

genetic anomalies in the course of different forms of leukemia. The traditional cytogenetic methods and extremely sensitive anti-transcriptase polymerase reaction (RT-PCR) are widely used for finding out these anomalies. The first step was taken by us. We have defined such changes as:

inv(16)(p13;q22)/CBF/MYH11;t(4;11)(q21;  
p15)/NUP98/RAP1GDS1;  
t(11;19)(q23;p13)/MLL/EEN.

These anomalies are not notable for the exact linearity and perfectly register FAB-variants, except for the acute non-lymphoblastic leukemia, variant M3, when in 95 per cent of the cases are defined as t(15;17)(q22;  
q21)/PML/ RAR. The diagnostics of the chronic myeloleukemia and other chronic myeloproliferative diseases and leukemoid reactions widely use the concept Philadelphia (Ph') chromosome, formed by the translocation t(9;  
22)(q34; q11) or hybrid gene BCR/ABL. The using of the cytogenetic and molecular and genetic analysis while collecting the data of immunophenotyping is the 3<sup>d</sup> level of the hemoblastosis diagnostic. We consider it to be used in the nearest future in order to solve difficult diagnostic problems and give a possibility to point out some nosologic forms and variants of the onco-hematological diseases, which are notable for the mechanisms of forming, clinical and hematological and prognostic features, and optimal methods of therapy.

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## **STRUCTURE OF THE MODELS AND ALGORITHM OF THE CYCLICLE BIOCONTROL IN COMPUTER SYSTEM OF THE MILLIMETER THERAPY**

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**Urgency of the study.** In 1978 CHzhou Lini in China has voiced the suggestion about that at irradiation of the person weak, but broadband spectrum of the electromagnetic waves organism "itself by itself" perceives lacking him electromagnetic fluctuations. This was exactly he, who has for the first time executed hardware realization given to ideas, in accordance with which medical device generates the electromagnetic fluctuations with small spectral density, but in broad band of the frequencies, including infrared and extreme high frequencies (EHF) ranges of the waves.

In 1993 F.A. Pyatakovich, S.L. Zaguskin, T.I. Yakunchenko have for the first time developed system biotechnical, founded on biocontrol amplitude-frequency inflexion millimeter of the range of the lengths of the waves. The Clinical acknowledgement considered above of the ideas was received at treatment to complicated peptic ulcer with the help of biocontrol way millimeter therapy [F.A. Pyatakovich, T.I. Yakunchenko, 1997, 2000,2003].

It Is considered and matrix way to realization millimeter influences on base three avalanche stairwell diode (ASD) [L.A. Krupenikina, O.V. Maslova, 2001; T.I. Yakunchenko, F.A. Pyatakovich, L.A. Krupenikina, 2002].

The Way was founded on chronobiological principle to inflexions with use parameter to biofeedback.

In designed author to system effectively functioned whole only three programs of the influence, intended for correcting immunological and rheological of the breaches beside sick sugar diabetes.

These restrictions were connected with hardware system of the realization millimeter radiations and use in her ROM. Consequently,

actual is a development computer software operated systems millimeter therapy, founded on matrix way of their realization.

**The Purposes and problems of the study:** development system acceptance bidirection, onruled on personalization and reinforcement to efficiency of the influence, in accordance with development and use matrix specialized device in computer biocontrol system for millimeter therapy.

For achievement delivered purposes necessary to solve the following problems:

conduct the analysis of the perspective directions, in accordance with decision of the reinforcement to efficiency medical technology with use matrix millimeter influences, marketed in a milieau of computer biocontrol;

consider the probabilistic models of the pathological conditions, referring to gynecological diseases and intended for categorization metroendometritis, endometriosis and diffuse of the form fibromioma;

develop the general structured models reception millimeter of the waves on base hexagonal schemes matrix radiation;

form to models and algorithms of programme control intensity influences, founded on electoral use poles matrix radiation by electromagnetic flap EHF-range by means of synchronizing them with parameter to biological feedback;

consider the results of the studies on influence of the electromagnetic radiation extremely radio frequency millimeter range of the lengths of the waves on base hexagonal schemes matrix radiation on current of the pathological process under some gynecological disease.

In work were used methods of the system analysis, modeling, mathematical statistics, methods to registrations and analysis electrophysiological to information in the manner of heart rate variability (HRV), information analysis HRV and EEG.

For entering electrophysiological to information in mode on line us was used

external device on the base monocrystal microcontroller of the company Atmel. The Device includes the sensor of the pulse, which correct works with all operating system family Windows, using standard name port COM1 or COM2. His possible disconnect and connect in hot mode that is to say, not producing switching off the superblock of the computer.

