

Influence of “Q10 Magic Power”
supplementation on functional abilities and
exercise performance of cyclists



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Research was held by laboratory of functional testing «VO2max Lab» and in cooperation with Kyiv Regional Special Junior Sport School for Olympic Reserve “Promin”, from 21 of July to 30 of August 2016.

6 athletes was participated in research: 4 adult (2 – female, 2 - male) and 2 juniors. All participants have more than 4 years of competitive sport experience, they are members of Ukraine national team.

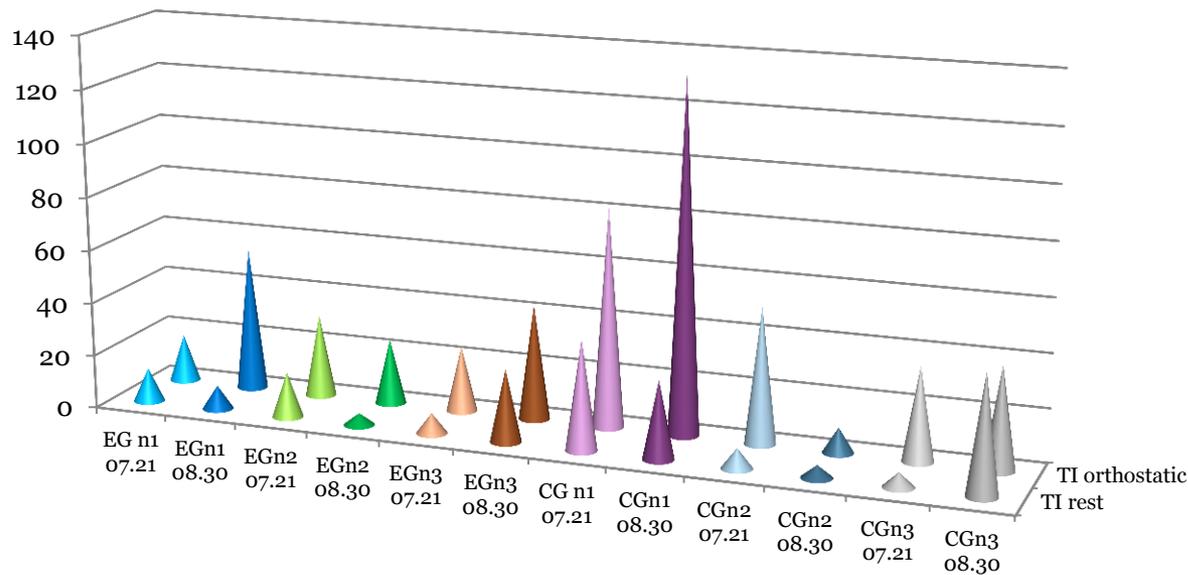
Subjects was divided into 2 groups, 3 athletes in each (one from every category). All cyclist was observed during last month of competitive season, they did same training program, took part in same competition, were on same diet. «Q10 Magic Power» was taken by experimental group for every morning during experiment.

Data collection was held on first and lest day of research.



For achieving goal of this experiment next research methods was used:

- Analysis of RR intervals. RR intervals was recorded by heart rate monitor «Polar RS800 CX», Bayevsky formula was used for analysis. This method was used to determine athlete's recovery levels.
- Electrocardiography. ECG was recorded by electrocardiograph «Мидас ЭК1Т». This method was used for evaluating functional abilities of heart, amplitude of P and T teeth in standard leads, Sokolov-Layon index and index of adequacy of hypertrophy.
- Bio impedance body mass analysis. Body mass date was collected by electronic scales «Tanita BC-545N». This method was conducted for registration of influence of changes in body weight on the performance.
- Blood test. This test was conducted by «INVITRO» laboratory. Registration of influence of changes in biochemical properties of blood on the performance.
- Ergospirometry and respiratory gas analysis. Data was recorded by portative ergospirometer «Cortex MetaMax3B». This method was used to determine functional abilities of cardio-respiratory system.
- Ergometry. Evaluation of workability of athletes was conducted by cycling turbo-trainer «Tach Flow».
- Data analysis. Due to small amount of subjects which took part in experiment we can't use statistical methods for data analysis.

