Physiological Effects of Drinking Water Enriched with $^{1}H_{2}^{16}O$

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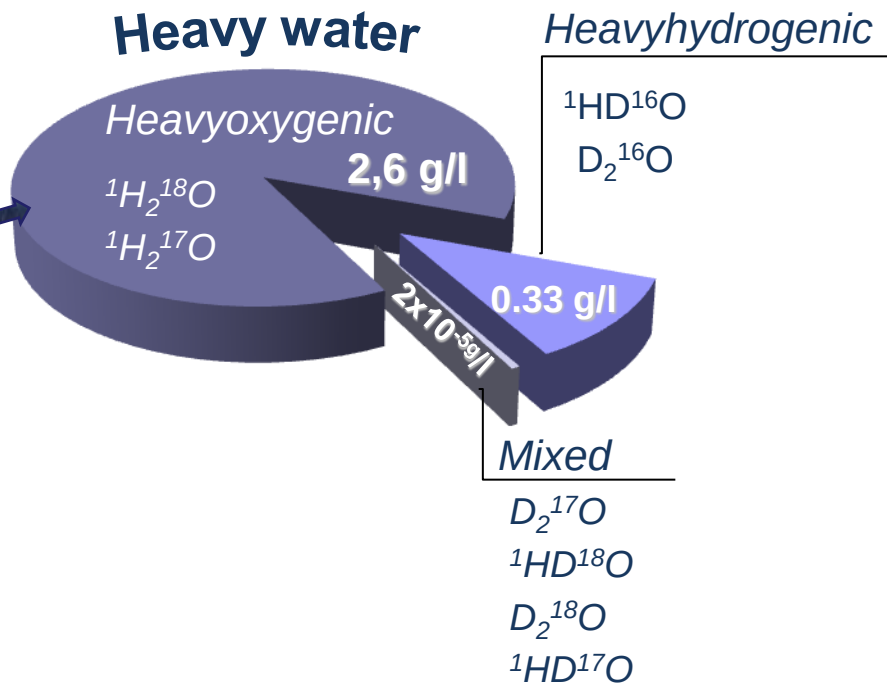
Certified industrial production in Russia
ISO 9001 certification in process
Own scientific research of physical and biological properties of Water Enriched with $^{1}H_{2}{}^{16}O$

Molecular composition of natural water

A liter of natural water contains 2.9 grams of heavy water isotopologs



Water Enriched with $^1H_2{}^{16}O$ is actual equivalent Heavy Isotopologs Depleted Water

Kinetic solvent isotope effect

Chemical reaction: $A \longrightarrow B$

Isotope effect $= k(H_2O)/k(D_2O)$

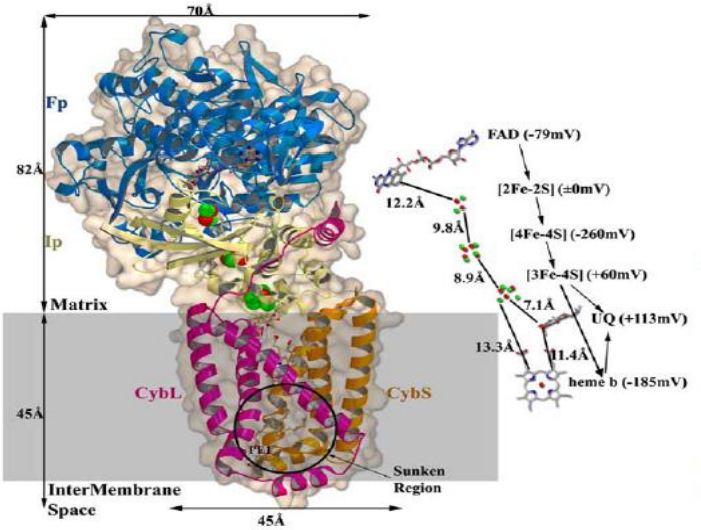
Reaction	Isotope effect
Enzyme catalysis	≈ 2
Oxidation-reduction reaction* (Transfer pair H+ - e)	30 ÷ 455