On base conditionally-probabilistic models, approximated by differential law of the distribution, were received information features of the microstructure rhythm heart with calculation main parameter to entropy. These factors served the central to categorization degree to activities of the autonomous nervous system.

In study are presented methodological acceptance of modeling of the structure receptions millimeter of the waves, founded on biological principle. The Genetic system of the person includes the symbiosis to spirals desoxyrhybonucleinic acids (DRA) with protein - histon, which are united in structure hexagonal nature. DRA-matrix (the double spiral 2x2) does 2,5 turns around each histon, going consecutively to the following, shifted on 1/2 periods under corner 60°, forming as a result architecture look like corn cob. The Anisochronous engine or generator are a copy given to designs.

Any external electromagnetic background causes in double spiral DRA electromoving power (EMP) i.e. DRA begins to work as perceiving antenna, but inwardly designs appears the revolving electromagnetic field. Histons also present itself complex protein, on essences, presenting information "diskette-resonator".

The Logical continuation considered models receptions millimeter of the waves was a development hexagonal structures matrix receptions, consisting of poles EHF-generator and providing shaping revolving electromagnetic field.

We consider six models (molded) millimeter influences.

Table 1 Codified model to switchings EHF-generator, generating revolving electromagnetic field

ormula	Order to switchings generator	Frequency GHz	Order to realization of the formula in beats of the pulse			
			N umber of cycles	Rep etition cycles	pause	Time
	2	3	4	5		7
-4	a-c-b-a <sub>1</sub> c <sub>1</sub> b <sub>1</sub> a-c-b-a <sub>1</sub> c <sub>1</sub> b <sub>1</sub>	42-53-60-42-53- 60 42-53-60-42-53- 60	21 12	9*3 3=298	0	Transition to formula F-5
-5	a-c <sub>1</sub> -b-a <sub>1</sub> -c-b <sub>1</sub> a-c <sub>1</sub> -b-a <sub>1</sub> -c-b <sub>1</sub>	42-53-60-42-53- 60 42-53-60-42-53- 60	21 12	9*3 3=298	0	Transition to formula F-6
-6	aa <sub>1</sub> -cc <sub>1</sub> -bb <sub>1</sub> aa <sub>1</sub> cc <sub>1</sub> -bb <sub>1</sub>	42-42 53-53 60- 60 42-42 53-53 60- 60	21 12	9*3 3=298	0	Transiton to formula F-4

In persisting work is considered computer biotechnical system, which contains the chronomodule of the breathing and pulse, hexagonal matrix from six avalanche- fly diode with different therapeutic length of the waves: 7,1 mms (42,2 GHz); 5,6 mms (53,5 GHz); 4,9 mms (60,5 GHz).

The First formula (F-1) includes the medical action to combinations of the frequencies 42,2; 53,5; 60,5 GHz with maximum use the frequency 42,2 GHz (7,1 mms). The Second formula (F-2) includes the medical action to combinations of the frequencies 53,5; 60,5; 42,2 GHz with maximum use the frequency 53,5 (5,6 mms). The Third formula (F-3) includes the medical action to combinations of the frequencies 60,5 53,5 42,2 GHz with maximum use the frequency 60,5 GHz (4,9 mms). In base of the realization molded the influences F-4, F-5, F-6 (tabl.1) mortgaged possibilities to switchings radiations in hexahonal to matrix, generating revolving electromagnetic field.

In formula F-4 use the sequence to switchings EHF-generator, located under углом 120 degrees. Cut-in EHF-generator (42-53-60 GHz) occurs consecutively.

Herewith periodic change position is realized with a-c-b on a1-c1-b1 (fig.3 and fig.4).

In formula F-5 use consequent switching EHF -generator (42-53-60 GHz), located on move of the hour hand.

Herewith periodic change position is realized with a-c1-b on a1-c-b1.

In formula F-6 use the sequence to switchings EHF -generator, located under углом 180 degrees. Cut-in fresh EHF -generator (42-42 53-53 and 60-60 GHz) occurs consecutively.

Herewith periodic change position is realized with aa1 on cc1 and on bb1 (fig.6).

Each program is repeated in cycle since period of the slow first-order wave by duration in 33 beats of the pulse. This period corresponds to the rhythm an intersystemic relations. Moreover 21 beats of the pulse accounts for period with maximum factor of the filling the signal and 12 beats of the pulse - for a period of with maximum porosity of the signal.

The repetition of the cycle 9 once provides time to realization equal 298 beats of the pulse (9 h 33 =298) that approximately corresponds to five minutes of physical time. On length following 60 beats of the pulse is realized pause, when influence is absent.

