

## Physiological Reaction of the Cardiovascular System of Men 50-59 Years to Feasible Regular Physical Activity

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Changes of the health status of beginners aging men is being closely examined. This caused a sharp increase in males with age of the risk of developing diseases of the cardiovascular system. It is noticed that men older than 50 years often have multiple risk factors cardiovascular disease – coronary heart disease or hypertension, and sometimes combinations thereof. In this regard, it is now very important for men approaching retirement age effective approaches to health improvement, reducing the probability of occurrence of a pathology of heart and vessels. Tested in the study the author's technique, which included regular exercise, have shown the possibility of stimulation of the cardiovascular system, the overall aerobic capacity of the body and enhance the metabolism. The study demonstrated the possibility of achieving after 1 year of muscle loads on the author's technique overall health. Complex loads, which demonstrated high efficiency, included training on simulators "SPIRIT Medical Systems MU100 vertical Ergometer" and "Finnlo EllypsisSX1", with the additional inclusion in the scheme loads the second half of the loads on the simulator "Finnlo MAXIMUM-S". The effect achieved by the author's method exceeded that in the result of a year of physical activity in the gym "Finnlo MAXIMUM elliptical S" when you add in the second half of training on the simulator "SPIRIT Medical Systems MU100 vertical Ergometer". The obtained results are considered as evidence of the decline of the trainees on the author's scheme of men older than 50 years of threats signs of cardiovascular pathology with a significant enhancement of their overall health.

**Keywords:** Muscle activity, Exercise, Exercise equipment, Male, Close to retirement age, The cardiovascular system.

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Numerous studies have confirmed the relationship between low levels of muscle activity and the appearance of cardiovascular pathology as

the age increases<sup>1,2</sup>. Long-term physical inactivity is very dangerous due to the development of a number of painful disorders against its background,

always leading to dysfunctions in the heart and blood vessels<sup>3</sup>. According to experts of the World Health Organization, more than 20% of all cases of cardiovascular disease are associated with a previous prolonged low physical activity<sup>4</sup>. To provide the body with a normal level of motor activity, variants of physical activity complexes are currently being developed to optimize the cardiac system, consisting of various physical exercises<sup>5,6</sup>.

Functionally beneficial effects of muscle loads in adulthood include a 20% reduction in mortality, especially by reducing mortality from pathology of the cardiovascular system, weakening the influence of risk factors for cardiovascular diseases and increasing the overall functional potential of the whole organism<sup>7</sup>. Continuous improvement of approaches to successful rehabilitation of patients with cardiac pathology shows the need to strengthen the prevention of manifestations of premature aging, especially in the cardiovascular system in adults, is mainly associated with general recommendations on the need to increase motor activity<sup>8</sup>.

Repeatedly it has been confirmed that physical exercise in the regular regimen especially among men highly effective only when they are continuously running with a clear correlation of their levels with the current functional status of the organism in the presence of favorable conditions, the optimum environment, a balanced diet<sup>9</sup>. It is considered reasonable to apply them to reduce the severity of age-related changes in men's health and preserve them for a life of good physical shape. With this goal in Russia in health care applied the standards of the age parameters of the body according to gender<sup>10</sup>.

Currently, very often men over the age of 50 years, followed by the dominant in modern society, ambiguous behaviors. They self-correct your lifestyle to preserve health, which often has little to do with the basics of a healthy lifestyle<sup>11</sup>. Often men at this age are fond of extreme recreation<sup>12</sup>. The presence in the body of men over 50 years of age-related changes often leads them to Express holding a "health storm" (pronounced strength training, Amateur sport). As a rule, they neglect the very important for their age "soft" schemes for the efficient muscle loads that have a bright improving effect<sup>13,14</sup>. In view of the correlation between the overall level of

moderate physical activity and lowering the level of early mortality of men from diseases of the heart and blood vessels had developed a complex exercise, aimed at increasing they have General physical preparedness and increase the supply of the strength of the cardiovascular system<sup>15</sup>. Seemed important to create easily applicable in practice program, with the possibility of dosing of the applied physical exercises can physically heal men over the age of 50 years.

Given these circumstances, the work is planned to evaluate the effectiveness of author's program of physical training of men approaching retirement age in relation to their General physical improvement and strengthening of the cardiovascular system.