* **My Hang V. Huynh, Thomas J. Meyer Colossal kinetic isotope effects in proton-coupled electron transfer // PNAS. 2004 V. 101 no. 36. PP. 13138-13141**

Solvent isotope effect in the biochemical reactions

In biological systems with long sequences of reactions and cooperative effects usually insignificant 0.27% of heavy water considerably slows down these processes

Complex II
Part of respiratory chain of mitochondria



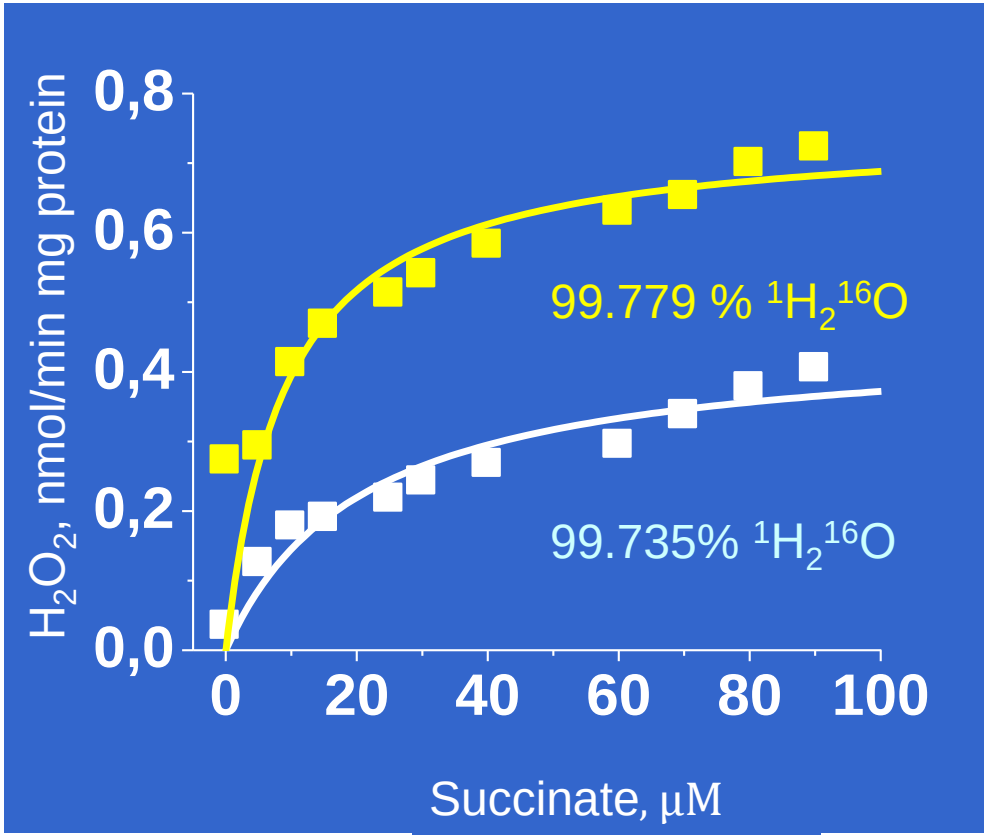
Cooperative transfer of pair proton(H+) electron(- e) in a complex II:

Succinate → [FAD] → [2Fe-2S] → [4Fe-4S] → [3Fe-4S] → heme b → UQ

Complex II

The molecules of heavy water inhibit the reactions of the mitochondrial respiratory chain - main energy reactions of the organism

Kinetics of the generation of hydrogen peroxide as a marker of cell energy



Model - isolated rat liver mitochondria with succinic acid (succinate) as a substrate

I.A. Pomytkin, O.E. Kolesova // Bulletin of Experimental Biology and Medicine. 2006. V.142. N 5. P.570-572

Water enriched with $^1H_2{}^{16}O$ disinhibits the reaction of generating the hydrogen peroxide

The goal of the study

To test whether water enriched with $^{1}H_{2}^{16}O$ may improve functional performance during aerobic exercises in healthy people

