

Convergence of Eastern and Western Medicine

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ABSTRACT

The article argues that, thanks to the study of the nature of meridional connections, it is possible to open the mechanism of interaction of body systems through the control of local blood flow and introduce methods of diagnosis and treatment, providing local blood supply through the control of heart rate variability (HRV).

Keywords

Autohemotherapy, Local blood flow, Heart rate modulations, Heart rate variability control (HR).

Introduction

To establish and substantiate the scientific bridges between Eastern and Western medicine, thereby establishing their unity. Prove that HRV is akin to low-frequency modulation of the carrier frequency of electromagnetic vibrations in radio transmission and provides an information (address) component of blood flow. This, in turn, explains the nature of the "eastern meridian" and opens the way to targeted autohemotherapy. The distinction between eastern and western (European) medicine is connected not so much with the geography of their origin and distribution, but with the difference in methodology, traditions, time intervals of development and opportunities for introducing scientific and technological progress into medicine. It is known that in ancient times in the east Tibetan medicine developed more than 5 thousand years ago and its traditions and knowledge today have been largely lost [1]. However, current trends require not only their restoration, but also scientific explanations and evidence. Eastern medicine, unlike Western (European), enjoyed mainly the empirical experience of individual healers accumulated over a long time and is to a large extent a manifestation of their art and talent for healing.

One of the fundamental concepts of oriental medicine is the concept of "meridian." This is a line that connects bioactive points

on human skin with certain systems of the body. Pain irritations of these points have a life-giving effect on their respective organs.

Exposure points are located on human skin and abundant on the auricle. In the literature concerning acupuncture, atlases are usually proposed, which clearly reflect the meridians. It should be noted that today there are at least five hypotheses explaining the presence of meridians [2]. This includes: 1) the ancient Chinese natural philosophy theory, based on the hypothesis of "life energy" and the struggle of its two principles - positive male and negative female; 2) the Western European theory of the 20s and 40s of the twentieth century, which arose in connection with the penetration of the acupuncture method into Europe, while assumptions were made about the galvanistic and electromagnetic nature of meridians, as well as "tissue" theories were introduced; 3) neuroreflective theory, to which the famous scientists Pavlov I.P., Sechenov I.M., Vvedensky N.E., Ukhtomsky A.A., Speransky A.D. had a hand; 4) vegetative-reflex theory; 5) analgesia theory associated with the analgesic capabilities of acupuncture. None of them are well-off in terms of scientific evidence. Bearing in mind that in a number of cases, treatment with exposure to bioactive points is extremely effective (for example, treatment of the sexual sphere), the problem of studying the nature of meridians should be considered extremely urgent. The authors in previous articles [3-6] have already suggested that meridional connections are based on the ability of the circulatory system to increase local blood flow in accordance with the need for this organ or system. At the same

time, the heart, having the ability to vary heart rate, can, due to non-frequency modulations, increase local blood flow in accordance with a certain address, thereby contributing to the speedy healing or healing of organs responding to this address. If the hypothesis is true, then there are unique opportunities for treatment with autohemotherapy methods. Passive methods of non-invasive autohemotherapy include certain types of controlled breathing exercises, active invasive methods include the previously used local blood transfusion. More modern methods include controlling a special pacemaker capable of providing appropriate heart rate modulations.

We will briefly focus on the main points of development of the idea of the influence of heart rate variability on the control of local blood flow in the vascular system. Initially, the local blood flow increase was simulated in the electrical model [3,4], the results of which are shown in Figure 1, 2.

It follows from Figure 1 that when simulating blood flow using an electric pulse source and a pulse consumer, depending on the phase shift, a significant increase in current simulating flow is possible. Figure 2 shows the results of the simulation, taking into account the presence of not only the main frequency of oscillations, but also lower harmonics. It is shown that the modulation coefficient is 3, the intensity of the local flow increases by 1.23 times. Further, after establishing the fact of a local increase in blood flow, an analysis was carried out of the effect of low-frequency heart rate modulations (HR) in various cases of changes in heart rate variability (HRV), including with physiological tests.

