

Diagnostic and treatment equipment for treatment with MRT with the function of synchronization with the biorhythms of the patient's EMR

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Abstract

The proposed medical diagnostic complex, which includes apparatus for microwave resonance therapy (MRT) with function diagnostics of functional state the patient, based on the registration the resonance frequencies molecular vibrations of the body's structures and their abnormalities combined with features electropuncture diagnosis and diagnosis by analyzing kardio-signals. This allows you to get objective information about the state of the body and significantly increase the effectiveness of treatment.

1. Introduction

Developing hardware for microwave resonance therapy (MRT) is performed in the direction of maximum optimization physical therapy microwave radiation of scrolling high frequency (SHF). One of these areas of development is the creation multifunctional devices or medical diagnostic complex (MDC), which combine medical microwave - radiation with other methods and different methods of diagnosis, which is important step in the introduction of millimeter (MM) therapy in medical practice. Use MDC will enhance the efficiency of treatment, particularly when serious diseases. Doctor, examining a patient using the proposed MDC will pick up individually optimal frequency, power and irradiation mode, monitor by using the PC reaction to radiation, adjusting the treatment. Especially important in MDC is the use biofeedback, which allow for adjustment of the parameters based on the body in response to his response.

2. Main Part

We know several options for treatment and diagnostic facilities. The first such MDC was developed in Russia - MDC "Yalbot - Yarmarok," which includes diagnostic part ("Yalbot") and therapeutic ("Yarmarok"). Change of rheological properties of blood is selected as diagnostic parameters. Actually "diagnosis" comes to action on

the blood of several fixed frequencies and to obtain maximum response, which is fixed on the blood gets the necessary medical frequency. It is at this frequency apparatus "Yarmarok" being treated patients [1].

MDC, which consisted of devices for type "RAY-EHF" and a special device electropuncture diagnostics "Ray EHF-D" (RAS of Friazino, Russia) [1], which allows to obtain objective information on the condition the body and identify organs and system pathology, based on changes in electrical parameters (complex conductivity anode-cathode conductivity and temperature gradient), measured at constant and alternating current.

Another MDC based on the discovery effect arising from the interaction of intense low-MM-waves from the human body [2]. Diagnosis (was named authors resonant wave) is based on registration resonant frequencies of molecular vibrations of structures of the body in health and disease. At the resonant frequency of the various organs of the body normally close to the resonant frequency of water (50.3, 51.8, 65 GHz). Deviations resonance spectra taken from the affected systems, organs or tissues from normal spectra (taken with water) indicates the presence of disease. MRT therapy is conducted at one of the resonant frequencies (50.3, 51.8, 65 GHz), and during treatment using the monitor regularly removed resonant response of the organism to the action of MM-waves. This allows you to control the treatment process by comparing the current resonance curves for each patient with the standard (normal).

In the NGO "Forum" (RAS) developed by MDC "Sharm" in which search points acupuncture, diagnosis by riodorac and by Folyu allow for targeted, controlled correction of the body by microwave irradiation [3].

Corporeal computer diagnostics by the method riodorac and akabane allows to perform diagnostic medical adapter "Adma", that functionality and software connected to the apparatus "Electronics

EHF-101" in computer-functional diagnostics, proposed by "DDM-ELMED" (Kyiv, Ukraine) [3].

MDC EHF-therapy "Midis-710-4" (company "Midis", Moscow, Russia) has built-in search BAP and diagnostic system akabane. MDC EHF-therapy "Stela 2"(Tomsk, Russia) has built-in diagnostics Folyu allowing the selection of individual treatment to assess the frequency and quality of the procedure [4].

In the Research Center for Quantum Medicine Hospital Sitko MRT (Donetsk, Ukraine) designed by MDC "Remegh" that provides simultaneous monitoring and fixing the database electrodermal resistance (EDR) of 24 biologically active points (BAP) twelve paired meridians. Operational EDR change in response to changing conditions and relative simplicity made it the basis of measurements electrical characteristics of vessels and individual organs. MDC "Remegh" provides both quantitative and qualitative assessment of the patient [5].

