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The Use of Electromagnetic Forces of the Earth in Manual and Physiotherapy

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ABSTRACT

Physiotherapists usually ignore the electric polarization of human bodies that occurs under the influence of the electromagnetic forces of the Earth. This is irrational, since the positive or negative electrification of human tissues has the opposite effect on both their properties and functional activity. How physiotherapists must take into account the polarizing effect of the electromagnetic forces of the Earth when analysing the functional states of the tissues of the human body is shown here. It also shows how these electromagnetic forces can be used by manual and physiotherapists.

1. Introduction

Electromagnetic forces of understandable origin constantly act on the earth's surface. First of all, such forces include the Lorentz forces arising from the diurnal rotation of the Earth relative to the geomagnetic field (Figure 1).

Thus, thanks to the daily rotation of the Earth, its atmosphere and surface intersect the horizontal lines of the geomagnetic field. Therefore, both objects of the earth's surface and objects of the earth's atmosphere are constantly exposed to the Lorentz force F_L , which is directed upward and therefore moves positive charges up and negative charges down. The fact that this force is significant is confirmed by calculations according to which this force is capable of accelerating up a single proton up to $4,175 \cdot 10^7$

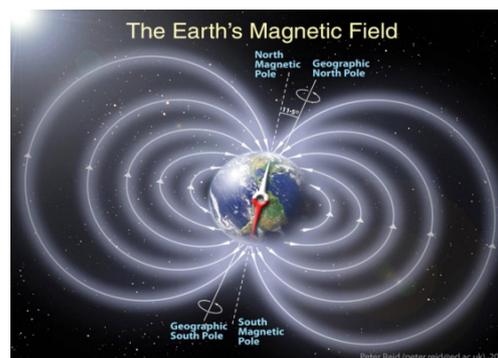


Figure 1. With the Earth's daily rotation, all terrestrial objects constantly cross the lines of force of the geomagnetic field. For this reason, they are constantly affected by the Lorentz force F_L , directed upward, and the Lorentz force F_L^* , directed to the equator

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$\text{m}\cdot\text{s}^{-2}$, and a single electron to $2,7\cdot 10^{12} \text{ m}\cdot\text{s}^{-2}$, in any case, on the equator line. In addition, calculations show that under the influence of the same Lorentz force F_L , one proton can “raise” a drop consisting of ~ 84830 water molecules ($\sim 1,5\cdot 10^6 \text{ D}$)^[1,2].

Given the results of such calculations, it is not surprising that this Lorenz force F_L is able to quickly and efficiently distribute positively and negatively charged water vapor in the clouds (Figure 2)^[3].

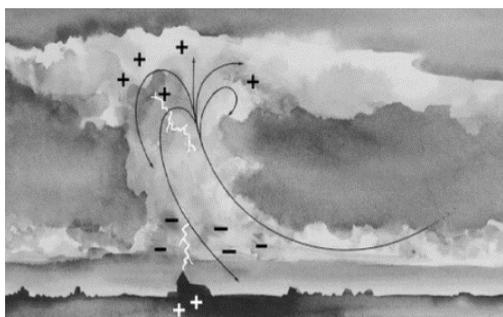


Figure 2. Polarization of clouds: the lower part of a typical cloud has a negative charge and the upper part has a positive charge^[2,3]

All this makes it possible to assume that the same Lorentz force F_L causes a positive charge of the upper atmosphere and a negative charge on the Earth’s surface. The fact that such a distributive effect of the Lorentz force F_L is significant is confirmed by the fact that the upper layers of the earth’s atmosphere have a potential of $\sim 1\cdot 10^5 \text{ V}$ relative to the earth’s surface^[3].

As well, it is not also surprising that the same Lorenz force F_L is able to create the celestial discharges, both up directed positively charged (Figure 3, left), and down directed negatively charged (Figure 3, right)^[2].



Figure 3. Left: these are blue jets representing ascending currents of hydrated protons. Right: these are ordinary thunderstorms, which are downward flows of hydrated electrons^[2]

Given all this, it is not surprising that this Lorentz force F_L can cause electric polarization of the body of a standing or sitting person. Thus, when a person is standing or sitting, his head is positively charged, and his legs are negatively charged, like the cloud in Figure 2.