Traditionally, HRV is studied by studying cardio interval by recording an electrocardiogram (ECG). The authors proposed and introduced a method for assessing HRV by recording pulse waves (PV) of the radial artery. At the same time, areas under PV are considered and a "integral histogram" is built, which reflects the process much more accurately. The signal-to-noise ratio is shown to improve 5-8 times. Here are integral histograms reflecting changes in cardiocycles during recording within 20 seconds (Figure 3).

The curves are constructed by the method mentioned above, i.e. by determining the areas under the contour of each PV, placing them sequentially in the form of a histogram on a time scale and conducting an envelope that characterizes HRV.

Figure 3a illustrates harmonics that include 3-4 cardiocycles. This is the so-called respiratory arrhythmia. The peak looks like a process of modulating the heart rate of respiration. Observations show that at the top of the breath, HR slows down. This is most likely due to the completion of the active oxygen exchange process and the transition to exhalation, which is an "idle run." Thus, due to HRV, the optimal work of the small circle of blood circulation is realized. Modulations, as you know, are realized due to the vagus nerve, which is affected by the chest during breathing.

The experiment shown in Figure 3b is associated with a long breath delay during inhalation. Respiratory arrhythmia is not visible here, but there is a relaxation process associated with a drop in pulse pressure, which is a result of vasodilation.

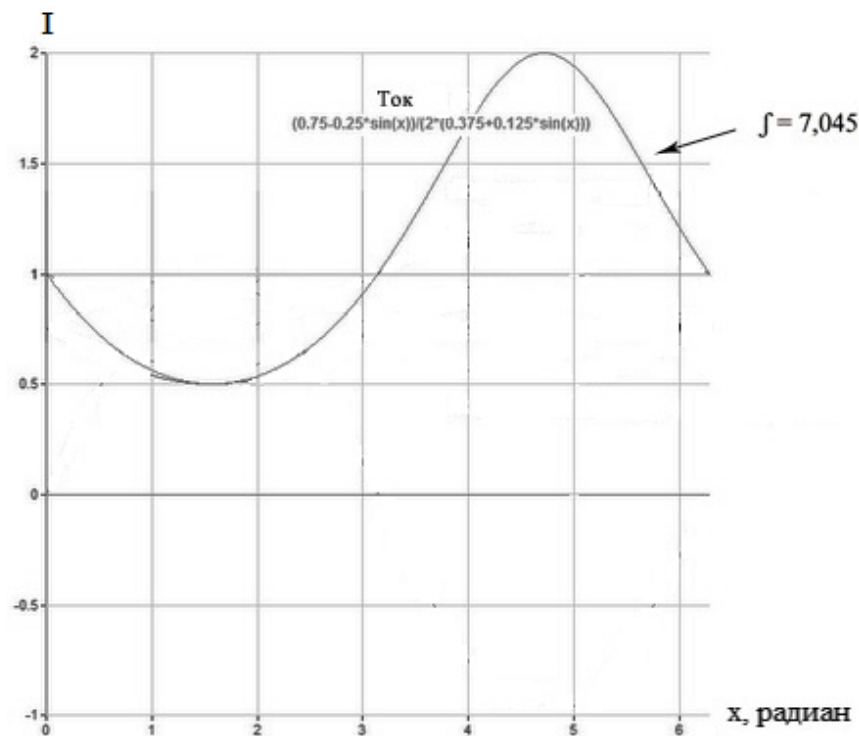


Figure 1: Change in current of pulsed consumer (I) at different combinati on of pulsations of source and consumer.