P.K.Anokhin Institute of Normophysiology of RAMS

The design of study

28 days					
Drinking water	D/H, ppm	Number of volunteers	Age, years	Body mass index	Volume of consumed water per day, litres
Group 1 AquaSlap™ water	**90**	**14**	**21,1 ± 1,3**	**24,8 ± 1,7**	**1**
Group 2 Control water	**140**	**6**	**20,5 ± 1,6**	**23,0 ± 1,2**	**1**

The level of the light isotopologs in AquaSlap™ water corresponds to Standard Light Antarctic Precipitation

The measured indicators

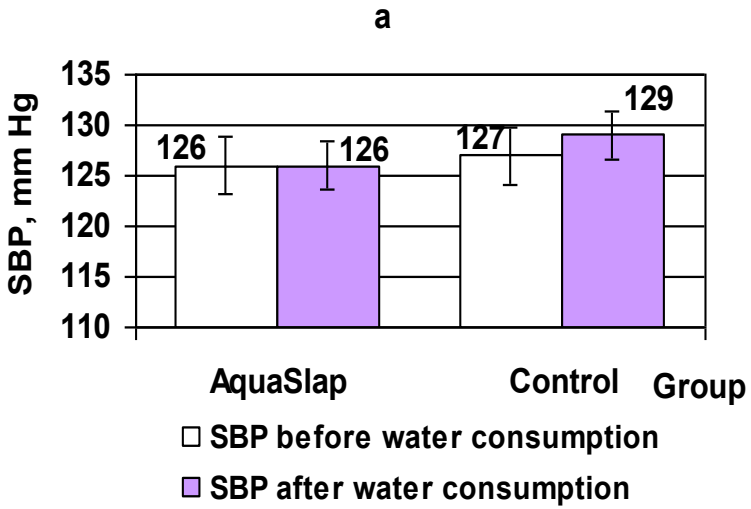
- **blood tests**
  - **clinical**
  - **biochemical**
  - **immunological**
  - **hormonal**
  - **antioxidant activity**
- **psychological and vegetative status**
- **lung function**
- **gas exchange**
- **level of health provision**
- **physical performance**

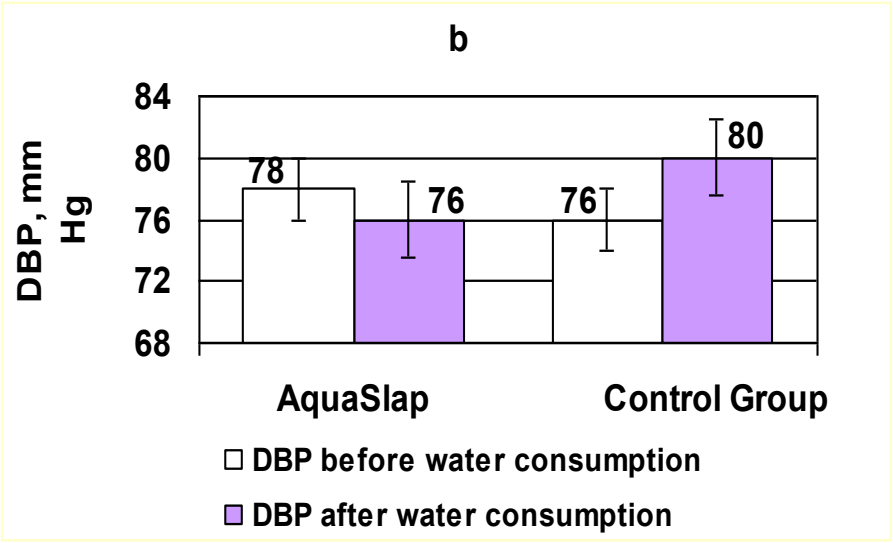
The differences in blood indicators

The significant (p<0,05) differences in blood indicators before and after AquaSlap water consumption by test persons

