

Modern Organismic Models of Traditional Chinese Medicine

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Abstract: Based on the requirements of holistic medicine to the development of model of human's organism and the advanced study of Wu Xing theory in this paper the methodology of creating of set homeostatic functional models of the bioenergetic informational acupunctural human's system is considered. The study was performed on the aggregation of advanced investigation of Traditional Chinese medicine theory of Wu Xing and modern principles of Cybernetics, particularly Homeostatics. As the result of the investigation the functional homeostatics organismic models such as "Pentacube", "Hexagon", meridional homeostatic model and meridional model "Merkabah" were created and the proofs of correctness were represented. The models allows to generate strategic system treatment algorithms, describe quality of functional relations between organs and their retiform structure and to more accurately diagnose the disease and the effects of treatment by various drugs.

Key words: Wu Xing • Homeostat • Pentacube • Hexagon • Meridional homeostatic model • Merkabah

INTRODUCTION

The main requirement for the medicine of XXI century is that the human organism should be considered as a complex integrative system. In the V.K. Kozlov's article [1] describes in detail the conception of a system medicine that aims to medical prevention-preservation of the health, i.e. preventing the progress of diseases, their complications and unfavorable outcomes. The core of prevention, in turn, is the category of health, interpreted in the following way to the theory of adaptation: healthy person is the one, which organism has the maximum of adaptive features (reserves), which are reduced through disease and at disease progression may be completely lost.

The concept of a holistic medicine provides the representation of the disease of regulation-prepathological (prenosological, functional) states, so the main purpose of diagnostics is to identify the standard disturbance of the regulation as the basis of disease and for preventive and curative action is the preventive correction available disorders [1].

Holistic medicine requires [1] the creation of a human's body model that can describe the regularities of biological organization and transformation of health into disease. Such model should be procedural, systemic-functional or regulatory because it enables to generate strategic algorithm of correctional systemic influence. Such philosophical conception of world view is being developed in India, Tibet, Greece and China for many years, based on the concept of cyclic and phase (i.e. oscillating and wave) nature of the process of life. The main principle is that human body organs interact to each other by means of physiological and functional connections.

Insofar as holistic medicine means a healthy organism as an adaptive system, so the model should reflect a similar property. In general adaptability reduces the phenomenon of stability [2-4], which is expressed by the phenomenon of homeostasis for biosystems.

The homeostasis itself is provided by the use of adaptivization mechanisms-elementary homeostats [2, 3]. Structurally, the homeostatic systems differ from other adaptive systems that the two control loops have a

common control object and, in turn, are under the control of the third loop, which forms the second, control top-level. High adaptive capacity of homeostatic systems are achieved through embodied in them the controlling contradiction between the goals of control top-level [2, 3]. Consequently, the models should reflect in some way the homeostatic mechanisms of the human's body in its structure. As an example of homeostatic system class stability, we selected the human organism and examined it based on the five-membered cycle of the Wu Xing, which reflects the interaction of human organs groups¹.

So the main purpose of this investigation is to create an applicable in integrative medicine actual model of human's organism based on aggregation of the ancient Wu Xing theory and modern part of the Cybernetics such as Homeostatics.

MATERIALS AND METHODS

In this investigation for the construction of models of the human's body in the form of homeostatic networks used a goal-view of homeostat (Figure 1). It was built on the basis of the representation area of natural processes changeability which described in [2].

According to the Wu Xing theory, the pentagons of human organs yang and yin have two circular cycles. One is clockwise and stimulating in nature, the other is anticlockwise and depressive. The pentagons' stimulating and depressive processes can be graphically represented as a pentagram (a five-pointed star). This may be due to the interaction between two poles (antagonist) of homeostats. Besides, if you combine the Yin and Yang organs relating to the same element according to the Wu Xing theory, you can get a number of Yin-Yang homeostats (Figure 2).