## MATERIALS AND METHODS

The work was done at the faculty of physical culture of the Moscow City Pedagogical University, Institute of Natural Sciences and Sports Technologies. The research was approved by the local ethic Committee of Russian State Social University (Protocol 10 from 11.10.2017). Under observation are 52 men in the age 52-59 years (the amount of their average age,  $57.1 \pm 0.64$  years). Taken study men by random division was divided into two comparable sample group observation 1 (26 people) and the observation group 2 (26 people). All taken in the study men had significant chronic diseases with a low initial physical fitness. Was absent in the examined endocrine, cancer, clinically manifested pathology of the heart and blood vessels. All taken under the supervision of a registered risk factors for the onset of pathology in the cardiovascular system. All men came under surveillance, smoked a pack of cigarettes or of cigarettes a day or more, they had excess body weight (the amount of mass index their bodies was on average  $27.4 \pm 0.6$  kg/m<sup>2</sup>) had an increased level of cholesterol in the blood, comprising an average of  $5.9 \pm 0.8$  mmol/l, for many of them it was typical maintenance lifestyle with constant psycho-emotional stress. All observed men indicated experiencing them for no apparent reason unclear discomfort in heart and often the case of a rise in blood pressure.

To improve the health status of the men taken into the study, the authors applied two

author's health-improving programs with an assessment of their effectiveness. The contents of the tested wellness programs are contained in table 1.

Both exercise schemes used in the work were based on recreational walking, and included feasible exercises on simulators. The tested program <sup>1</sup>1 was used in the first observation group. She had a developing character. In the second group of men examined, physical training had a higher intensity and was carried out according to program <sup>1</sup>2. This program was of a training nature. In both groups of men observed, physical training was carried out daily for one year.

After 6 months of training, exercises (over 10 minutes) were added to the main part of physical activity using the SPIRIT Medical Systems MU100 vertical ergometer simulator (Figure 2). A significant characteristic of this simulator is the ability to regulate the effect of the exerted load on the limbs with isokinetic muscle tension, which enhances hemocirculation throughout the body (Figure 2).

The main part of the lesson throughout the whole year of training also included daily walking at a distance of 4 kilometers at a comfortable pace - the final part of the lesson (duration 4 minutes) consisted of traditional gymnastic and breathing exercises.

The tested program <sup>1</sup> 2 consisted of daily exercises using simulators according to the following scheme:

- The preparatory part of the lesson (duration 6 minutes) included dosed walking and breathing exercises;
- The main part consisted of exercises using the "SPIRIT Medical Systems MU100 vertical ergometer" simulator (for 20 min) (Figure 2) and muscle loads for 10 min using the "Finnlo EllypsisSX1" simulator (Figure 3).

After 6 months of physical training, more loads were introduced into the main part of the lesson on the "Finnlo MAXIMUM-S" simulator (duration 10 minutes) (Figure 4). This simulator is ellipsoidal and with its help it is easy to adjust the level of physical activity. In the process of training gradually increased the level of load on the legs and abdominals, which stimulated the functioning of the cardiovascular system. The main part of the lesson in the training program also included

improving daily walking at a distance of at least 6 km at an accelerated pace.

The final part of the training (duration 6 minutes) consisted of standard gymnastic and breathing exercises.

All men taken into the study were examined using the following methods. Their overall motor activity was estimated by the number of steps per day, the heart rate was recorded, a 12-minute Cooper test was performed, the endurance coefficient was recorded, and the levels of systolic blood pressure and diastolic blood pressure were determined. All persons included in both groups of the observation were examined twice - during taking under observation and after a year of daily physical activity according to the developed programs. The results obtained during the study were processed using Student's t-test.

## RESULTS

The indicators that were obtained when observing the men included in the study are presented in table 2.

The initially unexpressed motor activity in the observed men increased against the background of the appointment of both developed physical education programs. It was noted that against the background of the implementation of program <sup>1</sup>2, there was a larger increase in this parameter. After a year of observation in these men, this indicator prevailed over that in the first group of observation by 22.9%. During the assessment of the condition of men in both groups using the 12-minute Cooper test, an initially comparable state of this indicator was noted, which then improved more significantly in the second group. After a year of observation, this indicator exceeded the similar parameter in the first group by 11.8%. During training, men of both groups experienced a decrease in heart rate, which was more pronounced in those who made up the second group - by 15.3% versus 8.6% in the first. Moreover, they had an increase in the coefficient of endurance, which by the end of training in the second group of men was higher than that in the first group of men by 11.4%. Against the background of regular performance of physical exercises in the men taken into the study, there was a decrease in the level of blood pressure, removing it from a high normal level to

