DOI: 10.26717/BJSTR.2018.06.001309
Romanchuk AP. Biomed J Sci & Tech Res

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574-1241

Opinion Open Access

Indications of the Level Individual Cardiovascular and Respiratory Homeostasis Using Continuous Spiroarteriocardiorhythmography

Noskin LA[1], Rubinsky AV[2] and Romanchuk AP*[3]

[1]*Petersburg nuclear physics institute named by BP Konstantinov of National Research Centre, Kurchatov Institute, Russia*

[2]*Federal State Budgetary Educational Institution of Higher Education, Academician IP Pavlov First St. Petersburg State Medical University of the Ministry of Healthcare of Russian Federation, Russia*

[3]*International Humanitarian University, Odesa, Ukraine*

Received: June 23, 2018; **Published:** June 27, 2018

***Corresponding author:** Romanchuk AP, International Humanitarian University, Odesa, Ukraine

Opinion

To calculate the individual (personalized) level of cardiovascular and respiratory synchronization, the method of continuous spiroarteriocardiorhythmography in dynamic is suggest, the technique is certified and licensed in the Russian Federation (№29/03020703/5869-04, №7569782). The equipment ability to summarize all values of the shock volume per minute allows measuring the Cardiac output (CO). Jointly conducted ultrasonic spirometry in the dynamics record the volume and frequency of each inhalation/exhalation is evaluated respiratory minute volume (RMV). The ratio CO/RMV is an objective indicator of measurement cardiovascular and respiratory synchronization. At present, the Robinson index or rate pressure product (RPP) (RPP= Heart Rate (HR) * Systolic Blood Pressure) is used as the integral index of functional response of blood circulation. The experimental group of volunteers (63 people, 21 men and 42 women, and the average age of 19±2,3) allowed to differentiate the three groups, because we found a pronounced individual variability of RPP, which statistical significant differences was by functional stress at rest. In (Table 1) is shown the average performance of the CO, the RMV, the ratio CO/RMV and their variability for each group.

It should be noted statistical significant differences values RPP in the comparison groups, the indicators of the CO, RMV and the ratio CO/RMV are different little. This suggests the regulatory mechanisms of synchronization provide functional stability of the cardiovascular homeostasis in many values of loads.

Table 1: Mutability of the integral index of synchronization of cardiovascular-pulmonary rhythm of the comparison groups of by functional stress at rest.

			RPP/100	CO/RMV	CO	RMV
First group (n=16)		1	78.4±8.9	0.51±0.13	4.87±0.90	10,13±1,97
Second group (n=23)		2	99.3±6.0	0.50±0.16	4.94±0.93	10,97±3,19
Third group (n=24)		3	130.6±17.5	0.44±0.13	5.32±1.27	12,95±3,35
P критерии	P_{1-2}		<0.001	0.65	0.80	0.44
	P_{1-3}		<0.001	0.12	0.18	0.006
	P_{2-3}		<0.001	0.30	0.23	0.051

After that the informatively of the indicators for predictive diagnostic in assessment the level of cardiovascular and respiratory synchronization under moderate loads: with controlled respiration (6 times per minute) and moderate intensity stress test (from 40 to 80 Watts for 5 minutes) was investigated.

Table 2 shows the results measurement indicators of circulation for respiratory cycle at the rest and under different moderate loads modifying of respiration. In this case, the summary indicators of the respiratory and cardiovascular systems are increase with moderate intensity stress test; while the degree of synchronization could be obtain their ratio. The results suggest the tested method

allows quantifying the levels of cardiovascular and respiratory synchronization by regulation the shock volume provided a stable level of dynamic ratio CO/RMV.This result is for the use in the predictive diagnostic the degree of synchronization the regulatory systems cardiovascular-respiratory homeostasis discussed by scientific literature.

Table 2: Summary indicators of respiratory and cardiovascular synchronization within moderate loads.

Summary indicators	Different moderate loads and modifying of respiration		
	At rest	With controlled respiration	Moderate intensity stress test
	1	2	3
RMV, $l/_{min}$	11.51±3.18	12.20±3.72	26.47±3.59
CO, $l/_{min}$	5.06±1.06	5.25±1.12	9.47±1.94
$\frac{CO}{RMV}$, $l/_{resp.}$	0.48±0.14	0.46±0.15	0.39±0.10