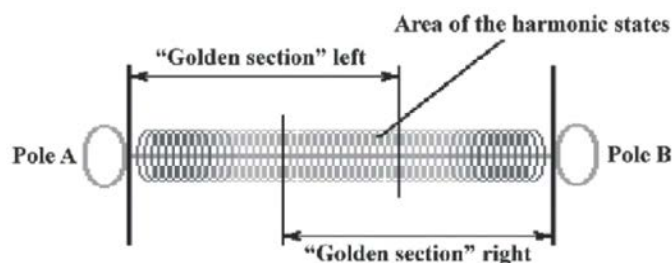


Fig. 1: Goal-view of homeostat

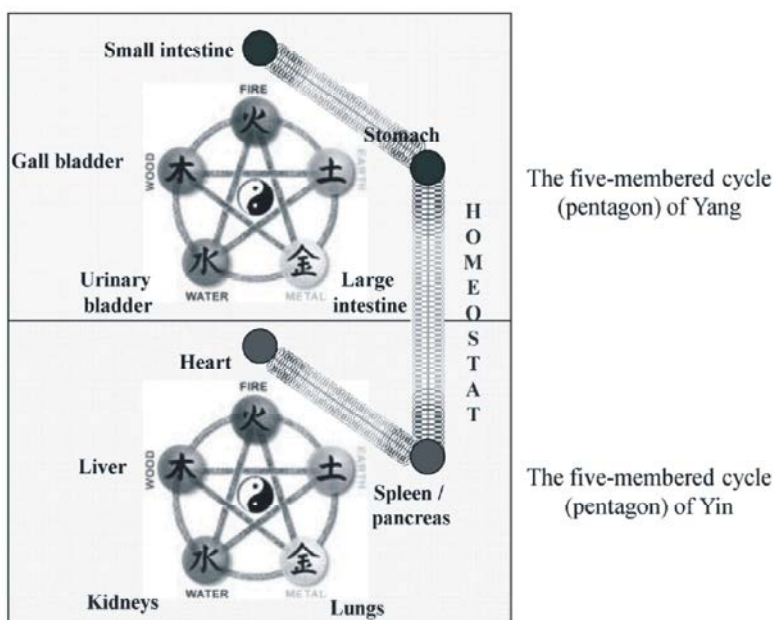


Fig. 2: Conceptual representation of the Wu Xing and Homeostatics aggregation

¹http://en.wikipedia.org/wiki/Wu_Xing

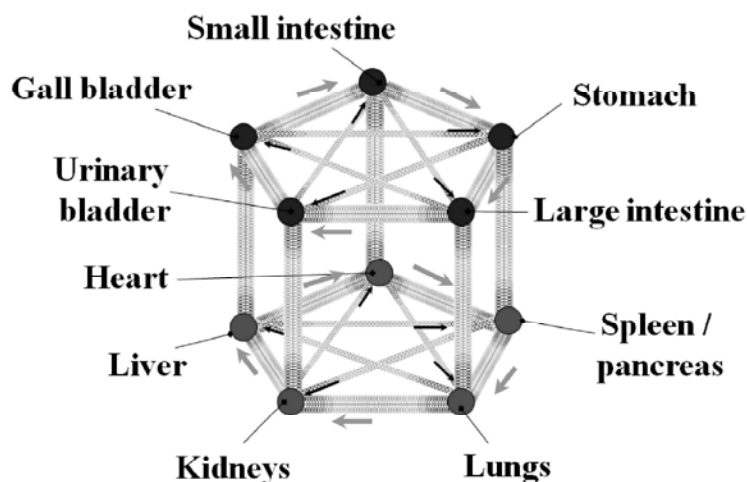


Fig. 3: Homeostatic "Pentacube"