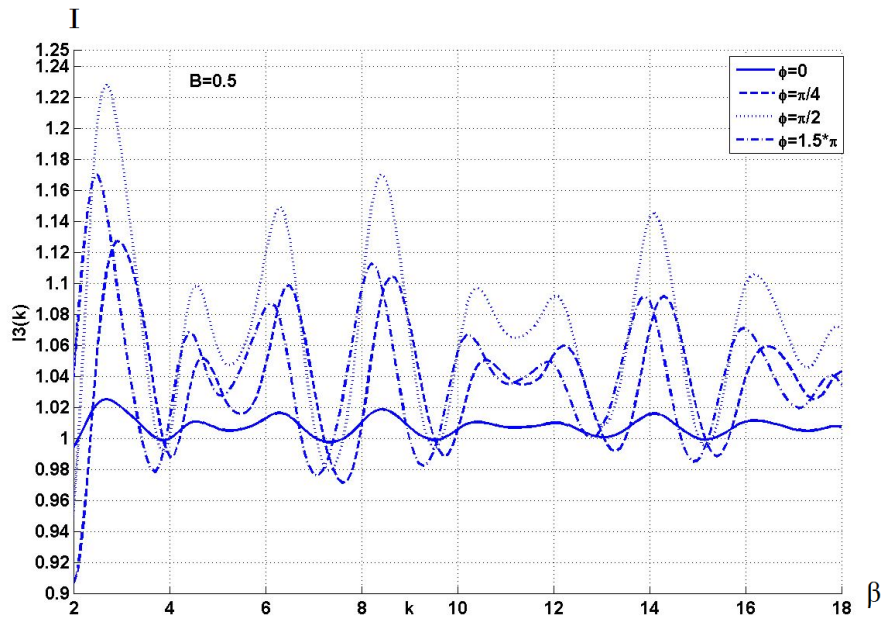


Figure 2: The dependence of the flow intensity I on the modulation coefficient β at different values of the phase shift φ .

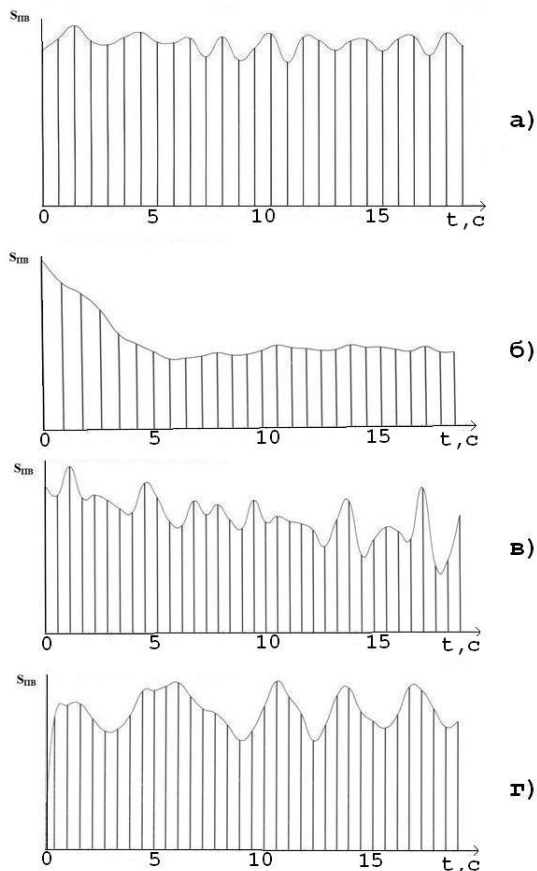


Figure 3: Heart rate variability built based on a pulse wave integrologogram.

Patient - male (hypertensive, 60 years old):

- a) Initial state; b) breath retention at exhalation;
- b) Physical loading of 25 squats; d) effect of nitro glycerol.

The following experiments were accompanied by further physiological tests, namely, the action of physical stress (Figure 3c) and the influence of nitroglycerin spray under the tongue (Figure 3d). As can be seen from Figure 3c, the physical load significantly increased the modulations from breathing (the amplitude of the modulations increased). In addition, slower harmonics appeared related to the frequency of squats. Exposure to nitroglycerin led to increased low-frequency breathing-related modulations. Signs of an increase in breathing depth are visible when its frequency decreases. In addition, it should be noted that when the body's stress response develops, the heart rate modulations (including from the respiratory side) are completely suppressed, and the HRV curve becomes smooth and turns into a line running parallel to the time axis. In this case, a person can catch his breath in view of lack of oxygen and blood flow becomes insufficient. This situation is dangerous from the point of view of the development of crisis processes in hypertensive patients and can lead to a vascular catastrophe. From the observations made above, it suggests that with the help of HRV, targeted blood supply is realized, i.e., heart rate modulations contribute to a local increase in blood flow. The considered example of respiratory arrhythmia, and variants associated with functional samples, proves the presence of control of the blood flow of the small circle of circulation synchronously with the respiratory process. Having the most advanced pulse wave sensors in service [7], we set out to systematize the results of research over a long period of work (since 1990) and attempt to develop methodological foundations that can be associated with diagnostic signs. This will allow the doctor to use the PV analyzer to clarify the diagnosis and outline a treatment strategy.