Indicator, unit of measurement	The range of norms	Before consumption	After consumption
Complete blood count			
Eosinophils, %	**0-5,0**	**2,8±0,4**	**1,1±0,3**
Basophil leukocytes, %	**0-1,0**	**1,0±0,0**	**0,4±0,1**
Lymphocytes, %	**19,0-37,0**	**40,5±1,9**	**35,1±1,6**
Monocytes, %	**2,0-10,0**	**4,8±0,3**	**7,0±0,5**
Biochemical blood analysis			
Clorides, mmol/l	**98-107**	**102,6±0,1**	**101,5±0,3**
Hormonal blood tests			
T3 - triiodothyronine, ng/ml	**0,8-2,0**	**1,5±0,1**	**1,2±0,1**
Thyroidstimulating hormone, mkmE/ml	**0,4-4,0**	**2,5±0,3**	**1,4±0,2**
Insulin, IU/ml	**6,0-27,0**	**5,3±0,8**	**8,0±0,7**

There were no any significant differences in average values of blood pressure

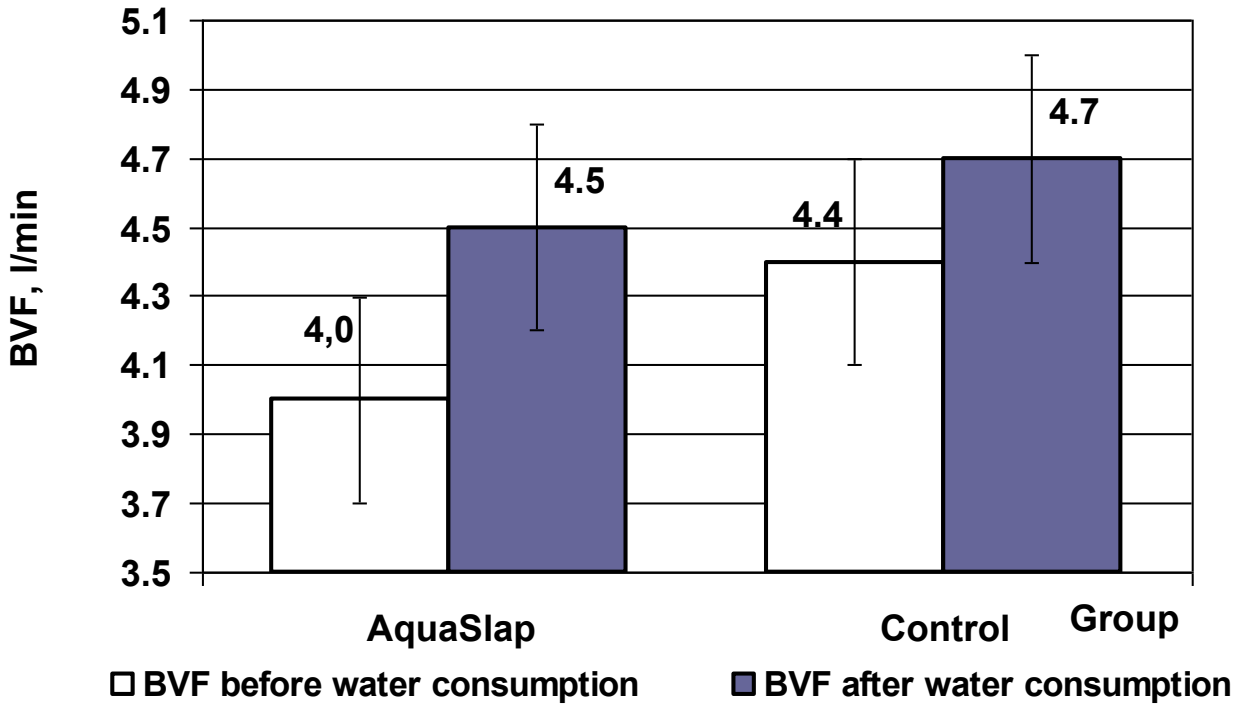




a - systolic blood pressure (SBP) b – diastolic blood pressure (DBP) before and after water consumption by test persons