There is also a polarization effect of the Lorentz force F_L^* , arising due to the interaction of the moving surface of

the Earth with the vertical component of the geomagnetic field (Figure 1) and directed towards the equator. Thus, the head and legs of a person lying along the meridian turn out to be charged differently.

The effect of both of these polarizations on the human body is discussed here. The possible medical use of these polarizations is also being discussed.

2. Results

Properties of Water, Depending on its Electrical Potential

It was discovered that the electrical potential of the water determines its ability to hydrate some polymers of biological origin. In particular, it has been shown that water with a positive potential better hydrates biological polymers than water with a negative potential (Figure 4)^[4,5].

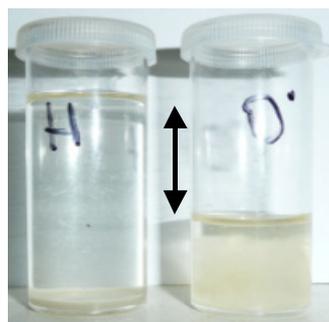


Figure 4. There is a swelling of starch in water with a different electric potential. Starch does not swell in water with the potential of -250 (left) and swells in water with the potential of $+250 \text{ mV}$ (right)

Water with a positive potential has an abnormal penetration, due to which it can evaporate even from a closed plastic bottle: the arrow shows how much during the day the level of such water has decreased.

Water with negative potential was obtained by bubbling uncharged water with hydrogen gas (left); water with positive potential was obtained by bubbling uncharged water with gaseous oxygen (right).

Both water used had $20 - 22 \text{ }^\circ\text{C}$ ^[4,5].

It was also found that an increase in the positive electric potential of water is accompanied by an increase in its surface tension, and an increase in the negative electric potential of water is accompanied by a decrease in its surface tension. Since this relationship is very distinct, it is easily visualized (Figure 5)^[4,5].

The fact that the surface tension of water strongly depends on its electric potential, salt crystals convincingly demonstrate. So, the drying of salt solutions prepared in water with a positive electric potential (charge) is accompanied by the formation of cubic or rhombic crystals (Figure 6, left), and the drying of salt solutions prepared in water with a negative electric potential (charge) is accompanied by the

formation of needle or tree crystals (Figure 6, right) ^[4,5].

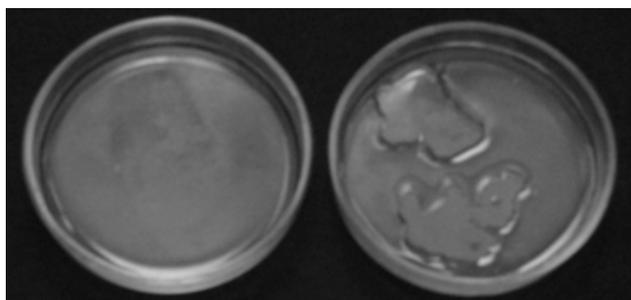


Figure 5. Left: 5 ml of water with a potential of -200 mV completely cover the bottom of the Petri dish. Right: 5 ml of water with a potential of $+200$ mV do not completely cover the bottom of a Petri dish

Due to the small surface tension, water with negative electric potential can spread throughout the bottom of the Petri dish; due to the large surface tension, water with a positive electric potential cannot spread throughout the bottom of the Petri dish ^[4,5].



Figure 6. It is the crystals that formed after the drying of solutions of KH_2PO_4 prepared on the water with potentials of $+250$ mV (left) and -250 mV (right) ^[4,5]

It is especially important that the described regularities are subject to crystals formed during drying of aqueous solutions of sodium chloride (Figure 7), which is the main salt component of human biological liquids ^[5].