Under the individual normal fluctuation interpulse interval from 0,66-1,00 with realtime of the procedure, including worker cycle and pause, will form 3,94-5,97 minute  $[(298+60)*0,66/60]=(358*0,66)/60=3,94$  and  $(358*1,0)/60=5,97$  minute. Clean time of the influence (without pause) will form  $(298 * 0,66)/60=3,28$  minute and  $(298 * 1,0)/60=4,97$  minute.

The Amount of the repetitions is defined by duration of the procedure: 298 beats of the pulse

(beside 5 minutes), 596 beats of the pulse (beside 10 minutes), 894 beats of the pulse (beside 15 minutes), 1192 beats of the pulse (beside 20 minutes), 1490 beats of the pulse (beside 25 minutes), 1788 beats of the pulse (beside 30 minutes) e.c.t.

The Realization of the influence is realized in software-operated mode, providing change the frequency and duration pulse influences with beat of the pulse and breathing of the patient in tact. The Biological feedback includes respiratory and heart-vascular system, sensor of the breathing and pulse, summer, width-pulse modulator, software-remembeering device, electronic commutator, wave-conductor with radiation antenna.

Use acceptance boadaptive of control was provided at realization matrix millimeter therapy directed on modification of the condition patients in the manner of relaxations. The Main correlations of the frequency of the pulse and respiratory cycle reductions, as well as period of the functioning and pauses for all programs of the influence were an realized with use of forced control breathing.

The Program to realization of the forced breathing includes six molded the influences with consequent realization millimeter impulse of the radiation, duration and pauses which depends on correlations of the number heart beats and cycles of the breathing: 3:1; 4:1; 5:1; 6:1; 8:1; 8:1.

Each formula of the influence of the program is realized in strict correspondence to with algorithm of the switchings ASD-radiations, recorded in ROM device.

The Formula of the influence cyclical is repeated. Herewith, one cycle of the influence is divided on two consecutively executed part. The Influence at will user is assigned number amount reiterative cycles from 1 before 7, including each period of the functioning in 300 beats of the pulse and period of the pause in 60 beats of the pulse.

In program herewith use the mode "synchronizing the forced deceleration of the breathing".

This mode realizes synchronizing impulses radiations with frequency of the heart beats and breathings reductions of the patient, but on special algorithm, when realize the fluent

deceleration of the breathing before correlation 8:1. In this case on special to straightedge indicator must be flashed signals of the breath, pauses and exhalation. The Light signals of the breath-pauses-exhalation are flashed at moments of the appearance signal pulse. Analysis is provided in program on correspondence to of the velocities of the breathing and pulse on special chronodiagnostical algorithm.

Biocontrol change the influence EMR is concluded in cyclical switching ASD - a generator of the different frequency synchronous in tact with beats of the pulse inwardly respiratory cycle, defining different duration useful carrying signal: at moment of the systole and on breath duration pulse most, but at moment diastole and exhalation- least.

In work are considered deterministic models of the pathological conditions endometrium and myometrium in the manner of codified matrixes syndrome on base of the parabolic dependency symptoms ( $Y = X^3$ ). The Designed system to formalizations signs for differential diagnostics metroendometritis, diffuse of the form endometriosis and fibromioma. The formalized history disease contained 38 signs.

The Quantitative signs, being half way between itself in parabolic dependency, have served the base for development of the differential diagnostic system to categorizations considered pathological conditions.

Use given diagnostic system is calculated for selection sick on undertaking optimum therapy, including computer software operated millimeter therapy. Clinical verification has shown that algorithm possesses high sensitivity (91,5%) and specificity ( 81,8%) that reflects his(its) differential - a diagnostic possibilities.

The Estimation to efficiency of the treatment with the help of software operated matrix millimeter therapy was conducted beside 60 womans with metroendometritis, complicated adnecstis on background base therapy. Herewith, two modes were used: 1) false millimeter therapy, when device was enclosed and installed matrix radiation, but without electromagnetic radiation (the mode placebo); 2) mode software operated influences

with the help of included hexahonal of the matrix.

In group sick got real millimeter therapy was noted full disappearance of the syndrome to pains beside 70 % sick after course treatment. The difference this statistical reliable ( $p < 0,001$ ).

Realistically more often met having weak and moderate pain in group sick cured with the help of real software operated matrix millimeter therapy.

After rate software operated millimeter of the action is noted reduction of the level

anxious situation of patient: realistically increased the share sick in low-level class (79%) anxious situation and realistically fell the share sick, having sparingly increased (16%) and high level (5%) anxious situation.

The dynamics reorganize internal structure of the rhythm heart is indicative of reduction level adrenergic mechanism and increase the contribution cholinergic mechanism of regulation (the table 2).