The homeostatic nature of this interaction is confirmed by the fact that organs interactions in these homeostats are synchronized. For example, in homeostat of "Metal" element (lungs-large intestine) lungs become more active from 3 till 5 in the morning and large intestine from 5 till 7 in the morning; in homeostat of "Water" element (kidneys-urinary bladder) urinary bladder becomes more active from 15 till 17 in the afternoon and kidneys from 17 till 19 in the afternoon; in homeostat of "Wood" element (liver-gall bladder) gall bladder becomes more active from 23 till 1 in the night and liver from 1 till 3 in the night; in the homeostat of "Fire" element (small intestine-heart), the heart becomes more active from 11 till 13 in the afternoon and small intestine from 13 till 15 in the afternoon; in the homeostat of "Earth" element (spleen / pancreas-stomach) stomach becomes more active from 7 till 9 in the morning and spleen / pancreas from 9 till 11 in the morning. So, connecting all 5 known organs of Yin and Yang horizontally and vertically, we get the integrative homeostatic functional "Pentacube", in the vertexes of which there are human organs and the edges are homeostatic connections between organs (Figure 3).

The directions of arrows on the figures of homeostatic models indicate "generating" (the green one) and "overcoming" (the black one) processes accepted and thoroughly described in the Wu Xing theory.

Advanced study of Wu Xing permitted to create the "Hexagon" model.

First of all, the premises for the existence of sixth group of organs were made many hundreds years ago by ancient Chinese scholars. In parallel with the system of

five Zang-Fu, they created a system of circulation of the twelve meridians (Jing-Luo), the imaginary vessel, which circulates Qi energy, usually called "vital force". After developing the system of meridians, the ancient Chinese scholars associated each meridian with a specific internal organ. Meanwhile, onto the 12 meridians only 10 of the internal organs were assigned. So, the question if two more internal organs existed arose. For the additional Zang organ, the so-called "master of the heart" (Xin Zhu) also known as pericardium was selected. Onto the place of the sixth fu organ, the "super-organ" was selected. It is known as San Jiao or triple heater. This organ of Three Jiaos is involved in metabolic processes of the organism. Currently, one can come across the fact that in addition to five-membered ring in the Wu Xing cycle, there is another equal "member". The "Fire" element is dual and contains 4 elements (two Zang organs and two Fu organs) in that representation.

Secondly, although the element of "Fire" fills the human body with vital energy, the physical-chemical mechanism of oxidation ("internal warming") in the "Fire" of heart-small intestine and in the "Fire" of pericardium-triple heater is different.

Thirdly, we turn to the stability of systems built on polygons. Hexagon has a higher symmetry axis L6 against the pentagonal L5. Structures of solids, characterized by the fifth-order axis of symmetry of the prohibited in classical crystallography, occur rarely in nature. The very nature aspires to create objects of different complexity levels in the hexagonal structures. This property is manifested both at the macrocosm and microcosm levels.

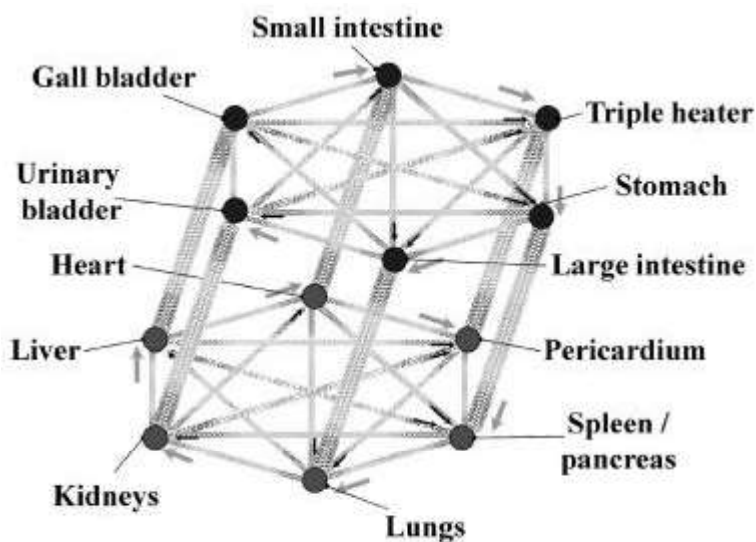


Fig. 4: Homeostatic "Hexagon"

Fourthly, the interaction rhythm (by analogy with the previously described homeostats) of organs such as pericardium-triple heater will also be homeostatic in nature: the pericardium becomes more active from 19 to 21 in the evening and triple heater from 21 till 23 in the evening.