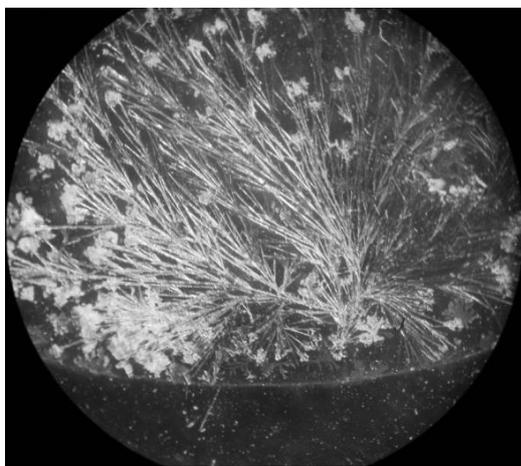


Figure 7. Crystals formed after drying a NaCl solution prepared in water with a potential of -200 mV ^[5]

Let us now try to evaluate all this knowledge in the medical aspect.

3. Discussion

3.1 The Relationship between the Electric Polarization of the Human Body and Its Hydration

It should be noted right away that the awareness of the described dependencies made it possible to assume that the properties of human biological fluids also substantially depend on their electric potential. So, this allowed us to explain the changes in the properties of biological fluids of women and the state of their reproductive organs during the menstrual cycle. Also, knowledge of the described dependencies made it possible to explain the polymorphism of crystals formed during the drying of biological fluids of women at different stages of the menstrual cycle ^[5].

The knowledge of these dependencies allowed us to assert that during the menstrual cycle there is a cyclic change in the electrical potential of biological fluids of women, in particular, that the beginning of the ovulation stage correlates with their negative electrization ^[5]. In addition, knowledge of the described dependencies allowed us to explain the nature of the phenomena that determine the weather dependence of the tone of blood vessels and human skin ^[6]. Thus, knowledge of the dependencies found to be very productive.

We now discuss the possible difference in the properties of biological fluids and the structures of a standing or sitting person, taking into account the electric polarization of his body. So, it can be assumed that the head of a standing person (together with the brain, vestibular apparatus, eyes, ears, etc.) is electrified positively, and its legs – negatively. As a result, the biological polymers located in the upper part of the human body are better hydrated than biopolymers located in its lower part. Since the hydration of biopolymers determines their stability, structure, and functional activity ^[7–10], it can be expected that the properties of biopolymers located in the upper and lower parts of a standing or sitting person will differ significantly.

This difference in the degree of hydration is especially important for DNA, whose properties strongly depend on the stage of hydration ^[11–13]. Suffice it to say that changing the degree of hydration of DNA molecules induces their $A \leftrightarrow B$ transitions ^[11, 13] and, consequently, the activity of DNA and RNA polymerases, the intensity of peptide synthesis, cell proliferation, etc. ^[14].

In order to better understand the effect of electric polarization on human metabolism, it is useful to take into

account the results obtained by studying the effect of electrets on human cells, in particular on neuronal cells. In order to better understand the effect of electric polarization on human metabolism, it is useful to take into account the results obtained by studying the effect of medical electrets on human cells, in particular on neuronal cells. It is especially useful to take into account the fact that positively charged electrets initiate the proliferation of cells of the nervous system, and negatively charged electrets initiate the formation of dendrites by neurons^[15] (compare with Figure 7).

Thus, standing on your head (Figure 8), yoga does not only change the usual view of the world.



Figure 8. This is Sirshasana or a headstand. When performing such an asana, negative charges accumulate in the person's head, and positive charges in his legs

There is no doubt that the tradition of doing a daily headstand is ancient. This allows us to conclude that the positive impact of this kind of depolarization on humans has been tested by time. In particular, it can be assumed that a daily headstand contributes to the formation of new dendritic processes in brain cells and is thus a way of counteracting dementia. There is also no doubt about the regenerative effect of the tradition of yogis on the brain to go to bed with the head on the equator, that is, in the direction of movement of negative charges. Thus, yogis have long used the distributive effect on the electric charges of both Lorentz forces F_L and F_L^* (Figure 1, see comments).

3.2. The Use of the Polarizing Action of the Considered Lorentz Forces in Manual Therapy

Let's also try to use the forces of Lorentz F_L and F_L^* for physiotherapeutic purposes, in particular, to increase the effectiveness of manual therapy. For this, we first take into account the electric polarization of human hands, namely, the negative electrization of the right hand and the positive electrization of the left hand (Figure 9).