Figure 4 shows the results of 2 channel measurements that can be used to analyze the status of the most important parameters of the

central pulse, such as the central aortic systolic ejection (CASP) and the rate of propagation of PV in the aorta (SRPVz). Having outlined the basics of digital diagnostics of the cardiovascular system, one should wonder: is it possible to use in this work all the knowledge that Eastern medicine has accumulated since ancient Tibetan pulse diagnosis based on tactile sensations for diagnosing the entire body. At the same time, it is necessary to find such a jumper that would make it possible to connect modern ideas about hemodynamics with the concept of "meridian" adopted in treatises on oriental medicine. In many manuscripts of that period, we find a mention of a certain KI energy, which is ahead of the blood flow, filling the body with life and determines in many ways the state of health.

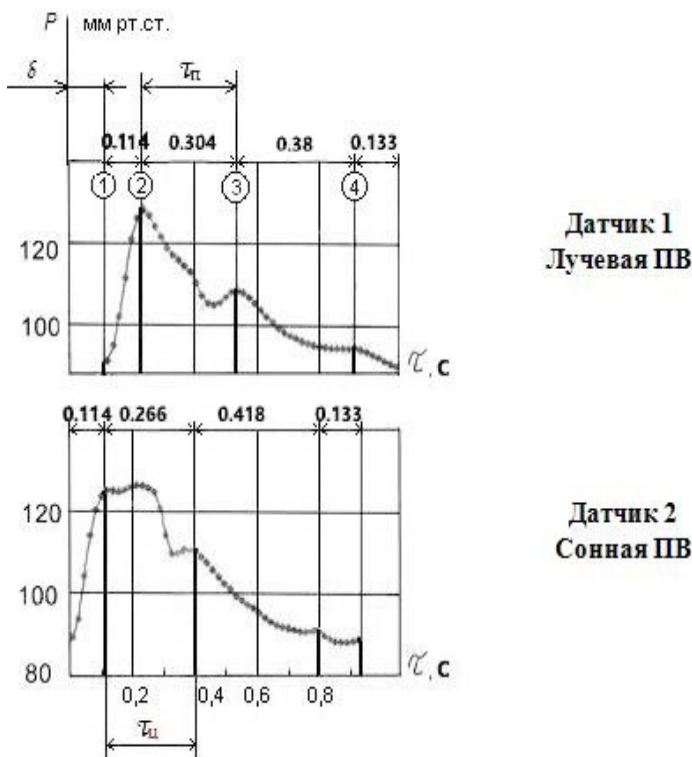


Figure 4: Two-channel examination of pulse waves (PV) during their synchronous recording:
a) Peripheral pulse wave; b) Central pulse wave.

If we make a careful assumption that the "KI energy" is an analogue of pulse pressure waves, which are ahead of the blood flow rate by an order of magnitude in speed, then a certain analogy can be drawn between them. However, this is not enough to explain the physical nature of the "meridian."

Let us turn to the latest articles of the authors concerning the issue of heart rate variability (HRV) and targeted blood delivery [4-8]. These works show that HRV gives the blood flow an information component due to frequency rhythm modulations, thanks to which it is possible to increase local blood flow and create a certain address determined by the modulation frequency.

Let us imagine that placing a needle at a certain bioactive point causes an increased rush of blood to this point in order to heal as soon as possible. Accordingly, a certain modulation of the HR occurs in the coordinate of the point. A similar modulation is the "call sign" of the relevant organs or systems of the body, and it is there that the increased flow of blood is directed, which is the reason for the accelerated recovery of this organ or system. **If so, the physical nature of the meridian lies in the redistribution of blood flow when address modulations are applied.**

This hypothesis can be realized by creating fragments of pulse wave records up to 10 minutes in length. In this case, an integralogram is built (described in detail in source [6]) and its spectral analysis is carried out. Pentagrams associated with the body's systems according to the principles of oriental diagnostics are filled in by spectrum (Figure 5).

Then the program calculates the states of redundancy and insufficiency, clearly shown in the form of "rains" (Figure 6).

