DISEASES OF INTERNAL ORGANS SUCH AS THE VALUE DEFINED BY USING MEASUREMENTS SET OF PARAMETERS OF THE HEART RATE

Viacheslav Uspenskiy

Summary: Mapping a set of values of the basic parameters of cardiocycles in the serial mode register has identified six typical combinations of these parameters. Encoding these combinations for 600 cardiocycles allowed us to obtain three-membered codogramm-identifiers of the diseases of the internal organs. The rationale of the method is obtained by analyzing codogramm this type of patients, diagnosed according to the International classification of diseases (ICD-10). Practical testing for diagnosis, for 8 years showed their high efficiency for more than 30 diseases.

Key words: parameters of heart rate, measurement, dynamics, coding, codogramm identifiers, diagnosis.

1. Introduction.

The results of the study of biophysical properties of electrocardiosignals attest that they possess the properties of the signals [1, 2], and the heart properties information on [1, 3]. In particular, a comparison of the values of the main parameters of the heart rate in the sequential dynamics of registration of the electro-cardiogram revealed their probabilistic variability, which is characteristic of the impulse nature of technical communication systems. It is also known that the heart generates impulses of electric, magnetic and hydrodynamic of nature, which reach every cell of the human body. Received codogramm-identifiers more than 30 diseases of internal organs and the developed technology information analysis of the heart rate for diagnosis of diseases of internal organs [1, 3].

2. The object and methods.

The purpose of the study is to test the reference diagnostic codogramms, the most common and life-threatening human diseases.

The object of the study was 3743 patient random sample of different age and sex, with disease of the internal organs, the diagnosis of which is made of modern General-the accepted methods of examination in accordance with ICD-10. The study was conducted in the conditions of practical medical activities for 8 years.

Research methodology: the original data were the values of the main parameters of QRS-complex cardiocycles, as determined by the results of amplitude measurements accurate to 5mkV, the time interval between cardio embolism with accuracy to 0.25 MS and "phase angle" α = arctg – the ratio of the amplitude of cardio embolic to the subsequent time interval (figure 1.)

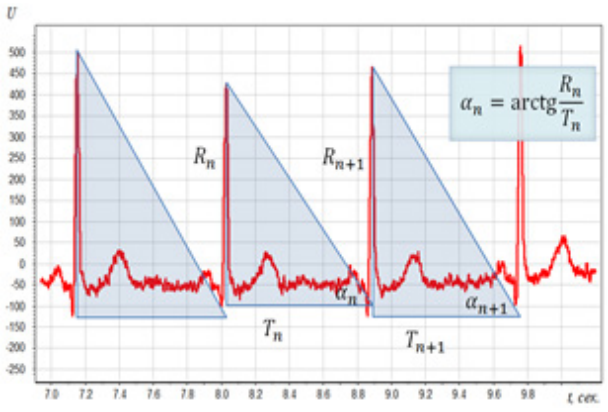

Figure 1. Measurement parameters consistent cardiocycles: amplitude Rn, Rn+1, the intervals Tn, Tn+1 and "phase angle" of αn, αn+1

Set 600 cardiocycles necessary for the information of the analysis carried out in the mode of continuous recording of electrocardiogram with the use of specially designed for electrocardiograph of ECG-registration available to information analysis [3,4].

Coding in serial mode symbols A, B, C, D, E, F variants of the ratio of the amplitudes of QRS-complex, the time intervals between them and "phase angles" relative to each other for 600 cardiocycles (table 1).

The next stage – structuring codogramm obtained for the three combinations of symbols method of transferring one character at a time "window" using a three-symbol coding from the beginning to the end, electrocardiogram (ECG) including 600 cardiocycles.

The final stage is a comparison of structured codogramm patient with a set of specific codogramm-IDs-diseases of internal organs, which do not depend on gender and age. The diagnosis of

the disease was recognized as established in the case of 100% availability in a structured codogramm patient three-letter combinations included in codogramm-ID of the disease [3].

Table 1

The correlation of the dynamics of the amplitude of the Rn, the time interval Tn, arctg angle α and their symbols

The parameters of QRS-complex	Symbols					
	A	B	C	D	E	F
R_n,	+*	–*	+	–	+	–
T_n,	+	–	–	+	+	–
arctg α_n	+	–	+	–	–	+

* Increase (+) or decrease (-) of the parameter QRS-complex subsequent electro cardio in relation to the same parameter of the previous electro cardio.

Sensitivity of diagnostic code standards were determined for each disease using the formula:

Se = PD / (*PD+ND*), where

Se (sensitivity) – sensitivity of diagnostic code reference disease;

PD (present diagnose) is number of patients with a true diagnosis;

ND (no diagnose) – the number of patients with false negative result in diagnostics with a scan code reference from a number of patients with a true diagnosis.

Specificity reference code combinations determined by the formula:

Sp = H / (*H+NH*), where

Sp (specificity) – specificity of the diagnostic standard of the disease;

NH (no healthy) – the number of cases of false-positive diagnosis of the disease in the group of healthy people;

H (healthy) – healthy people with a true absence of disease.

The specificity of each diagnostic code of the pattern was determined in the group of 87 healthy people.

Results.

Practical testing codogramms diagnosis by identifying diseases of internal organs showed high specificity and sensitivity (more than 90% of confirmed diagnoses) for more than 30 diseases.