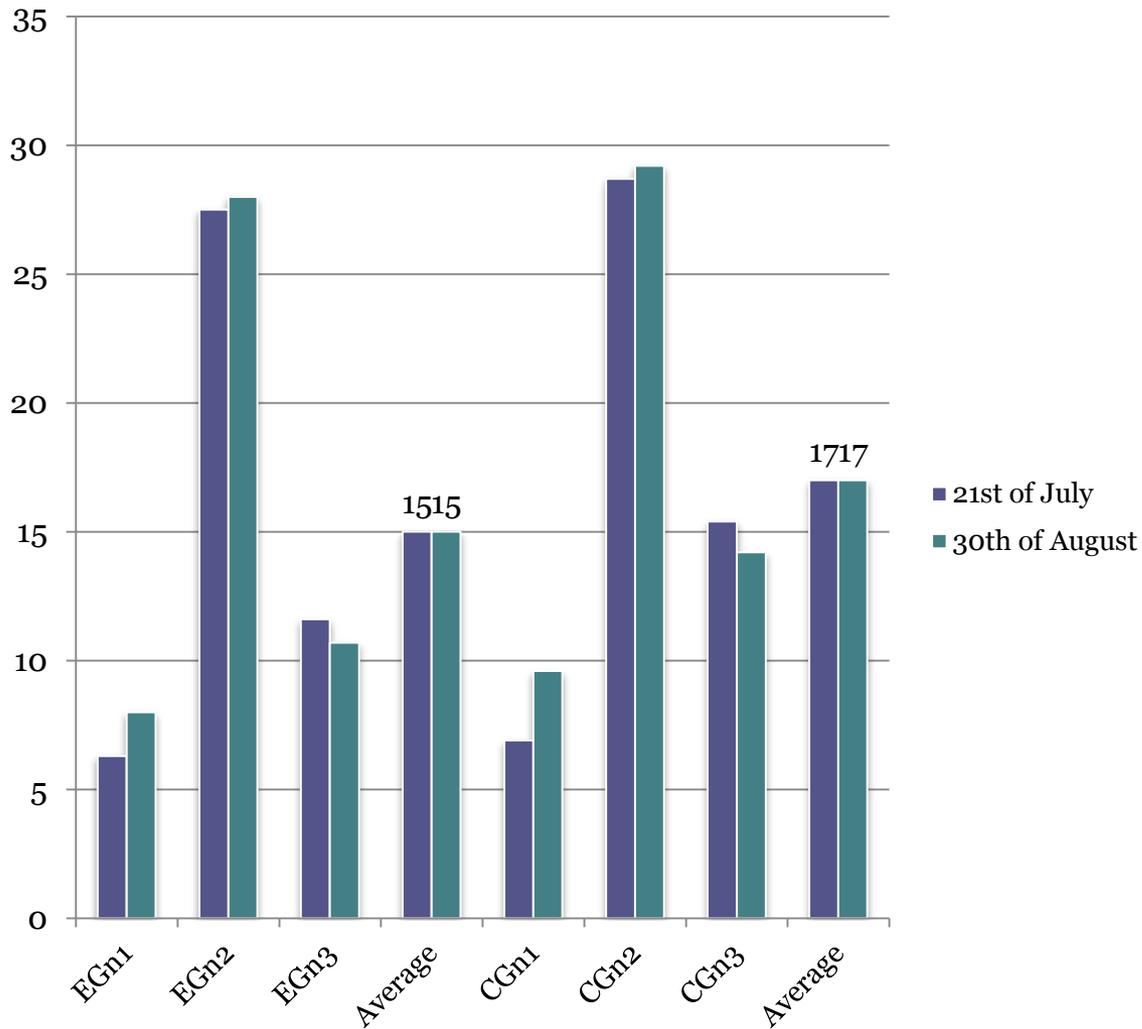


Img. 1. Results of RR intervals analysis of cyclists of experimental (EG) and control (CG) groups in rest and after orthostatic test.

RR intervals analysis.