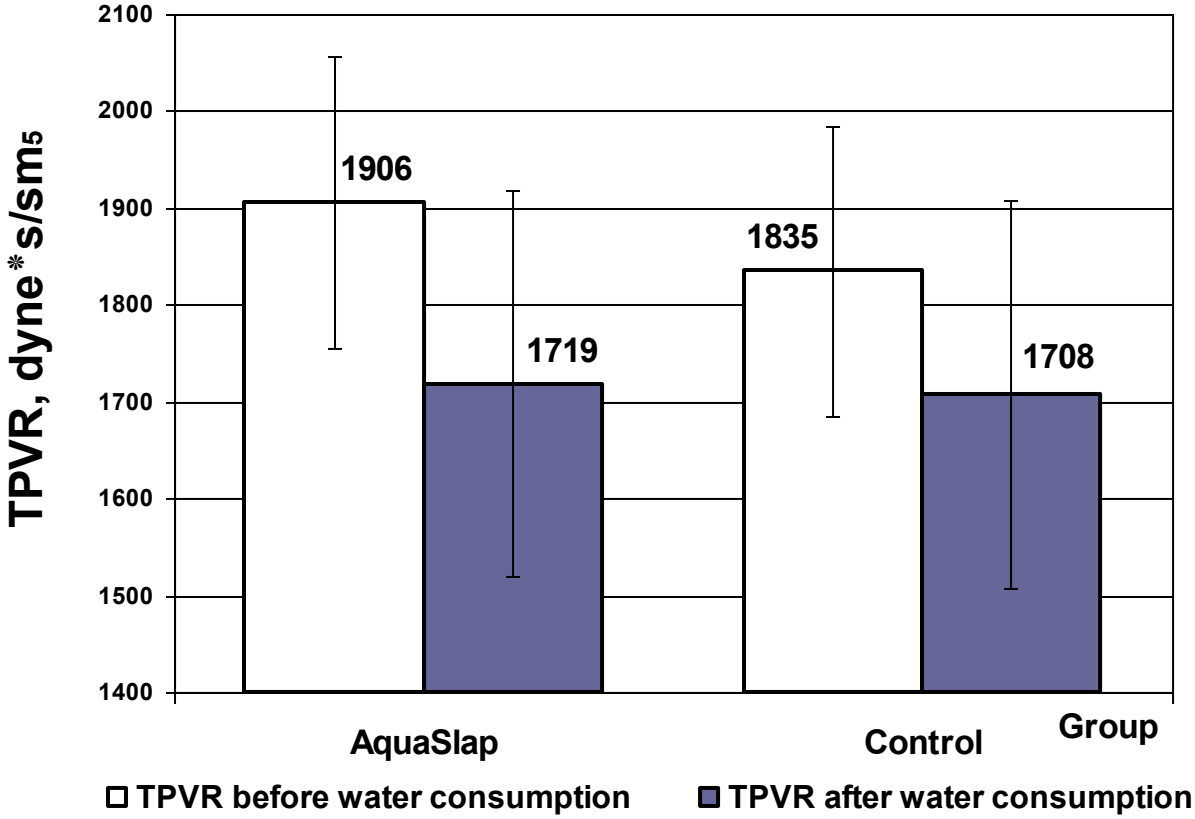
The blood volume flow per minute

Average values of blood volume flow per minute (BVF) before and after water consumption by test persons