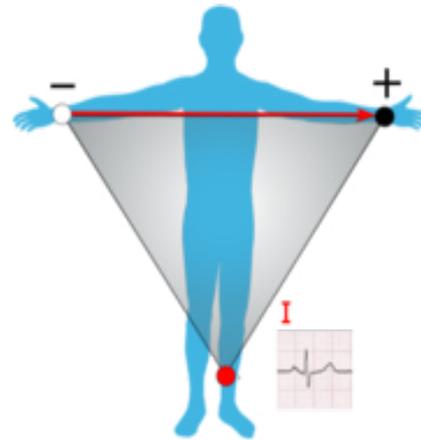


Figure 9. Human hands are polarized in such a way that the left hand has a predominantly positive charge, and the right one is predominantly negative^[16]

In addition, it is necessary to take into account the location of the spinal nerves and their “areas of responsibility” (Figure 10).

This allows us to conclude that the Lorentz force F_L will effectively direct the negative charges of the right hand (Figure 9) to the human spinal nerves (Figure 10) when it lies face down. Thus, we can stimulate the innervation of the corresponding organs and initiate the appearance of new interneuron contacts.

Obviously, directing negative charges of the right hand to the spinal nerves of a person can be no less effective if his face is oriented to the equator – in this case, the action of the Lorentz force F_L^* will be used. Thus, in both cases we can get effects comparable to the effects of negatively charged electrets^[15].

Clearly, also using the Lorentz force F_L^* , one can direct the positive charges of the left hand (Figure 9) onto the spinal nerves of a person whose face is oriented opposite to the equator. Thus, we can get an effect comparable to the effect of positively charged electrets^[15].

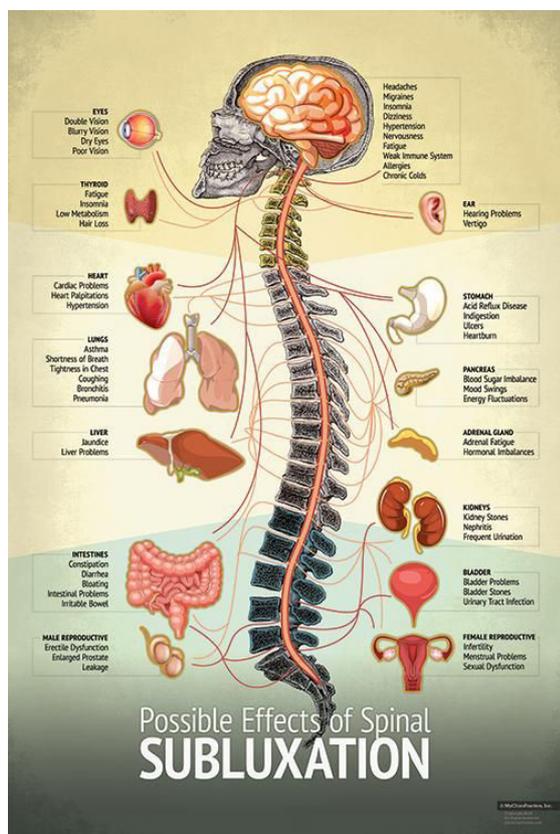


Figure 10. This shows the location of the head and vertebral nerves, as well as some of the organs that they innervate. Based on this, it is possible, in particular, to assess the consequences of injuries (curvature, dislocation, contusion, etc.) of different parts of the spine

Thus, taking into account the electric polarity of human hands (Figure 9) and using the Lorentz forces F_L and F_L^* , the therapeutic effects of medical electrets^[15] and pulsed electromagnetic fields^[17, 18] can be reproduced.