And fifth, in a model of five-membered cycle in pathological states of excess or lack of Qi energy in the organs, logical rhythmic of activity has a probabilistic nature and points to an extreme degree of degeneration of the pentagonal system. In the model of six-membered cycle this uncertainty states is completely eliminated.

The ideas described above enable us to draw a conclusion that the sixth group of organs exists: triple heater-pericardium, relating to the element "Fire". The processes of stimulating and suppression and, accordingly, the homeostatic interactions of organs in sexangles of Yin and Yang of the integrative homeostatic functional "Hexagon" are the same as the processes between the organs in the pentagons of "Pentacube". Since inner homeostatic interactions between the organs in pentagon of organs are described as a five-point star (a star as a planar geometric figure is meant) and are exhaustive, so in sexangle of organs the inner homeostatic interactions will be described as a six-point star / hexagram, representing in form the projection of stellated trigonal bipyramid on the plane and will be also exhaustive. Consequently the conclusion can be made about the presence of homeostatic connections between the homeostat of "Wood" element (liver-gall bladder) and homeostat of "Fire" element (pericardium-triple heater) and between the homeostat of the "Fire" element (small

intestine-heart) and the homeostat of "Earth" element (spleen / pancreas-stomach) in homeostatic "Hexagon" of the human body organs (Figure 4). It should be noted the structure figure-of-sexangle is the most effective shape in nature.

Due to the fact, there are regulators in the compound of homeostatic bioenergetic system, then we suggest, that as channels of regulating the standard meridians are used, which have projections on the surfaces of human body. It is known, that besides 12 standard meridians, related to the definite organs of the human body, there are other subsystems of meridians, performing the functions of additional direct and feedback connections ("miraculous" meridians, tendinomuscular meridians, unpaired meridians, collaterals and secondary meridians) [5]. To switching centers, transmitting control action into the unpaired posteromedian and unpaired anteromedian pretend, to our mind, spinal cord for Yin organs and encephalon for Yang organs (Figure 5). Chief-regulator likely to represent consistent beginning of nature, pacing the works of homeostats of organs.

The meridional homeostatic model allows to describe the information flows dynamics within the system more completely. It also allows to reveal the central internal meridian (the channel of transformation and communication of Yin-Yang) mentioned both in TCM and ancient Indian traditions. The analysis of given functional models allows to understand control strategies of pathological processes. It also allows to minimize prognostic list of pathological states qualified the conceptual thinking of traditional Chinese medicine philosophy.