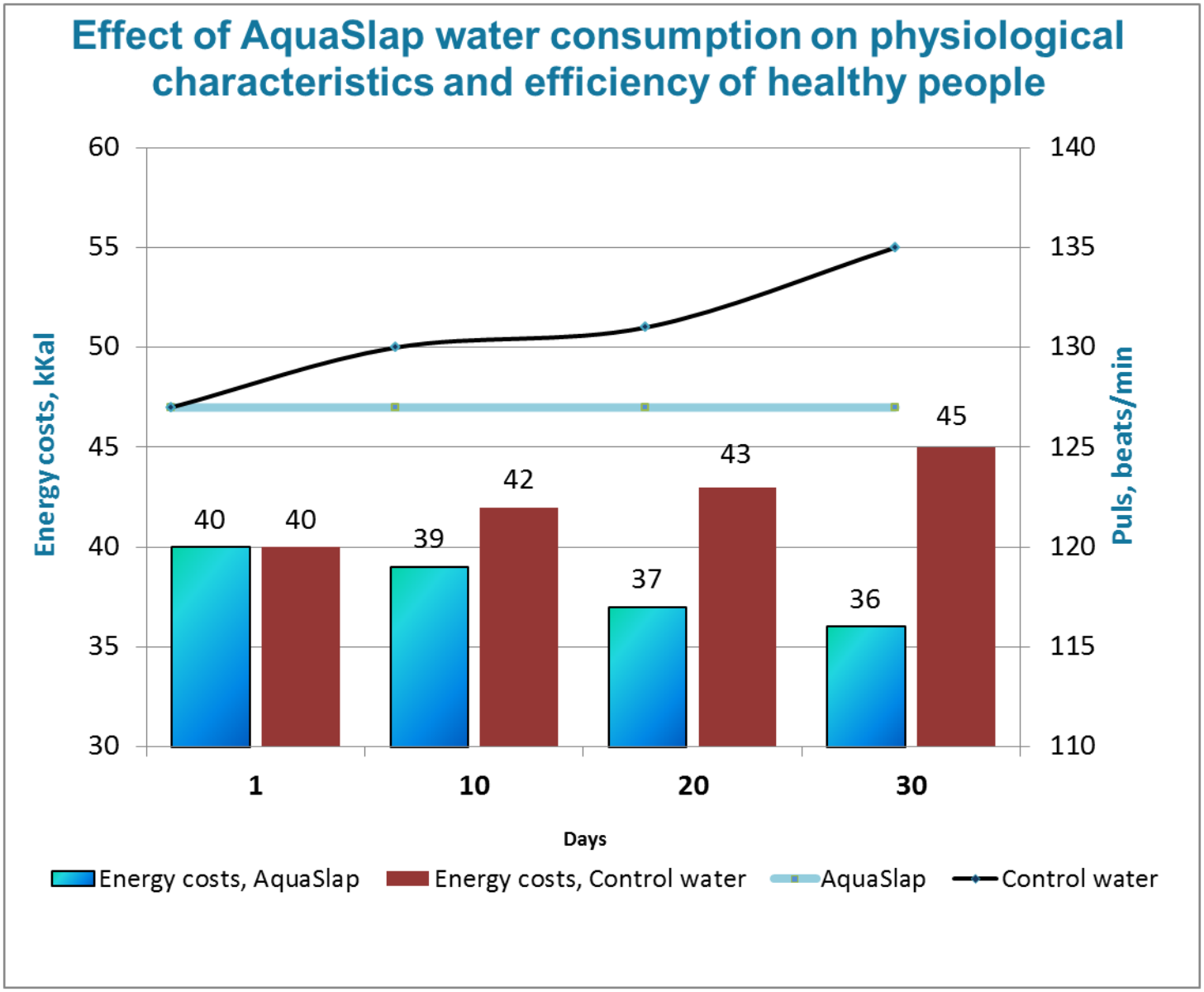
The peripheral vascular resistance

Average values of total peripheral vascular resistance (TPVR) before and after water consumption by test persons