Heart rate variability was used for determination of athlete's recovery levels on test day. In this experiment the accent was on evaluation of similarity of cyclists conditions. In the beginning of this research most of subjects demonstrate normal reaction on orthostatic test.

In the end of the experiment most of cyclist (84%) were in not recovered conditions, what can be seen in too expressed reaction on orthostatic impact, or, on the contrary, absence of reaction (img. 1). Such changes in heart rate rhythm may be caused by previous participation in main competitions, which require maximal effort from athletes, and recovery is much slower after suchlike hard performance.



Img. 2. Results of analysis of body fat percentage of subjects in experimental (EG) and control (CG) groups, and average group index in the beginning and at the end of research.

Body mass analysis.

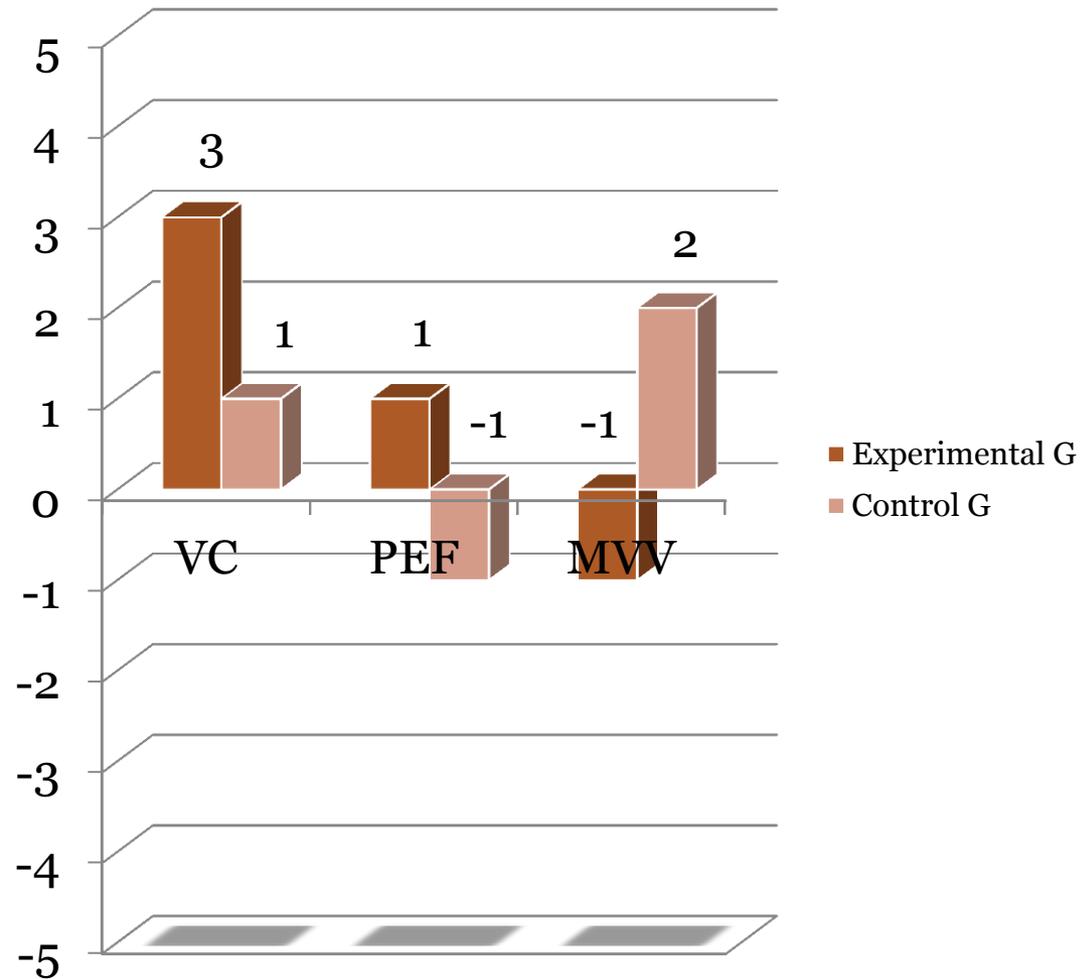
Examination of body mass component was necessary to exclude effect of its change on cyclists' performance in the end of the test. During experiment most of body weight components of subjects did not change greatly. For example, the average body fat level among both groups at the beginning and at the end of research was equal (img. 2).