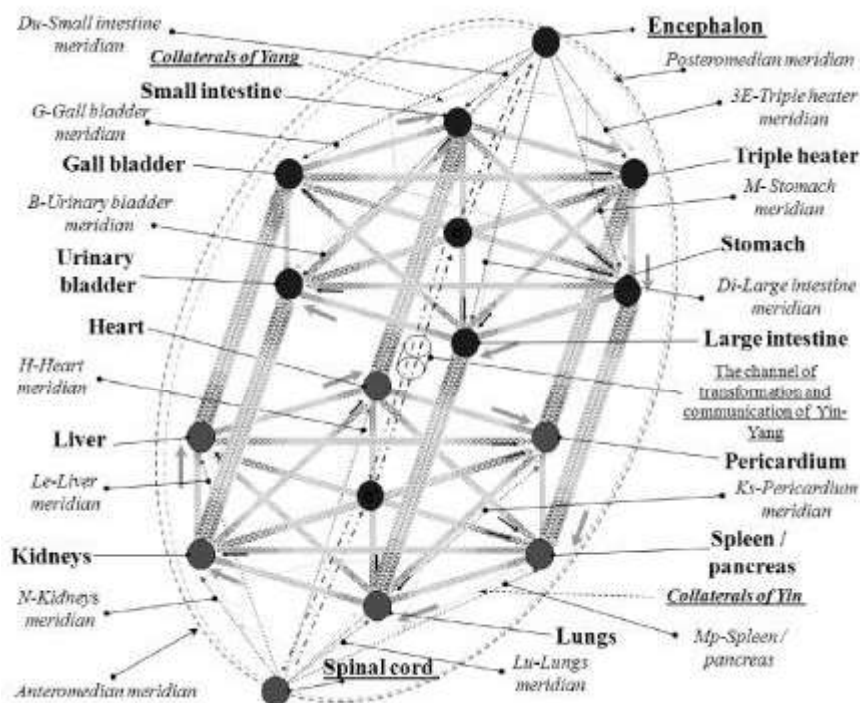


Fig. 5: Meridional homeostatic model

Represented functional models possess the scientific novelty. It also got a good reference of the Institute of Reflexology of Federal Clinic Experimental Centre of the Traditional Methods of Diagnostic and Treatment of Ministry of Public Health and Social Development.

Proceeding from judgment that organizers and regulators of local processes in the control space of the lower level of system of correct polygons are stars (connected and not connected), it is possible to make a conclusion, that in homeostatic "Hexagon" (a polyhedron-a prism) of the meridional homeostatic system of energies interaction of human body organs such organizer-regulator of processes is a star-shaped polyhedron-merkabah or a stellated tetrahedron [6]. Merkabah as a member of a row of Platonic solids (octahedron is an invariant to stellated trigonal bipyramid) can model dualism. Merkabah as a process is the integral stage of biosystem genesis, namely biological-energy evolution of a cell: at the third stage of the ovicell division eight cells form a stellated tetrahedron and they are absolutely identical to each other [6]. Static model of interaction a stellated tetrahedron reflects the basic rules of constructing of meridional biosystem and the technology of forming homeostatic connections as complete units. Knots in "Merkabah" system represent a brain as the switching centers of a human body. 4 knots

of Yang-tetrahedron are the encephalon and 4 knots of Yin-tetrahedron-the spinal cord. And as the switching centers encephalon and the spinal cord will be absolutely identical to character of controlling.

The key rule of constructing consists of the following: the meridian represents not unidirectional structural unit (brain-body), but a contour (brain-organ-brain), or a construction of the tunnel type with "two-way traffic". The technology of formation of homeostatic units is obviously displayed on a stellated trigonal bipyramid: homeostatic couple of Yin-Yang organs is formed owing to a crossing of meridians of the corresponding Yin-Yang organs. We can notice that such approach does not contradict, namely proves the correctness of meridional homeostatic model. Having connected homeostatic couples of Yin-Yang organs by a broken line in view of their timely activity, we receive a flat figure hexanema [7], determining a timely way (Figure 6).

Proceeding the meridians in view of timely activity both in a stellated tetrahedron as a whole and in Yin and Yang tetrahedrons and consequently also a process of meridional energy circulation (signals), on the given cognitive models occurs at first clockwise, then changes its direction on counter, i.e. on an endless helix and on a plane looks like an infinity sign. The control submodel "Merkabah" is the convergent functional portrait of