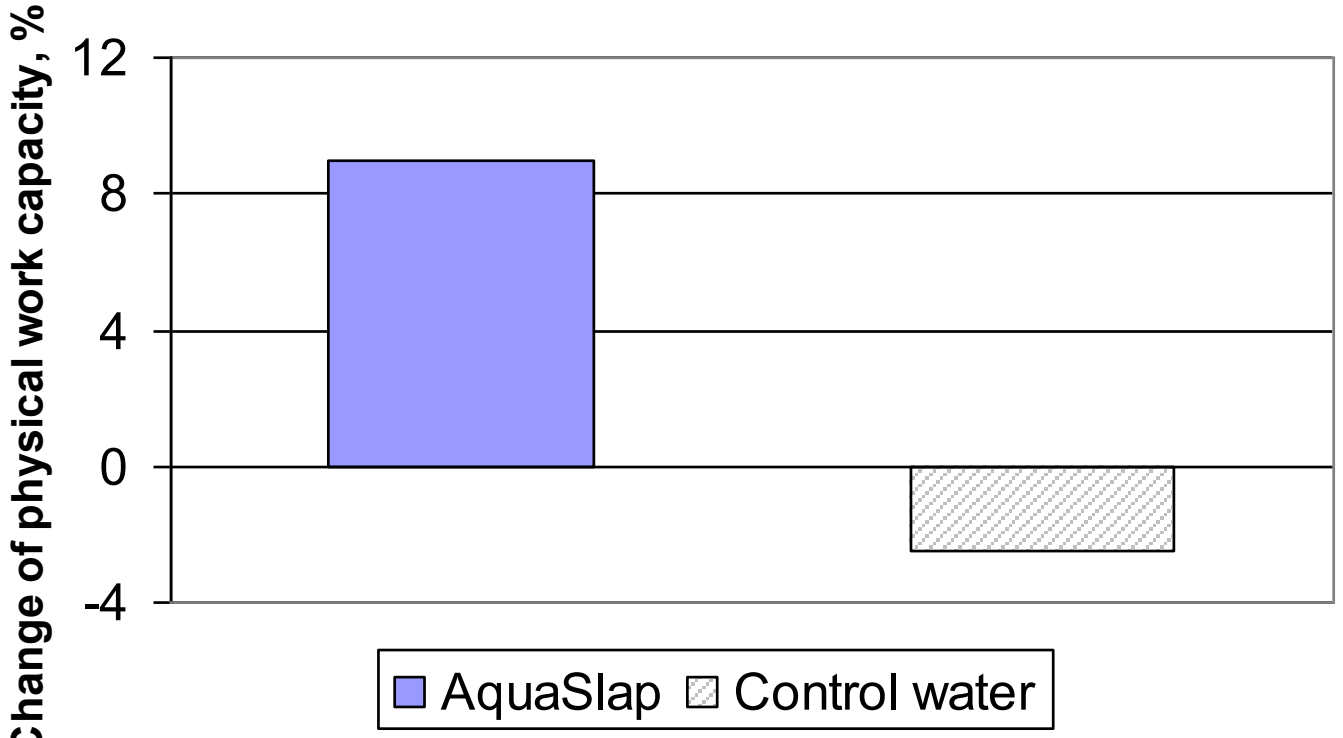


Gas exchange parameters

Drinking water	The change of level CO_2 emission, %	Heart rate, beats/min	
	After water consumption	Before consumption	After consumption
Group 1 AquaSlap water	**- 11**	**127**	**127**
Group 2 Control water	**+ 11**	**127**	**135**


Effect of AquaSlap water consumption on physiological characteristics and efficiency of healthy people
Energy costs, kKal
Puls, beats/min
60
55
50
45
40
35
30
140
135
130
125
120
115
110
40
40
39
42
37
43
36
45
1
10
20
30
Days
Energy costs, AquaSlap
Energy costs, Control water
AquaSlap
Control water

Change of physical performance after water consumption



Conclusions

- Water enriched with $^{1}H_{2}{}^{16}O$ facilitates mitochondrial respiration due to the de-inhibition of proton-coupled electron transfer

- The de-inhibition of proton-coupled electron transfer provides involvement previously arrested mitochondrial “facilities” in energy production in cells

- An improvement of energetic metabolism with water enriched with $^{1}H_{2}{}^{16}O$ seems to underlie major biological effects of the water

Conclusions

- Drinking AquaSlap™ water enriched with $^{1}H_{2}{}^{16}O$ improves functional performance in healthy people during aerobic exercises, a physiological state with high demand on energy production

- The consumption of AquaSlap™ leads to normalization hemodynamic parameters of healthy people

Drinking Water enriched with $^{1}H_{2}^{16}O$ has the significant potential to increase of energy resources of healthy people and represents a promising approach to improvement of quality of life of healthy people