In the final part of the article, I would like to note the following. More recently, the emerging direction - applanation tonometry - already has advanced status in cardiology. With the development of the hardware base and the improvement of ideology, in the near future it should win a strong place for itself both in mobile medicine and in medicine in general. The integration of the ancient knowledge of oriental medicine and the modern achievements of medicine embedded in the study of the pulse carries a huge potential, which is only slightly opened in this article.

The next stage of work was a focused experiment devoted to the study of the redistribution of blood flow, which accompanies the process of digesting food after eating.

It is known from the field of electrogastrography that the electrical activity of sections of the gastrointestinal tract is harmonic in nature and lies in the following ranges (Hz): a) stomach 0.18-0.25; b) pancreas 0.13-0.18; c) small intestine 0.07-0.13; d) large intestine 0.03-0.07; e) rectum 0.01-0.03. Peristaltic (muscular) contractions of these sections of the gastrointestinal tract should have appropriate frequency ranges, which should be accompanied by a rush of blood to the working sections of the gastrointestinal tract. This can be detected in the HRV curve if sequential spectral analysis is performed according to the procedure set forth in, for example, [5]. Accordingly, the pilot participating in the experiment was filmed a pulsogram (a fragment of the shooting 20 s) before eating and 1 hour after eating (the sensors described in [6] were used). The results are shown in Figure 7.

It follows from Figure 7 that the basic harmonic of the HRV envelope has shifted from 0.6 Hz to 0.07 Hz. Thus, there is direct evidence that local blood flow increased in the section of the large intestine 1 hour after eating. Therefore, it can be argued that through HRV modulations, targeted redistribution of blood flow occurred.

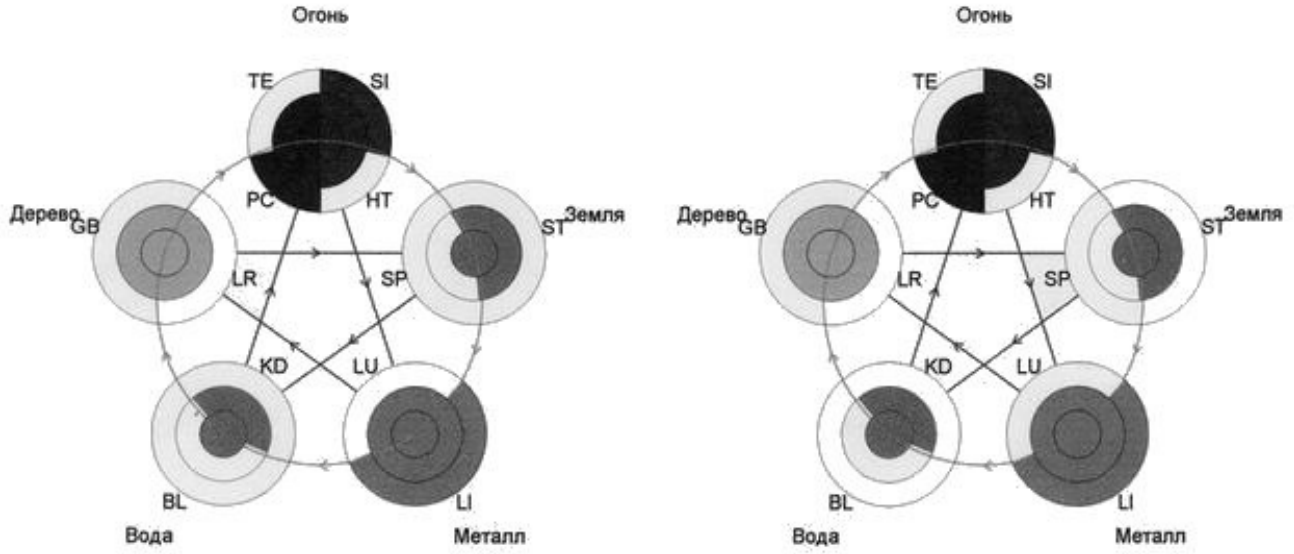
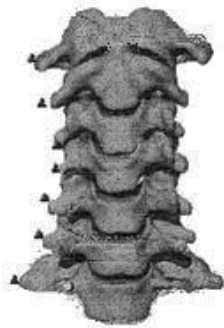


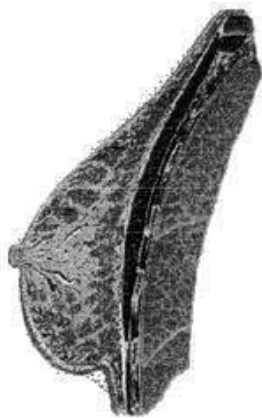
Figure 5: Pentagrams.