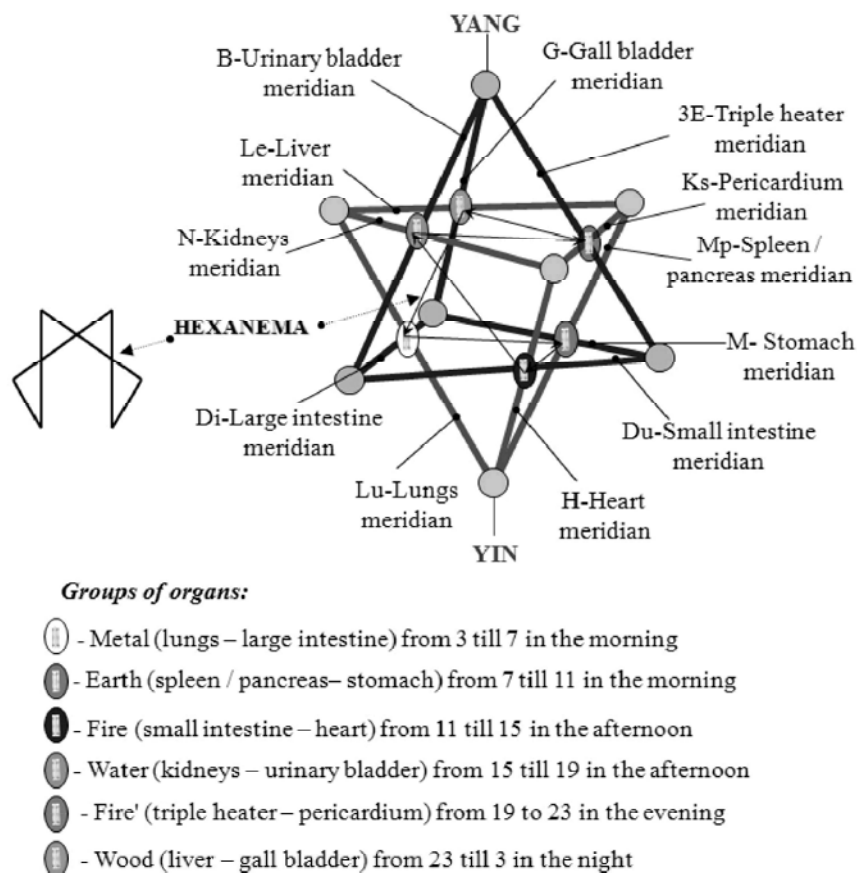


Fig. 6: Meridional control submodel “Merkabah”

human body and involves the improved information human body models of the TCM Wu Xing and the Ancient Egypt.

The homeostatic character of interaction between organs in homeostatic models is confirmed by Y.S. Zhang's scientific research of Wu Xing cycle [8, 9]. Zhang defines by logic and practice for an usual body the intervention reaction coefficients $p_1 \sim 0,618$ and $p_2 \sim 0,382$ for a couple of organs in cycle. It means the functional connections between organs reflect the “golden section” which is typical for homeostats of biological systems [2, 10]. It is the “golden section” explains the highest degree of stability of any biological system.

The correctness of control submodel “Merkaba” is confirmed by the system of “Later Heaven” bagua³, developed in ancient treatise “I Ching” (“Book of Changes”), which was the basis of the ancient and

medieval natural philosophy the Far East. Thus, we can build a table of correspondences of eight co-control knots that represent the encephalon and the spinal cord in the “Merkabah”, with trigrams, in consideration of that each knot corresponds to three meridians Zang or Fu organs (Figure 7). The table shows that the logic of monad of Yin-Yang saved as on the encephalon and the spinal cord fit for 2 sets of 18 control trigrams, therefore, in view of the unrolling of Taiji in the model of the “Later Heaven” of Wen Wang cycle, onto 12 organs fit a set of 288 control hexagrams (144 hexagrams for Zang-organs and 144 for hexagrams for Fu-organs).

The correctness and rightness of all represented models are also confirmed by medical research of human nervous and meridional systems communications [11-14], by medical research of human nervous and organs systems communications⁴ and Dilman's pathogenesis model [15].