Also, the tendency for both groups was loss of body weight, mostly by muscle mass. This can be caused by character of athletes' performance during research. Experimental group lost 3% of muscle mass, control group lost 4%.

Spirometry. The main aim of spirometry testing was determination of the limiting factors in respiratory system that can limit workability of subjects.

In the beginning of the research several athletes had low strength (peak expiratory flow – PEF) and power (maximal voluntary ventilation – MVV) characteristics of respiratory system. During experiment all this limitations not changed.

There are no significant changes after the research in functional abilities of respiratory system between experimental and control groups (img. 3). For example, 3% increase of vital capacity in experimental group reflect only 200ml increase of lungs volume, which can not significantly affect gas exchange between internal and external environment.



Img. 3. Percentage changes in functional abilities of respiratory system (VC – vital capacity, PEF – peak expiratory flow, MVV – maximal voluntary ventilation) of cyclists from experimental and control groups during experiment.

Electrocardiography. Before start of the research most of subjects had significant decrease in functional abilities of myocardium according to criteria for professional athletes.

Amplitude of tooth P in standard leads reflect tensivity in heart functioning. In experimental group this index was higher than recommended by 25%, at the same time in control group this index was higher only on 8%. After period of supplementation of Q10, this marker increase by 31% in experimental group, and on 19% in control. Dynamics was the same in both groups, but in experimental one increase was much higher.

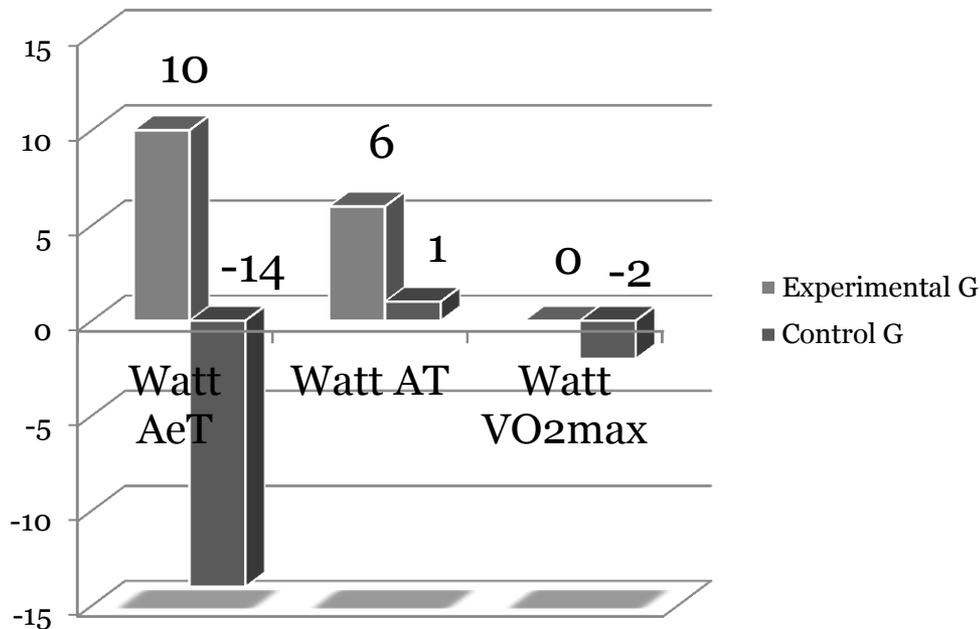
Amplitude of tooth T in standard leads reflect metabolic activity in myocardium, it tells about ischemic. Dynamics of this characteristic also was the same in both groups. In control group it decreased on 5%, in control on 9%.