In the limited liability "Fiztegh" was developed series of devices such as "Gheba" [6], which, together with the staff of EHF-therapy "Amfit-0, 2/10-01", form a complex that allows for rapid diagnosis of the patient and determine the correct choice of treatments directly during MRT therapy. How effective was the chosen method of electro-diagnosis. Diagnosis is carried out by measuring electrodermal impedance dependent capacitance of the skin. Measurements made at 0.1 sec. This new technical solution method of electro-diagnosis in a significant reduction in the amplitude of the test signal in comparison with analogues - device "Ray" or devices that work on the method by Folyu. In this device the authors to improve the reliability of evidence moved from measurements at constant current to alternating current measurements and reduced the amplitude of current to 2.5 mA.

Thus, in most cases, the MDC for the diagnosis of biological objects selected electro-diagnostic method in its various versions.

The work associated with the attempt to use other methods of diagnosis and the treatment by MRT therapy. So to assess the overall functional state of the organism can apply new methodological sensitive screening techniques. The use of diagnostic systems analysis electro cardio signals - convenient model for the fullness information about the functional state of the organism. Correct and adequate bio-cybernetic approach to the analysis of electro cardio signals hypothalamic to determine the level of regulation not only autonomic, endocrine but also areas; biorhythmic assess brain activity, which by definition must be linked to the rhythmic activity of the heart, without which it is impossible systematic organization [7]. Fluctuations in the length of intervals between cardiac caused by neurohumoral influences adequately reflect the total

(current) functional state of the organism and can be used for developing tactics and forecasting changes in the functional status of patients. In addition, this method allows to quantify the level of adaptation and functional reserves of the body, to assess the contribution of the central and autonomic regulation of the cardiovascular system to characterize the sympathetic-parasympathetic balance of autonomic nervous system (ANS).

Main idea of the method used is that any autonomic functions, whether rhythmic activity of the heart, a change in temperature, fluctuations in blood sugar, etc., contain full information on the occurrence of these processes at all levels of management, and most importantly - they will be selected from function of the whole organism [7].

In this connection, it is advisable to use this diagnostic technique in the treatment using MRT therapy.

The Centre correction of human functional state Tauride National University. Vernadsky was conducted trial of EMR UHF correction of functional state students [8]. To investigate the functional state of the human body used computer complex "Omega M" ("Dynamics", St. Petersburg), which is used in the clinic for screening diagnosis of internal diseases (acute pneumonia, peptic ulcer, acute bronchitis, coronary heart disease heart disease, hypertension, underweight, etc.) and evaluation the effectiveness of preventive measures [9]. The use of hardware and software showed its high diagnostic and cost-effectiveness in clinical practice. Effects of microwave electromagnetic radiation was carried out using 7-channel generator "Ramed Expert-04" (production research laboratory "Ramed" Dnipropetrovsk).

Results of the study showed high efficiency of microwave electromagnetic radiation correction of functional state of the human body and the feasibility of using cardiointervalographic methods for the diagnosis of patients.

In developed MDC (Figure 1) device for MRT-therapy diagnostic feature of the functional state of the patient, based on the registration of the resonance frequencies of molecular vibrations of the body's structures and their deviation from the norm, combined with the functions of electro-diagnosis and diagnosis by analyzing electro cardio signals. This allows you to get objective information about the state of the body and identify organs and systems of pathology, based on changes in electrical parameters (resonance frequencies of molecular vibrations of the complex conductivity anode-cathode conduction) and indicators of heart rate variability (HRV).