Table 2 shows the results of determination of sensitivity and specificity codogramm-identifiers the following diseases of internal organs: Prostatic adenoma (PRA), Adnexitis (ADXT), Anemia (A),Thyroiditis autoimmune (TA), Bronchitis (BHT), Dystonia neurocirculatore (DNC), Gastritis (gastroduodenitis) hyperacidities (GHPR), Gastritis (gastroduodenitis) hypo-anaciditas (GHPO), Hepatitis (HT), Hepatosis (HPS), Arterial hypertension (AHT), Gallbladder dyskinesia (GBD), Cholelithiasis (CHLT) Myocardial ischemia (CRDH), Ovarian cystoma (OVCT), Colitis (CLT), Mastopathy (MPT), Uterine fibroma (Myoma) (UTM), Urolithiasis (URLT), Gastric polypus (polyposis) (GP), Gallbladder polypus (polyposis) (GBLP), Colon polypus (polyposis) (CLP), Uterine polypus (polyposis) (UTP), Prostatitis (PRT), Diabetes (DBT), Diffuse-nodular Struma (NSTR), Cholecystitis (CHT), Uterine endometriosis (UTEM), Gastric peptic ulcer (GPU), Duodenal peptic ulcer (DPU), Oncopathology (Cr).

Discussion.

The results of the study indicate that diseases of internal organs can be identified by codogramm-ID obtained by encoding the dynamics of the parameters of the cardiac cycle. The algorithm of the process of obtaining codogramm-IDs-diseases of internal organs can be considered as a metrological model of information analysis of electric cardiosignals.

Conclusion.

Approbation of technologies of information analysis and reference codogramm identifying diseases of the internal organs, showed high specificity (more than 90% of confirmed disease) for more than 30 diseases. Diseases of internal organs can be represented by a set of parameters cardiocycles, the dynamics of which use the coding takes the form codogramm identifying the disease. This measurement model can be a new direction in obtaining codogramm identifiers of diseases of internal organs.

Table 2

Sensitivity (Se) and specificity (Sp) in % codogramm-identifiers of diseases of internal organs

№	Disease	* PD	** ND	*** NH	Se	Sp
1	PRA	67	7	-	90,5	100
2	ADXT	102	13	3	88,6	96,7
3	A	53	4	2	92,9	97,8
4	TA	47	2	1	95,7	98,9
5	BHT	124	15	2	93,2	97,8
6	DNC	217	8	4	96,4	95,6
7	GHPR	154	7	2	95,7	97,8
8	GHPO	166	12	-	93,3	100
9	HT	68	6	1	91,8	98,9
10	HPS	205	4	3	98,1	96,7
11	AHT	252	19	2	92,9	97,8
12	GBD	242	4	2	98,3	97,8
13	CHLT	73	2	-	97,3	100
14	CRDH	127	6	3	95,3	96,7
15	OVCT	54	4	2	93,1	97,8
16	CLT	118	6	3	95,2	96,7
17	MPT	214	16	-	93,04	100
18	UTM	78	7	-	91,8	100
19	URLT	202	18	2	91,8	97,8
20	GP	48	5	1	90,5	98,9
21	GBLP	27	3	2	90,0	97,8
22	CLP	83	3	3	96,5	96,7
23	UTP	46	7	1	86,8	98,9
24	PRT	213	6	4	97,3	95,6
25	DBT	132	12	-	91,7	100
26	NSTR	106	13	1	89,1	98,9
27	CHT	96	8	3	92,3	96,7
28	UTEM	135	4	2	97,1	97,8
29	GPU	56	5	-	91,8	100
30	DPU	110	12	-	90,2	100
31	Cr	128	16	13	88,9	87

* Number of patients
** false-negative diagnosis
*** false positive diagnosis

References.

[1] **V. Uspenskiy** "The Heart Iinformational Function. Theory and Practice of Diagnosing the Internal Diseases on the Basis of an Information Analysis of Electrocardiosignals", Economics and Information, Moscow, 2008.

[2] **V. Uspenskiy** "Information Function of the Heart. A Measurement Model", Measurement, Proceedings of the 8-th International Conference, Slovakia, pp. 383-386, 2011.

[3] **V. Uspenskiy** "The Heart Iinformational Function. Theory and Practice of Diagnosing the Internal Diseases on the Basis of an Information Analysis of Electrocardiosignals (2nd revised edition)". /Edited corresponding member. RAS Professor Simonenko V. B. - Planeta, Moscow, 2016.

[4] **V. Uspenskiy.** Information Function of the Heart. Biophysical substantiation of technical requirements for electrocardioblock registration and measurement of electrocardiosignals parameters acceptable for information analysis to diagnose internal diseases. Joint International IMEKO TC1+ TC7+ TC13 Symposium August 31st− September 2nd, 2011, Jena, Germany urn: nbn: de: gbv: ilm1-2011imeko: 2, urn: nbn: de: gbv: ilm1-2011imeko-024:6

Information about the Author.

Viacheslav Uspenskiy The Central Military Clinical Hospital named after P.V. Mandryka, 127051, Moscow, Russia, Lichov pereulok, Dom 8, kv. 11, Tel. 8(495)6997935

e-mail: medddik@mm.st