**Table 1.** Features applied in the work of wellness programs

Wellness components	Physical education program '1	Physical education program '2
The pace of daily walking with a wellness goal, steps / minute	80-90	90-100
The distance daily overcome by recreational walking, kilometers	4 kilometers	6 kilometers
Features of physical training on simulators	In the first six months of classes on the simulator "Finnlo MAXIMUM-S elliptical", after 6 months, trainings on the simulator - "SPIRIT Medical Systems MU100 vertical ergometer" additionally join	In the first 6 months, physical training is conducted on the "SPIRIT Medical Systems MU100 vertical ergometer simulator" and on the "FinnloEllypsis SX1", after 6 months training on the "Finnlo MAXIMUM-S" is added to physical activity
The general pace of exercises on simulators	Average	Mediumhigh



**Fig. 1.** Appearance of the simulator «Finnlo MAXIMUM-S elliptical»  
[https://leosport.com.ua/image/cache/catalog/product/Orbitrek/Finnlo/3950/384869\\_middle-1000x800.jpg](https://leosport.com.ua/image/cache/catalog/product/Orbitrek/Finnlo/3950/384869_middle-1000x800.jpg)



**Fig. 2.** Appearance of the simulator "SPIRIT Medical Systems MU100 vertical ergometer"  
[https://c1.neweggimages.com/ProductImage/A00Y\\_1\\_201807011861043091.jpg](https://c1.neweggimages.com/ProductImage/A00Y_1_201807011861043091.jpg)

a normal blood pressure level. Moreover, in the second group of men, more preferable results were achieved compared to the first group: in terms of systolic blood pressure by 10.5%, in terms of diastolic blood pressure by 12.2%.

### DISCUSSION

Regular physical activity in humans during ontogenesis increases the level of adaptive capabilities of all organ systems<sup>16,17</sup>. It is very important in ensuring the adaptation of the whole organism to the influence of physical activity that they consider building up the margin of safety of the cardiovascular system. This is due to an increase in its ability to carry oxygen to all working organs<sup>18,19</sup>. Even after a single physical training, the speed and volume of blood flow increases, the state of vascular tone normalizes, rheological parameters of the blood improve, which positively affects the level of oxygen delivery to all organs<sup>20,21</sup>.

In the case of prolonged performance of regular and feasible physical exertion, a person has an increase in fitness of the heart muscle and the activity of all components of hemostasis is weakened, which significantly reduces the risk of thrombosis<sup>22,23</sup>. Unfortunately, the question of the peculiarities of the effect of prolonged feasible physical training on the level of the general activity of the cardiovascular system in men over the age of 50 is not completely resolved<sup>24</sup>.

It is noted that by the end of adulthood, males have a high risk of developing many diseases in the cardiovascular system<sup>25</sup>. This is facilitated by the accumulation of a number of disorders in their body and the emergence of risk factors that in the near future are capable of forming arterial hypertension, or coronary heart disease or metabolic syndrome<sup>26,27</sup>. This pathology and its complications often greatly reduce the life expectancy of most men, making it shorter than women<sup>28,29</sup>.

In clinical practice, it is customary to use physical exercises to improve health. However, changes in the level of physical fitness and dynamics against this background, the functional capabilities of the cardiovascular system are normal, especially in people who have survived to the end of adulthood. This indicates a far cry from solving the problem of the effect of regular muscle work on the overall biological activity of the body in the second half of ontogenesis<sup>30</sup>. The presence of this gap in the system of scientific views was the motivation for the study.

It is recognized that in males over the age of 50, vessels often experience cramping. As men age, there are simultaneously a number of



**Fig. 3.** Appearance of the simulator “Finnlo EllypsisSX1”  
<https://sun3-11.userapi.com/BNNWB8qlpMiaOzhiGqHGloQ7xyjSjRGSVCzSBA/QkuyIWWIC-A.jpg>



**Fig. 4.** Appearance of the simulator “Finnlo MAXIMUM-S”  
<https://5.allegroimg.com/original/018c74/1dale31e431a94f435c21b85c005>

risk factors that contribute to their cardiovascular disease<sup>31</sup>. A major role in this is played by functionally unfavorable changes in the functioning of the heart and blood vessels. In the case of prolonged low muscle activity and a progressive decrease in the functional reserves of the whole organism, conditions are created for the formation of dysfunctions, and often pathologies in the cardiorespiratory system<sup>32</sup>.

Men over the age of 50 often have severe hypodynamia, which can increase the severity of atherosclerosis, significantly increasing the risk of onset of angina pectoris and the development of myocardial infarction. At the same time, an increase in physical activity lowers the risk of their development and improves the quality of life and general health in most males.