³https://en.wikipedia.org/wiki/Ba_gua

⁴<http://www.newmedicine.ca/>

<i>Yang tetrahedron of "Merkabah"</i>			
Meridian	Control trigram of encephalon	Meridian	Control trigram of encephalon
Urinary bladder	☵	Stomach	☳ ☵
Gall bladder	☳ ☵	Triple heater	☳
Triple heater	☳	Small intestine	☳
Small intestine	☳	Large intestine	☳ ☵
Large intestine	☳ ☵	Stomach	☳ ☵
Urinary bladder	☵	Gall bladder	☳ ☵
<i>Yin tetrahedron of "Merkabah"</i>			
Meridian	Control trigram of spinal cord	Meridian	Control trigram of spinal cord
Heart	☵	Liver	☵ ☳
Spleen / pancreas	☵ ☳	Spleen / pancreas	☵ ☳
Lungs	☳ ☵	Pericardium	☳
Kidneys	☵	Kidneys	☵
Liver	☵ ☳	Pericardium	☳
Lungs	☳ ☵	Heart	☳

Fig. 7: Table of correspondences of co-control knots oà "Merkabah"

RESULTS AND DISCUSSION

Functional integrative homeostatic models are synthesis of knowledge of Eastern and Western medicine and, in contrast to empirical models of classical medicine, describe the circadian biorhythm of body, a multiplicity of the treatment process, the dynamic disease growth pattern, taking into account nosological and prenosological states, which gives an opportunity to increase the selectivity of treatment process with respect to the patient, to more accurately diagnose the disease and the effects of treatment by various drugs.

The system approach to the construction of functional models and submodel allows to observe all scope of relations of "Pentacube", "Hexagon", meridional homeostatic model, "Merkabah" elements and connections between them and to approach to understanding of dialectic "plan" of the nature in organizing and controlling the processes, to see dynamics in statics. The given integrative functional homeostatic models and control submodel allow to understand the essence of pathological processes in a human body, as infringement of energy flow (transferring signals) both in homeostatic and meridional systems with the further disbalance of rhythms of homeostats and displacement of homeostatic energy from optimum areas to the risky areas. The same comprehension of occurrence of disease states in turn, on the basis of knowledge of traditional Chinese medicine, will lead to forming and using of algorithms of

updating of biosystem and taking out from pathological conditions by methods of not classical medicine, but phytotherapy or acupuncture.

On the basis of the functional homeostatic models the strategic apparatus of medical correction techniques creation in the form of hard set of four remedial strategies was generated. It has the following form:

- Strategy 1: To stabilize and/or inhibit organ, related to the same group of organs.
- Strategy 2: To stabilize and/or inhibit organ, related to the opposite group of organs.
- Strategy 3: To stabilize and/or inhibit sore organ.
- Strategy 4: To stabilize and/or inhibit organ, associated by the Yin-Yang homeostat with the sore one.

These treatment strategies are subsequently specified up to the corresponding heuristic rules (hereinafter referred to as HR) subsequently.

Strategy 1:

- HR 1.1: To stabilize and inhibit organs, related to the same group of organs.
- HR 1.2: To stabilize organ, related to the same group of organs.
- HR 1.3: To inhibit organ, related to the same group of organs.

Strategy 2:

- HR 2.1: To stabilize and inhibit organs, related to the opposite group of organs.
- HR 2.2: To stabilize organ, related to the opposite group of organs.
- HR 2.3: To inhibit organ, related to the opposite group of organs.

Strategy 3:

- HR 3.1: To stabilize sore organ.
- HR 3.2: To inhibit sore organ.

Strategy 4:

- HR 4.1: To stabilize organ, associated by the Yin-Yang homeostat with the sore one.
- HR 4.2: To inhibit organ, associated by the Yin-Yang homeostat with the sore one.

Functional homeostatic models of human organs energies interaction “Pentacube” and “Hexagon” became the basis of the idea of computer-aided system of medicinal herbs selection creation. The system [16, 17] allows to automatize the third stage of overall treatment process, by means of generation of decision-making algorithms concerning to the type of sore organ correction and generation of the phytomedicinal forms list on the basis of selected parameters.

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