrodynamic theory, and in electric engineering and radio technology as well (e.g. RF electric and magnetic force fields), are the true – or exclusive – causes of biological impact. From the *quantum perspective to biological systems* which has a solid theoretical and experimental foundation now, it is evident that *potentials*, i.e. in the electromagnetic domain, the (scalar) electrostatic potential Φ and the magnetic vector potential A, would govern the behaviour of the system. The physical significance of a difference in Φ is well known as *voltage*. Similarly, a descriptive notion was attributed to A by Maxwell, as the "*electromagnetic momentum*". Both terms (Φ as the representation of electromagnetic energy, and A as the representation of electromagnetic momentum) are complementary and fundamental in terms of classical Hamiltonian theory. In the Hamiltonian operator (the quantum analogue to the classical energy term), the momentum is expanded to the so-called kinetic momentum including qA, with electric charge q as a scaling factor.

From the physical and biological principles considered so far, we conclude that *biological systems are controled, in a fundamental way, by the physical quantities of electric charge, electric potential, electromagnetic momentum (i.e. magnetic vector potential), and electron spin.*

Research conducted by Mae-Wan Ho revealed that exposition to the magnetic vector potential of toroidal coils with a negligible magnetic field rises abnormalities in pattern formation in *Drosophila* embryos, as well as exposition to solenoidal coils with a strong magnetic field would do, thus evidending the biological effectiveness of the vector potential A. There is a need for more biological research replacing ordinary coils with toroids for magnetic field experiments.

According to accepted physical theory, *electric and magnetic force fields acting on biological tissue emerge as the first derivatives of the potentials Φ and A*. The Maxwell/Heaviside equations of classical electrodynamics are invariant with respect to a gauge transformation mediated by a scalar function χ. The gauge conditions of classical electrodynamics level out a *scalar derivative S* that emerges in *a completed formalism applying Clifford's algebra which, in turn, proves to be the key to the unification (and simplification) of Maxwell's, Schrödinger's and*

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