ПОЗВОНКИ ШЕЙНЫЕ



ПОЗВОНКИ ГРУДНЫЕ



ПРОДОЛЬНЫЙ СРЕЗ ПРАВОЙ МОЛОЧНОЙ ЖЕЛЕЗЫ



ПРОДОЛЬНЫЙ СРЕЗ ЛЕВОЙ МОЛОЧНОЙ ЖЕЛЕЗЫ

Figure 6: "Rains".

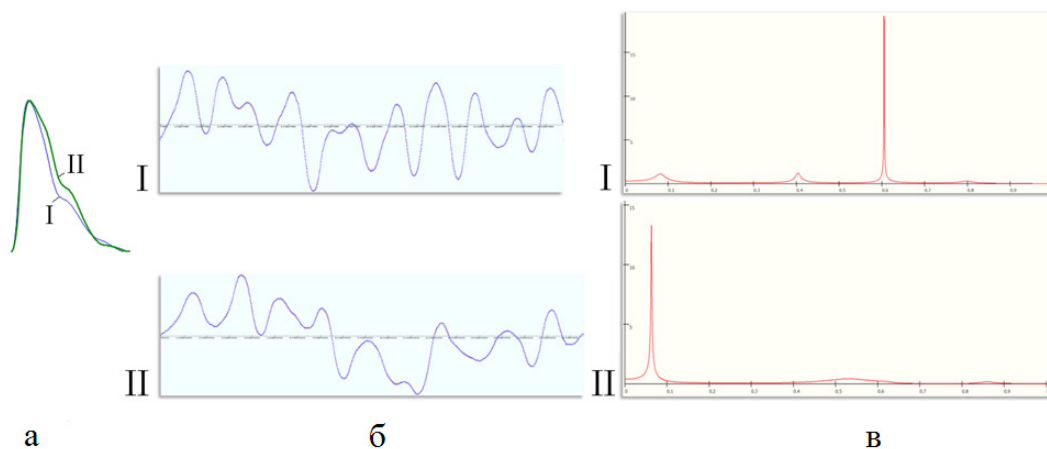


Figure 7: Pulse wave (PV) records and their pre-meal (I) and post-meal (II) analysis:

a - PV averaging, б - Integral histograms, c - Harmonics in the envelope of the HRV curve.

Naturally, having proved the fact of interest on a single experiment, it should be generalized by repeating the measurements on large samples.

Conclusions

- The observations made in this article can shed light on the formation of meridional diagnosis and therapy, which underlies ancient Eastern medicine. It is possible that the vast experience of Eastern doctors, starting with ancient Tibet and Avicenna, consisted in the ability to redistribute blood flows in the body by creating addresses due to the effect on bioactive points and skin zones. At the same time, heart rate modulations occurred, accompanying local blood redistribution. Targeted HRV management can, taking into account modern achievements in the field of biomedicine, contribute to the development of completely new methods of non-invasive autohemotherapy and revive partially lost prescriptions of ancient Eastern medicine.
- The described method of increasing the intensity of blood flow into the local zone can presumably improve drug therapy by providing enhanced delivery of drugs with blood directly to the desired area, where pathology is developed and this drug is required, if rhythmic compression is provided in this area.
- More recently, the emerging direction - applanation tonometry - already has advanced status in cardiology. With the development of the hardware base and the improvement of ideology, in the near future it should win a strong place for itself both in mobile medicine and in medicine in general. The integration of the ancient knowledge of Eastern medicine and the modern achievements of medicine, embedded in the study of the pulse, carries a huge potential, which is only slightly opened in this article.

- The effectiveness of this method is indirectly confirmed by the methods of transfusion of own blood and blood of compatible donors. It is still difficult to assume how useful non-invasive autohemotherapy methods may be, but they may be able to supplement existing methods of treating the most dangerous diseases associated with oncology and rehabilitation of the consequences of vascular disasters.

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