The device operates as follows [10]:

Signal generator 1 millimeter-wave (MMW) range of attenuators 4 undergoes high-frequency pulse

width modulation. The modulated signal passes through the attenuator 5, which weakened to a level of non-thermal power, and a main highway directional coupler 6 enters the attenuator 9, where the signal is modulated rectangular low frequency. If the attenuator 9 closes it fully reflects the input signal. Open 9 sends a signal attenuator MMW-range aimed at the emitter 11. Reflected from the irradiated skin 12 patient signal is sent transducer 11, which has the opposite properties, and through the open attenuator comes in 9 additional path directional coupler 6. At the same time directed transducer 11 receives proper electromagnetic radiation in patients

MMW band, which also comes in extra path directional coupler, where the detector 7. As a result, detecting packet modulated irradiated and reflected signals at the output of the detector 7 is created by a mixture of high-frequency vibration modulation of broadband noise, the patient's own field and high-frequency noise. Block 2 microcontroller measured ratio of the reflected signal from the patient's skin to the level of the signal emitted MM range. Block 2 microcontroller processes the measurement results in scanning mode frequency and level of MMW and determines the frequency of the patient's therapeutic treatment.

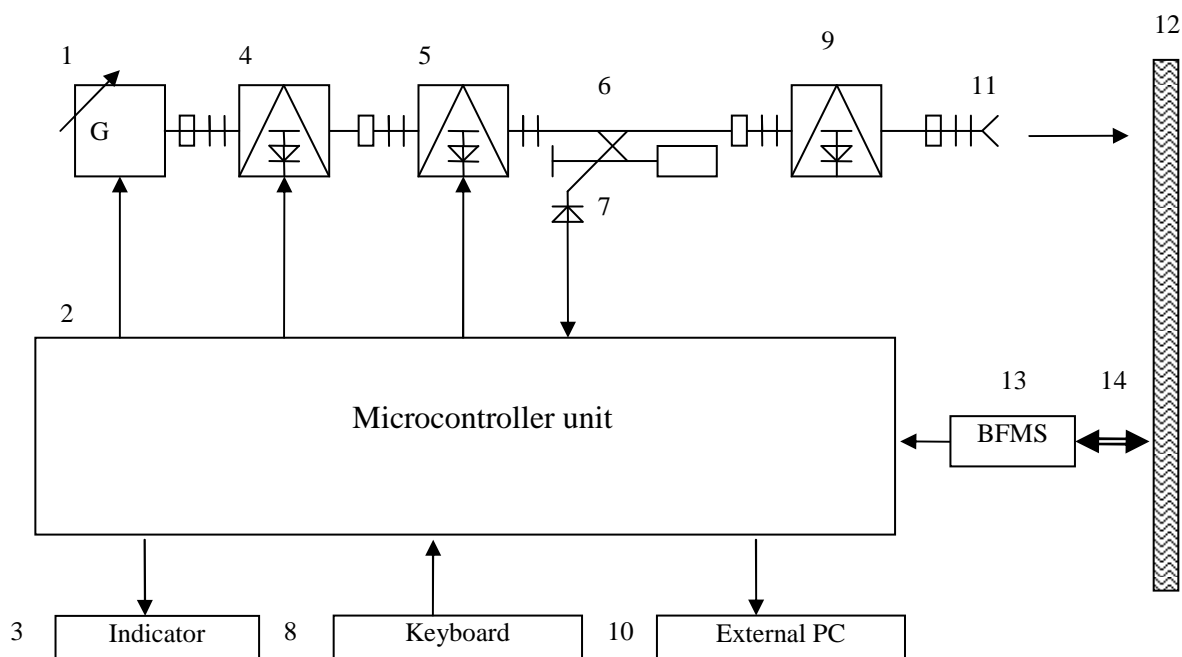


Fig. 1. Block diagram of apparatus for MRT of the synchronization electromagnetic radiation with biorhythms patient's

Block 2 microcontroller registers the electro cardio signals coming from cardio electrode and current value between the reference electrode and the measuring electrode electroacupuncture through the block formation of measuring signals (BFMS) 13. BFMS amplifies and changes the level of measurement signals for subsequent analog-to-digital conversion in the microcontroller unit 2. BFMS also creates a healing electroacupuncture signals when combined MRT-therapy and electro-therapy.

Electrodes cardiointervalographic or electroacupuncture electrodes 14 are connected to (BFMS) 13 are designed for continuous measurement electro cardio signals (signals electroacupuncture).