**Table 2** Indexes to information model of the microstructure rhythm heart

information parameters of model	Regime of millimeter therapy					Module of difference		
	D ate tial	R egime pl acebo	R e gime re al	P <sub>1</sub>	P <sub>2</sub>			
	%	%	%	- P <sub>3</sub>	P <sub>1</sub>	P <sub>1 - P<sub>2</sub></sub>	P <sub>2</sub>	P <sub>2 - P<sub>3</sub></sub>
Accelerate correction	4	2	10	2	8	8	6	6
Zero correction	96	93	65	3	2	2	1	3
Delay correction	0	5	25	5	0	2	5	2
S P <sub>1l</sub> -P <sub>1z</sub>				10	5	5	2	6
D(x <sub>i</sub> )				5	8,0%	2	1%	3
P				>	0,05	<	0,05	<

What follows from presented in table 2 data, pattern of microstructure rhythm heart at period small variability nearby interval was characterized by before treatment. Zero correction formed 96% all interval. Consequently, was noted sharply expressed a prevalence of the adrenergic mechanism regulation. When use placebo mode has not occurred reliable change the internal structure of the rhythm heart.

Only after course software operated matrix millimeter therapy noted reliable shifts microstructure rhythm heart. In particular, decreased the share zero correction before 65%, increased the share slowing correction before 25% and increased the share accelerating correction before 10%.

The Nature of the change parameter EEG, herewith, reflects the normalization an neurodynamic processes to brain activity,

directed on reinforcement of the reactions of the braking.

Concluding as a whole, follows to emphasize the system nature, rendered on sick with pathology feminine sexual spheres, influences software operated matrix millimeter therapy, used in mode biocontrol.

#### Conclusion:

1. The Formed system of the slicing parameter in the aggregate presenting codified to models, realizing effects revolving electromagnetic field, differing by hexagonal location of the radiations in leading matrix.

2. The designed chronodiagnostic algorithms for computer software-operated millimeter therapy, differing by biocyclical principle of control influence extremely high frequency radiation in hexagonal to matrix.

3. They Are Created structure of the models and algorithm of computer control intensity

influences, directed on optimization of the medical influence, differing differentiated by use hexagonal radiating matrixes, timed parameter to biological feedback;

4. The marketed algorithms of the analysis and processing to clinical information in the manner of automated module, directed on recognition metroendometritis, endometriosis and diffuse of the form fibromioma and differing way of the coding to information in the form of the parabolic dependency signs.

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### **DESIGN OF MECHATRONICAL UNIT WITH CAM ACTUATOR FOR ARTIFICIAL HEART VENTRICLE**

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Last years in the world the tendency of increase in quantity of operations on implantation of the mechanical devices supporting heart activity as change of donor organ is connected with many insoluble biological and social problems is observed and cannot provide all needs. Today completely to satisfy need for donor hearts it is not possible, therefore the problem in creation of autonomous implanted systems of auxiliary blood circulation and artificial heart is extremely actual.

In the decision of this problem it is possible to allocate two basic directions: constant replacement of natural body with an artificial limb completely replacing pump function of heart and capable long years to support blood circulation that is total artificial heart; temporary replacement of function for the period of treatment of the heart before recovery of its functional ability. Methods of the temporary heart assistance and replacements of its delivery function by the mechanical devices relate to the last direction incorporated by concept «auxiliary blood circulation».

By development of the mechatronical module of left ventricle assist device (LVAD) with executive mechanism of cam actuator type it is necessary to adhere to requirements of reliability of maintenance of a continuous flow in the system of blood circulation at given antipressure and a low trauma of blood, maintenance of stability of work at pulsing change of pressure and the charge on its input. It should guarantee full tightness of the working cavity of the pump in relation to the environment, have the minimal sizes and weight for implanted variants of application, a low level of pulsations and noise. Researches have shown, that this mechatronical module at the given characteristics is capable to satisfy the above described requirements.

As cam actuator was chosen triple mechanism with a target pusher. For replacement of a sliding friction with friction stagger and reduction of wear of a cam in the scheme of the mechanism the additional part – a roller is included. Mobility is local in this kinematical pair and does not change transfer functions of the mechanism. Given mechanism of the cam actuator is intended for transformation of linear motion of a cam to back and forth motion of the pusher. Thus in the executive mechanism of the given type, it is possible to realize transformation of movement under the complex law. One of the important advantages of the cam actuator is the opportunity of maintenance of the exact stops of the output. At the designing the given mechanism in structure of LVAD it is necessary to consider its heat-power characteristics, as at work of a drive a thermal emission is inevitable, but it does not reach so high values to lead to the heating of the body because motor works in a mode without reverse. This basic advantage of the offered design with a cam in comparison with earlier drive of the LVAD on the basis of roller-screw mechanism was developed in Vladimir State University.

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