Metabolic adequacy of hypertrophy is the marker of activity of metabolic process in myocardium according to level of it hypertrophy. In all subjects was founded physiological hypertrophy of left ventricle, measured by Sokolov-Layon index and HR in rest (bradycardia). Metabolic adequacy of hypertrophy measures by equation:

$$MAoH = \frac{AT_{V5}}{AR_{V5}} \times 100$$

This index as the amplitude of T in standard leads, reflects risks of ischemic process in hypertrophied left ventricle. This index increased in both groups, in experimental rise was higher on 4%.

In total, changes in myocardium functional abilities was better in experimental group.



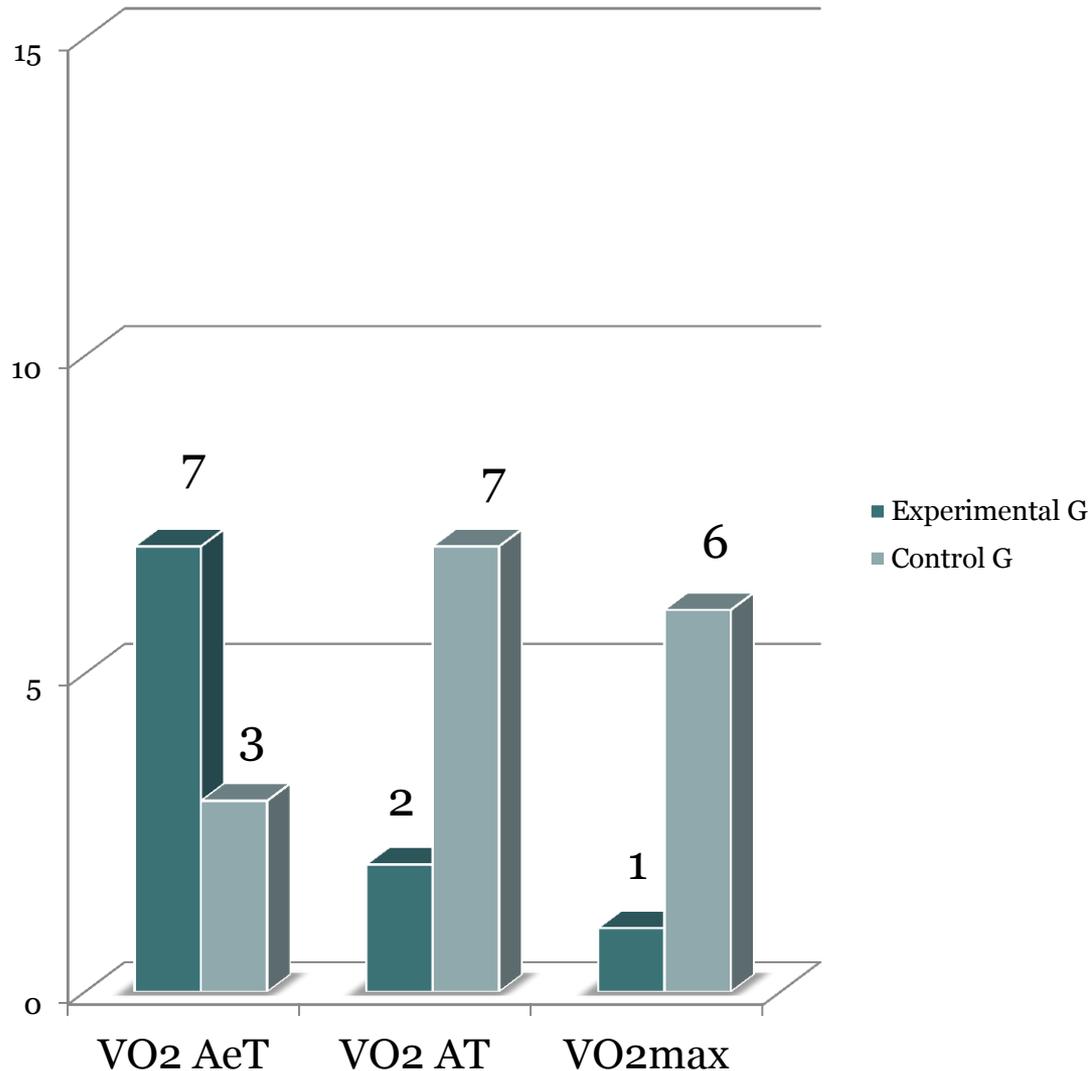
Img. 4. Increase of workability at the end of experiment in percentage in experimental and control groups, on levels of aerobic threshold (Watt AeT), anaerobic threshold (Watt AT) and maximal oxygen consumption (Watt VO2max).