Device for MRT-therapy has keyboard 8 to control the unit in manual mode and display 9 which

shows the current state of operation of the device. In apparatus for MRT therapy connected personal computer (PC) 10, using the appropriate software controls the machine, makes reading and processing of measurement data electro cardio signals and electro signals determines the method of treatment. Thus MDC consists of apparatus for MRT therapy, external PC and software.

In the mode of treatment unit can perform synchronization cycles of therapeutic radiation MMW cycle redistribution of blood flow in a patient-software controlled manner using the cardiointervalographic on the analysis between pulse interval of patient and provides a change of pulse duration in time with the blows of pulse.

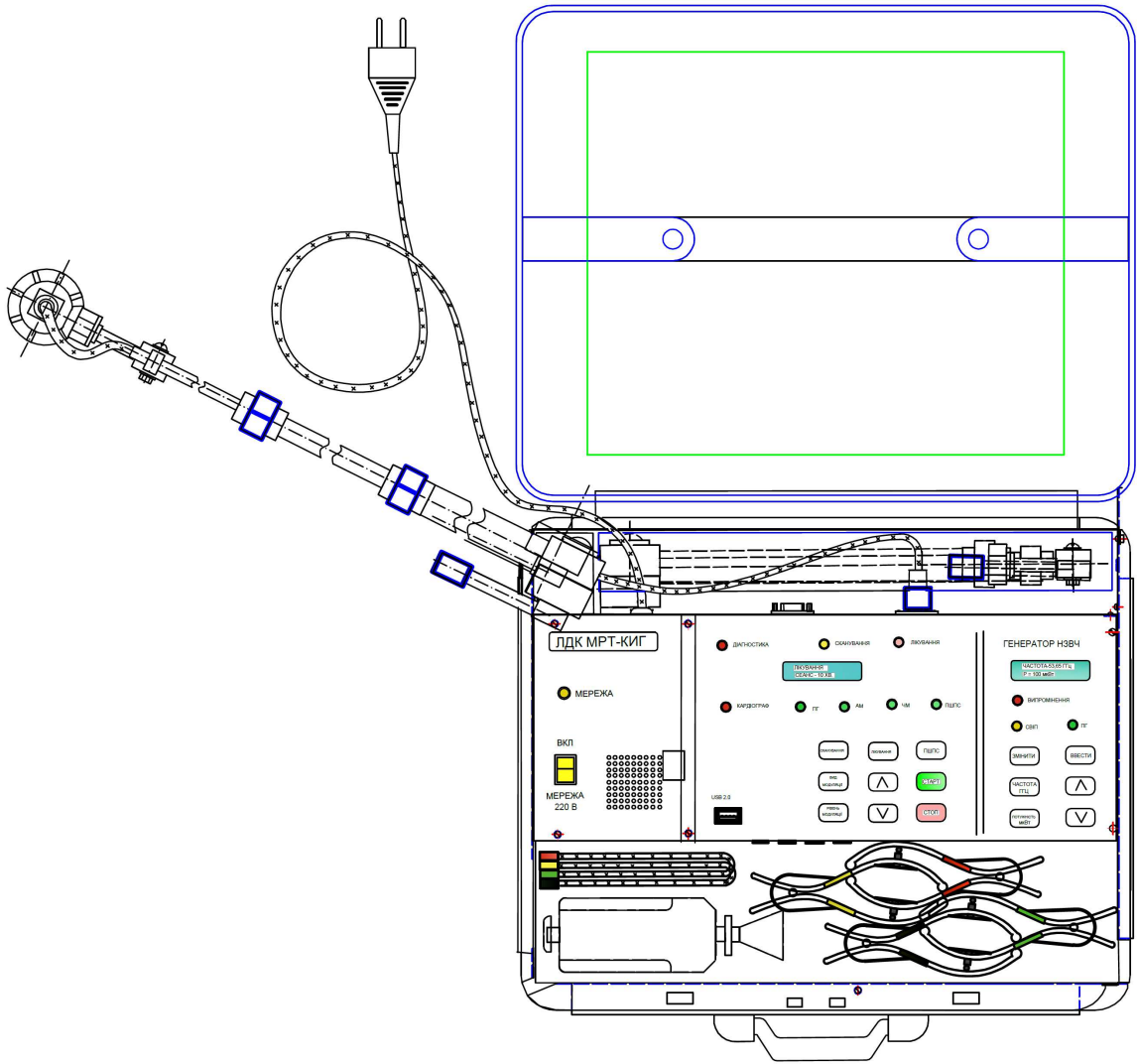


Fig. 2. Original appearance diagnostic and treatment equipment of the device MRT

In diagnostic mode, because the cardiovascular system is indicator of adaptive reactions, changing heart rate recording apparatus kardio-signal, conducts pre-processing the received signals and then transmits the results of processing the external PC. Further analysis of the data processed by mathematical analysis of heart rate to assess the status and degree of voltage regulation mechanisms.

After the generator is as follows. The amplitude of the irradiating radio frequency ω , which is followed by a low frequency Q, in the case of open and closed p-i-n-attenuator 4 can be written as:

$$U_1(t) = K_1^2 K_2^2 S P_0 \frac{\text{sign} \cos(\omega t + \varphi) + 1}{2} + U_n(t) \quad (1)$$

$$U_2(t) = K_1^2 K_2^2 S \Gamma^2 P_0 \frac{\text{sign} \cos(\omega t + \varphi) + 1}{2} + U_n(t) \quad (2)$$

Where K_1 - transfer coefficient attenuator 2; K_2 - transfer coefficient of the directional coupler 3; S - slope of the conversion of the detector 6; Γ - reflectance BAP patient's skin 8; P_0 - signal power generator unit managed millimeter wave 1; $U_n(t)$ - voltage noise band detector 6.