In the course of the study, the effectiveness of two somatic recovery options for men over the age of 50 who have a risk of cardiovascular disease

was evaluated. In the work, very significant results were achieved during the training sessions under programs with active regular physical activity. As a result, it was possible to very clearly improve the function of the cardiovascular system, increasing its reserve capacity.

The observed result against the background of the program '2 from the observed men were more effective than '1 due to the pronounced overall health effects on the body men. In the result of daily physical activity according to the program '2 in men older than 50 years, we have the ability to increase strength and endurance, largely due to the recovery of their cardiovascular system<sup>16</sup>.

Pronounced positive effects on the body both programs muscle workouts was due to the stimulation it metabolic processes<sup>18</sup>. Also their background was a moderate "soft" capacity level of fitness male observed optimizing processes in their cardiovascular system, release of existing

**Table 2.** The change in indicators in the examined

Indicators	Observation period	Observation group 1, n=26, M±m	Observation group 2, n=26, M±m
Total physical activity, thousand steps / day	when taken to research at the end of the study	6.4±0.12	6.2±0.06
		7.4±0.14 p<0.05	9.1±0.10 p<0.01 p <sub>1</sub> <0.01
Cooper 12-minute test scores, m	when taken to research at the end of the study	1.6±0.06	1.6±0.04
		1.7±0.05	1.9±0.03 p<0.01 p <sub>1</sub> <0.01
Heart rate during exercise, beats / minute	when taken to research at the end of the study	117.5±0.26	118.0±0.29
		108.3±0.19	102.3±0.24 p<0.05 p <sub>1</sub> <0.05
Stamina coefficient, units	when taken to research at the end of the study	19.6 ±0.07	20.3±0.10
		21.1±0.10	23.5±0.14 p<0.05 p <sub>1</sub> <0.05
Systolic blood pressure, mmHg	when taken to research at the end of the study	137.7±0.34	135.8±0.26
		133.8±0.29	121.1±0.22 p<0.05 p <sub>1</sub> <0.05
Diastolic blood pressure, mmHg	when taken to research at the end of the study	94.8±0.25	93.4±0.28
		90.9±0.29	81.0±0.10 p<0.05 p <sub>1</sub> <0.05

Legend: p - significance of changes in each group, p<sub>1</sub> - significance of differences in indicators at the end of observation between groups

reserves for their internal organs in conditions of activation of the hormonal system and activate the autonomic nervous system<sup>10</sup>.

It becomes clear that quite quickly, against the background of physical training in both schemes, the degree of elasticity and muscle strength increase and the spinal flexibility increases<sup>10</sup>. Systematic physical exercises performed on simulators lead to normalization of the synthesis of biologically active substances in tissues and especially neurotransmitters, forming a strict balance of life processes in the body. Performing physical exercises daily stimulates the intellect and increases the amount of memory, creating a balance of regulation, including sympathy and parasympathetics, contributing to a decrease in biological age<sup>2</sup>.

In comparing the results obtained in both groups of observed men, the advantages of program <sup>12</sup> were determined in comparison with the results of the application of program <sup>11</sup>. The obtained results allow us to recommend program <sup>12</sup> for widespread use, including clinically healthy people with somatic diseases in the compensation stage in people of mature age.

### CONCLUSION

Increasing calendar age in males can be considered as a risk factor in the development of cardiovascular pathology. Especially unfavorable in this respect, the situation in men over the age of 50 years due to the frequent presence of additional risk factors for the development of a pathology of heart and vessels. These men are very threatened by manifestacii hypertension or coronary heart disease. Feasible regular physical exercise can activate their cardiovascular system, strengthen metabolism in the body and increase General physical preparedness. In the work clarified that the complex annual exercise, using training on simulators “SPIRIT Medical Systems MU100” and “Finnlo EllypsisSX1”, with the additional use after 6 months of training classes on the “Finnlo MAXIMUM-S” forms a pronounced healing effect superior to itself, the result of a year’s training at the gym “Finnlo MAXIMUM-Selliptical” with the additional use from the second half of the simulator “SPIRIT Medical Systems MU100”. The obtained results allow us to broadly recommend men aged

above 50 years regular exercise copyright scheme 2 with the aim of significantly reducing the risk of they cardiovascular disease and provide General improvement.

### Conflict of interest

No conflict of interest is declared.

### Sources of financing

The study was conducted at the expense of the authors.

### Ethics Committee Resolution

The research was approved by the Ethics Committee of Moscow City Pedagogical University, Institute of Natural Sciences and Sports Technologies (record <sup>10</sup> from 11.10.2017).

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