AT. Athletes of experimental group in the end of experiment was showing more power output on level of anaerobic threshold (img. 4). Increase of this parameter is highly related with increase of special endurance – ability for effective physical work for long time. 1% increase of this parameter in control group – inessential.

AeT. Most significant changes in working capacity of subjects was on level of aerobic threshold – maximal intensity when anaerobic metabolism is not takes part in energy production for muscle activity. Considering functions of Q10 in human organism, 10% increase in power output at level of AeT in experimental group can be connected with Q10 supplementation. In the same time, significant decrease of workability at AeT (with saving this parameter at level of VO2max) in control group can be related to highly intense training process which is normal for competitive period.

Ergometry. The main criteria of effectiveness of physical training or supplementation is increase in workability of athletes. For assessment of supplementation “Q10 Magic Power” was used next parameters of athletes performance: working capacity at aerobic threshold (Watt AeT), working capacity at anaerobic threshold (Watt AT), working capacity at maximal oxygen consumption (Watt VO2max).

Watt VO2max. In the end of research significant changes in workability of cyclist at level of VO2max was not founded.

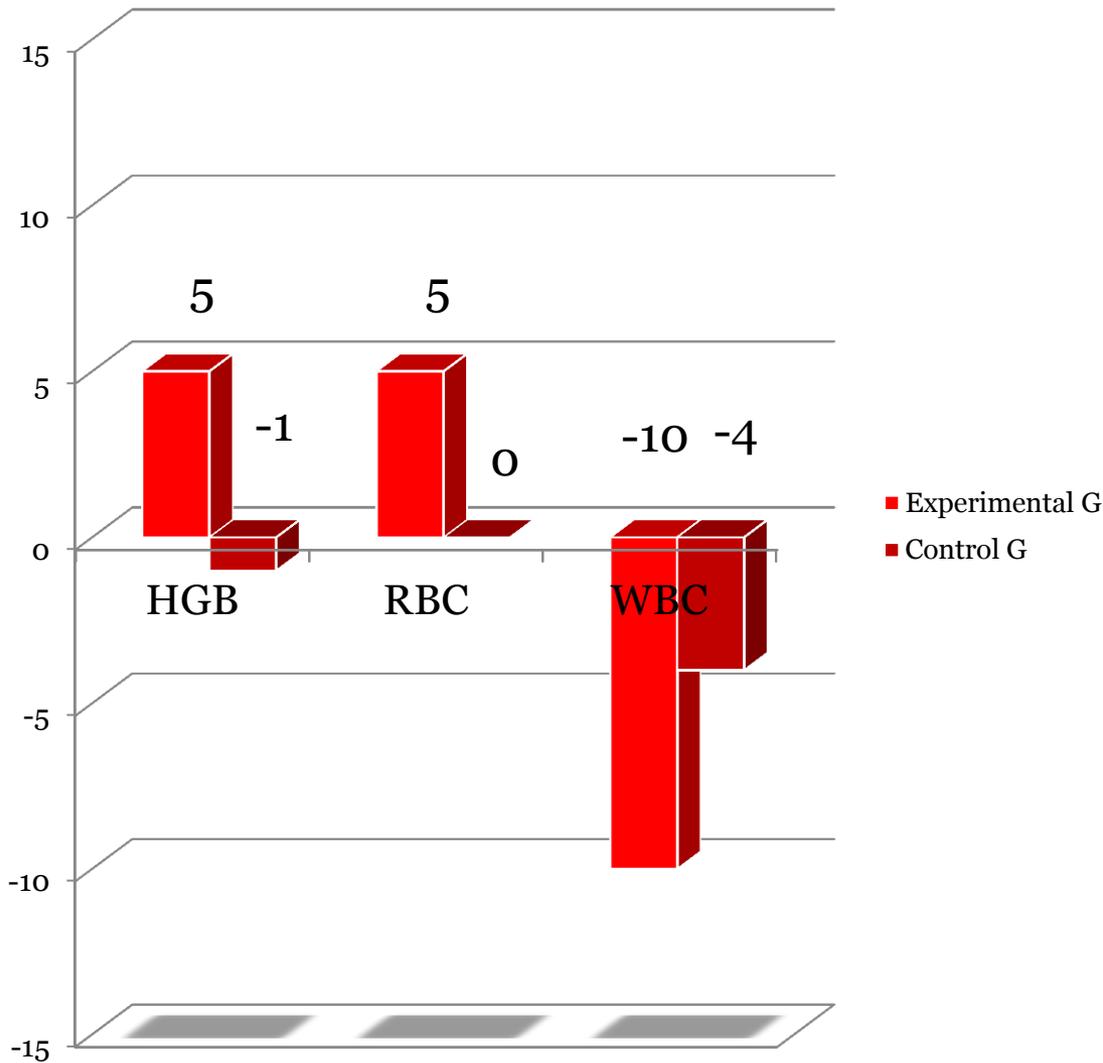


Img. 5. Changes in oxygen consumption in the end of research in experimental and control group on levels of aerobic threshold (VO2 AeT), anaerobic threshold (VO2 AT) and maximal oxygen consumption (VO2max).

Respiratory gas analysis. This research method allows to assess what character of changes in workability of athletes was after experiment, what mechanisms of energy production cause changes in working capacity.

During research was determined that in the control group increase of power output at AT and AeT was not supported by increase of oxygen consumption on this levels. Such dynamics shows that workability improvement was caused by better effectiveness of aerobic metabolism, decreasing of oxygen price for muscle activity (img. 5).

Instead, in control group was registered increase of oxygen consumption with decrease of working capacity.



Img. 6. Percent changes in blood markers in the end of research in experimental and control groups. HGB – hemoglobin, RBC – red blood cells, WBC – white blood cells.

Blood test. Hemoglobin concentration and red blood cells level are the informative markers of normal adaptation in human organism. Rapid decrease of this parameters indicates disadaptation or overtraining.