Microprocessor unit 7 are treated with the measurement data in the "Scan" on the frequency and power mm - irradiation. This starting with the lowest frequency and minimum power microprocessor unit 7 is adjustable to the minimum control input of the generator unit 1 mm - range area and p-i-n attenuator 2.

Next, the microprocessor unit 7 generates a series of pulses of high modulating ω (output C) and low frequency Q (output E) and serves to control inputs attenuators 2 and 4, and then stores the data proportional to the amplitude detection of the high-frequency pulses, conducts data processing, averaging and allocates them a constant component for the two heads:

$$U_3 = \frac{U_1 + U_2}{2} - U_n(t) = \frac{K_1^2 K_2^2 S (1 + \Gamma^2) P_0}{2} \quad (3)$$

$$U_4 = \frac{U_1 - U_2}{2} - U_n(t) = \frac{K_1^2 K_2^2 S (1 - \Gamma^2) P_0}{2} \quad (4)$$

Power P_1 exposure to the patient:

$$P_1 = K_1^2 K_2^2 P_0 \quad (5)$$

or, taking into account the gain attenuator 2, we have:

$$P_1 = \frac{2U_4}{S(1+\Gamma^2)} \quad (6)$$

Power, which is absorbed by the patient, determined by its reflection coefficient Γ :

$$P_2 = (1-\Gamma^2)P_1 = \frac{2U_4}{S} \left(\frac{1-\Gamma^2}{1+\Gamma^2} \right) \quad (7)$$

From (7) it is clear that the absorbed power of the independent power of the generator P_0 mm - wave 1, as determined by the factor $\frac{(1-\Gamma^2)}{(1+\Gamma^2)}$.

Therefore, constant power generator mm - range in the process of restructuring its frequencies do not affect the level of absorptive capacity. The latter depends on the reflection coefficient, which is the resonant absorption tends to zero, and the ratio:

$$\eta = \frac{1-\Gamma^2}{1+\Gamma^2} 100 [\%] \quad (8)$$

approaching 100%, indicating complete absorption of irradiated electromagnetic energy. η fuller figure characterizes the absorption ability vegetation BAP than the reflection coefficient Γ . Thus, with increasing monotonically reflection coefficient Γ , and the index η drastically reduced due to the simultaneous reduction of the numerator and the denominator increases.

Microprocessor unit 7 are calculated ratio $\frac{U_4}{U_3}$, which is the factor $\frac{(1-\Gamma^2)}{(1+\Gamma^2)}$ and an indicator of η .

