

## **INFORMATION VALUE OF PARAMETERS FOR HEART RHYTHM ANALYSIS UNDER CONDITIONS OF ANEMIC HYPOXIA**

**V. Mileva, M. Georgieva, Zh. Georgieva\***

*Department of Physiology, \*Department of Propedeutics of Internal Diseases, Varna*

Functional state of cardio-vascular system (CVS) presents an universal indicator of adaptation-adjustment reactions of the organism under conditions of health, disease and of transition between them. Both operative and strategic CVS management is realized by the vegetative and central nervous system and the system of hypophys-adrenal glands forming an united neurohormonal complex. Dysbalance in this complex plays an essential role in the pathogenesis of various diseases affecting directly or indirectly CVS. Dynamics of heart rhythm (HR) is a specific reaction of CVS changes, as mean HR frequency reflects the final result from numerous influences on CVS and organisms as a whole. In HR structure and parameters originating from it a latent information is coded dealing with dynamic interaction between single management levels and the state and degree of tension in regulatory mechanisms. Analysis of HR parameters enables the evaluation of the state of vegetative balance in the organism and of homeo- and heterostasis balance, i.e. of the adaptation of the organism under physiological and pathological changes related to its inner medium or to influences by external factors.

A total of 72 females with average age of 32,5 years with chronic posthemorrhagic iron-deficient anemia (IDA) and mean duration of disease of  $3,8 \pm 2,1$  years are studied. IDA is considered a model of anemic hypoxia. Patients are divided into 3 groups: 1<sup>st</sup> - with IDA of light degree (Hb -  $97,49 \pm 1,37$  g/l and serum iron -  $9,57 \pm 1,83$   $\mu\text{mol/l}$ ); 2<sup>nd</sup> - with IDA of intermediate severe degree (Hb -  $86,37 \pm 1,05$  g/l and serum iron -  $7,74 \pm 2,33$   $\mu\text{mol/l}$ ), and 3<sup>rd</sup> - with IDA of severe degree (Hb -  $67,27 \pm 1,32$  g/l and serum iron -  $5,01 \pm 1,42$   $\mu\text{mol/l}$ ). HR parameters are followed-up at rest and after physical loading (a working test consisting of 20 squattings per 40 sec). HR analysis is ensured by appropriate hard and soft-ware. Indexes in the three directions are estimated. Our results indicate: 1. Changes of parameters in the three directions at rest and after physical loading (table 1). 2. Dependence between the degree of anemia and grad-

uality at the levels of regulation and interaction with other regulatory links. 3. An increasing of the process of "centralization" in HR management in the course of advancing anemia and involvement in an management activity of higherly positioned central-cerebral structures. 4. A state of asthenization of regulatory mechanisms in cases with severe IDA after physical loading (changes of  $M_0$ ,  $AM_0$  and  $d R-R$ ).

Table 1

	I gr.		II gr.		III gr.	
	1	2	1	2	1	2
$\bar{X}$	885,4	706,3 <sup>XX</sup>	821,6	758,3 <sup>X</sup>	621,0 <sup>XX</sup>	722,3 <sup>XX</sup>
SD	71,2	85,9 <sup>X</sup>	69,9	170,2 <sup>XX</sup>	42,5 <sup>XX</sup>	98,3 <sup>XX</sup>
$M_0$	882,1	712,1 <sup>XX</sup>	838,7 <sup>X</sup>	822,2	631,7 <sup>XX</sup>	772,3 <sup>XX</sup>
$AM_0$	9,45	11,12 <sup>X</sup>	9,48	4,69 <sup>X</sup>	20,04 <sup>XX</sup>	7,93 <sup>XX</sup>
$\Delta R-R$	545,9	610,0 <sup>X</sup>	410,0 <sup>X</sup>	455,0 <sup>XX</sup>	320,0 <sup>XX</sup>	513,9 <sup>XX</sup>
TI	9,80	18,66 <sup>XX</sup>	14,20 <sup>X</sup>	4,84 <sup>XX</sup>	49,60 <sup>XX</sup>	10,23 <sup>XX</sup>
RVI	2,15	2,82	2,93	1,86 <sup>X</sup>	4,95 <sup>XX</sup>	2,58 <sup>X</sup>
VBI	297,27	78,81 <sup>XX</sup>	416,75 <sup>XX</sup>	18,34 <sup>XX</sup>	2385,7 <sup>XX</sup>	68,47 <sup>XX</sup>
HI	7,63	18,19 <sup>XX</sup>	16,15 <sup>XX</sup>	33,50 <sup>XX</sup>	74,78 <sup>XX</sup>	10,45 <sup>XX</sup>
$P_t$	16,76	27,80 <sup>XX</sup>	30,40 <sup>XX</sup>	30,40	23,02 <sup>X</sup>	31,25 <sup>X</sup>
$P_{bp}$	25,57	21,64 <sup>X</sup>	25,10	17,67 <sup>X</sup>	17,50 <sup>XX</sup>	22,12
$P_r$	38,07	27,42 <sup>XX</sup>	27,77 <sup>X</sup>	29,69	35,11 <sup>X</sup>	23,08 <sup>X</sup>
CI	0,89	1,85 <sup>XX</sup>	1,05	1,73 <sup>X</sup>	1,15	2,39 <sup>XX</sup>
$AS_{ubcI}$	0,65	1,80 <sup>XX</sup>	1,21 <sup>X</sup>	1,72	1,31 <sup>X</sup>	1,46
AI	0,69	0,80	0,63	0,63	0,49 <sup>X</sup>	1,00 <sup>X</sup>

1 - at rest

\*  $p < 0,05$ 

2 - after physical loading

\*\*  $p < 0,01$ 

We conclude that:

1. Changes of HR parameters and their analysis enable an non-invasive investigation and evaluation of the state of regulatory system in the organism and of the "price" paid for adaptation towards unfavourable conditions. 2. Comparative analysis of HR parameters informs about the vegetative security of the organism under conditions of anemic hypoxia. 3. Centralization of processes and disconcertance in some of them in severe IDA allows the determination of new therapeutic approaches.