Rise of hemoglobin concentration and number of red blood cells in experimental group shows that adaptation process was normal during research. In control group we did not find differences in this parameters (img. 6).

The same tendency for both groups was reduction of white blood cells number. This is caused by high intensity of cyclists performance in the last weeks of research. This is normal that immunity reduces while organism is affected by high levels of stress.

The aim of the research was determination of influence of supplementation «Q10 Magic Power» with main active ingredient coenzyme Q10 on cyclist functional abilities and working capacity. Coenzyme Q10 takes part in aerobic reactions, has antioxidant properties. Concentration of this agent can affect aerobic metabolism.

After the experiment main changes was founded in functional qualities that is highly connected with aerobic energy production. Instead of decrease of workability and rise of oxygen price of muscle activity in control group, cyclists from experimental group shows significant increase in working capacity at aerobic thresholds. But in circumstances of rising acidosis, when organism works at intensity higher than aerobic threshold differences was less, but still, experimental group shows better performance. At the level at maximal oxygen consumption there were no differences between groups.

Also important differences was registered in functional abilities of heart. Increase of metabolism and decrease of tension was same for all subjects, but in experimental group this changes was expressed greatly. We must note also that the initial state of myocardium of cyclists from experimental group was worst, it can be reason of better reaction in the end of research.

Changes in body composition, functional abilities of respiratory system, regulation of heart rhythm between groups was inessential.

1. Most significant impact of supplementation «Q10 Magic Power» was on working capacity at aerobic and anaerobic thresholds. It can increase athlete's ability for performing in durable exercises.
2. Also «Q10 Magic Power» supplementation can benefit functional state of myocardium. Especially when organism is affected by great stress.
3. Antioxidative properties of «Q10 Magic Power» can prevent hemolysis, which can be caused by excessive stress, such as sports competitions.
4. During workloads with high lactate output effect of supplementation «Q10 Magic Power» is not crucial.

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