Next figure η stored in the memory microcontroller microprocessor unit 7 varies the frequency and capacity mm - exposure by changing the control current and voltage on the generator 1 mm - radiation and changes (increase in) the amplitude of the control pulse high frequency ω on the p-i-n attenuator 2. Then the sequence is repeated. Thus, after scanning the frequency and level in the memory of the microcontroller is an array of values of the parameters η . From it, select the value that indicates the maximum absorption of the irradiated with electromagnetic energy.

This allows you to quickly adjust to the therapeutic (resonant) frequency of the patient with a maximum measure of η . In this case, η , as follows from (8), does not depend on the power of P_0 the generator 1, nor of the instability parameter elements. Absorption rate is controlled in the range of 0 - 100% and calibrated for reflection from the water.

The program calculated indices of heart rate variability (HRV):

Mo (Moda), AMo (the amplitude of moda), MxDMn (variation scale).

According to the variational pulsometry calculated index stress regulatory systems and the stress index.

Is = AMo/2Mo * MxDMn.

Calculated as the statistical properties of the dynamic range cardio and performance of spectral analysis.

Statistical properties of dynamic cardio series include: SDNN, RMSSD, pNN50, CV.

Indicators of spectral analysis:

- TP (ms²) - index of total power spectrum;
- HF (ms²) - power waves of high frequency;
- LF (ms²) - power low frequency waves;
- VLF (ms²) - power waves very low frequency;
- ULF (ms²) - performance ultra low frequency waves;
- HF (%) - the relative contribution of high-frequency waves;
- LF (%) - the relative contribution of low frequency waves;
- VLF (%) - the relative contribution of very low frequency waves;
- ULF (%) - the relative contribution of ultra low frequency waves.

The essence of the variational pulsometry is to study of the distribution of cardio as random variables. It is based variational curve (curve distribution cardio - histogram) and identifies its main characteristics.

On the basis of the performance of HRV is defined procedures and duration of treatment of the patient.

When using electro-conducting diagnostic scatter diagnosis of the functional state of specific sites of nerve fibers and receptors that determine violations of control and regulation (disease state) or organ tissue. To do this, the body of the patient for specific diseases selected set of acupuncture points, using training materials and compliance with the relevant software products MDS.

Choosing a full set of points which are responsible for the functional status of the patient, conduct a consistent review of the functional state of these points by comparing the values of forward and reverse currents through each point. Equal currents characterizing the normal functioning of the control nerve, and this point can be considered "healthy".

In the case of inequality characterizes the current examinee point violation control and regulation of the patient's body and is subject to medical exposure. The difference between the forward and reverse currents can be seen on stage organ disease: the greater the asymmetry currents, the greater the stage of the disease. In terms of asymmetry it perform therapeutic effect. Therapeutic effects can be carried out by MM radiation exposure, and by electro influence. Both methods can be combined. When the equality of currents recorded by the end of treatment impact point.

3. Conclusion

Thus MDS in diagnostic mode:

- determine the frequency of the patient's therapeutic treatment;
- kardio-signal records, conducting mathematical processing of the signal in terms of HRV;
- data on HRV parameters determined by the functional state of the patient, the diagnosis of disease and procedure and duration of treatment;
- provide electro diagnosis of the functional state of the patient, using a variety of techniques.

In the mode of treatment by the method of MRT-therapy:

- provides exposure to low intensity electromagnetic radiation of millimeter (mm) range on the patient's medical therapeutic frequency of the defined treatment program;
- combining treatment with MRT-therapy and electroacupuncture acts;
- synchronizes cycles of therapeutic irradiation MMW cycle redistribution of blood flow from the patient to the analysis between pulse interval patient and provides a change of pulse duration in time with the blows of pulse.

Use the device causes an individual approach to the treatment of each patient, as well as providing an objective assessment of therapeutic effect, increases the accuracy of the frequency therapeutic patient and increases the effectiveness of treatment (reduction of treatment, eliminating adverse reactions).

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