4. Conclusion

The study of electromagnetic forces acting on the Earth must be continued. This need is motivated by an increase in the number of sources of electromagnetic radiation, both natural and artificial origin. It is also necessary to study the various effects of electromagnetic forces on humans, in particular their electrifying effect. It is hoped that the information obtained in these studies will help to better understand the causes of personal sensitivity to electromagnetic influences, both natural and artificial. One can also hope that this information will provide methods that can reduce personal sensitivity to electromagnetic influences. At the same time, the information obtained can be successfully used in preventive medicine, as well as give an understanding of the conditions for comfortable work and rest. Of course, the same information can be ef-

fectively used in manual and physiotherapy.

References

- [1] Pivovarenko Y. A Charge Distribution in the Earth's Atmosphere. *American Journal of Physics and Applications*, 2015, 3(3): 67-68.
- [2] Pivovarenko Y. The Nature of the Celestial Elves, Sprites and Jets. *Discovery Nature*, 2018, 12: 1-4.
- [3] Feynman R., Leighton R., Sands M. *FLP*, 2. Boston, Massachusetts: Addison Wesley Publishing Company. Sixth printing, 1977: 566.
- [4] Pivovarenko Y. \pm Water: Demonstration of Water Properties, Depending on its Electrical Potential. *World Journal of Applied Physics*, 2018, 3(1): 13-18.
- [5] Pivovarenko Y. The Electric Potential of the Female Body Liquids and the Effectiveness of Cloning. *Research and Reviews on Healthcare: Open Access Journal*, Lupine Publishers, LLC, 2018, 1(2): 22-26.
- [6] Pivovarenko Y. The Value of Gaseous Hydrogen Generated by the Intestinal Microflora of Human. Chapter 07 in: *Top 10 Contributions on Biomedical Sciences: 2nd Edition*, 2018: 2-15.
- [7] Levitt M., Park B.H. *Water: now you see it, now you don't*. Structure, 1993, 1: 223-226.
- [8] Eisenberg H. Protein and nucleic acid hydration and cosolvent interactions: establishment of reliable baseline values at high cosolvent concentrations, *Biophys. Chem.*, 1994, 53: 57-68.
- [9] Gerstein M., Chothia C. Packing at the protein-water interface. *Proc. Natl. Acad. Sci. USA*, 1996, 93: 10167-10172.
- [10] Durchschlag H., Zipper P. Comparative investigations of biopolymer hydration by physicochemical and modeling techniques. *Biophysical Chemistry*, 2001, 93: 141-157.
- [11] Kursar T., Holzwarth G. Backbone Conformational Change in the A-B Transition of Deoxyribonucleic Acid. *Biochemistry*, 1976, 15(15): 3352- 3357.
- [12] Leal C., Wadso L., Olofsson G., Miguel M., Wennerstro H. The Hydration of a DNA-Amphiphile Complex. *J. Phys. Chem. B*, 2004, 108: 3044-3050.
- [13] Pivovarenko Y. The Electric Potential of the Tissue Fluids of Living Organisms as a Possible Epigenetic Factor. *Chemical and Biomolecular Engineering*, 2017, 2(3): 159-164.
- [14] Saenger W. *Principles of Nucleic Acid Structure*. New York - Berlin - Heidelberg - Tokyo: Springer-Verlag, 1984: 556.
- [15] Alexandrova O.I., Aleksandrova S.A., Khomutov V.P., Morgunov M.S., Blinova M.I. Viability of cells of various types cultured on the surface of a medical electret. *Journal of Technical Physics*, 2018, 88(9):

- 1348-1354. (In Russian)
- [16] Lilly L. S. ed. Pathophysiology of Heart Disease: A Collaborative Project of Medical Students and Faculty (sixth ed.). USA, Philadelphia: Lippincott Williams & Wilkins, 2016: 478 p.
- [17] Goodwin T. J. Physiological and Molecular Genetic Effects of Time-Varying Electromagnetic Fields on Human Neuronal Cells; Technical Report of NASA. Lyndon B. Johnson Space Center Houston, Texas, 2003: 30.
- [18] Pivovarenko Y. Arborization of Aqueous Chlorides in Pulsed Electromagnetic Fields as a Justification of Their Ability to Initiate the Formation of New Neuronal Dendrites. *International Journal of Neurologic Physical Therapy*, 2019, 5(1): 21-24.