

LIGHT WATER

**Opportunity for people all
around the world to take a step
towards vigorous and healthy life**

2012

Abstract

This presentation provides an opportunity to evaluate the potentials of Discovery in the fields of health care, improvement of one's working capacity and new possibilities in human life extension.

Our industrial technology of Light Water manufacturing is supported by fundamental scientific studies, protected by intellectual property rights, and is now ready for international commercial use - by private investment, or state investment in the project.



Except H₂O, natural water contains:

Mechanical, chemical and biological impurities.

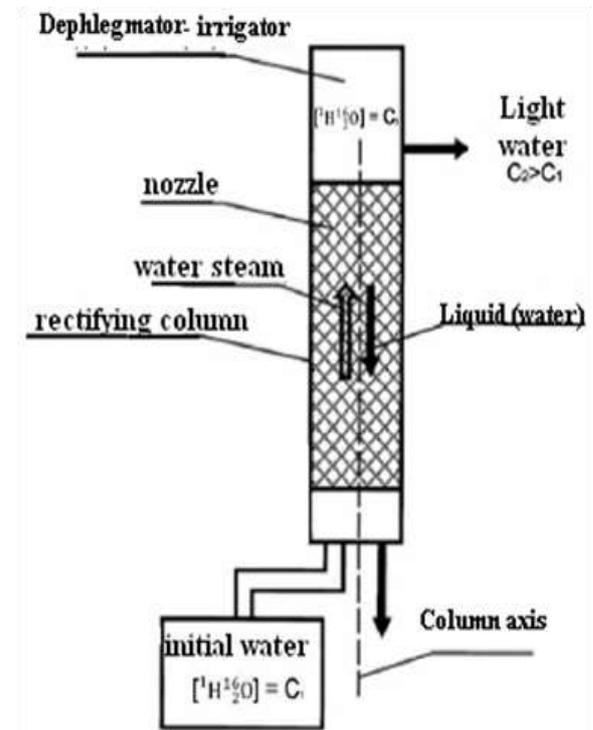
City tap water usually contains no more than 0.5 g / l.

Mechanical, biological and chemical purification methods are applied to extract the impurities.

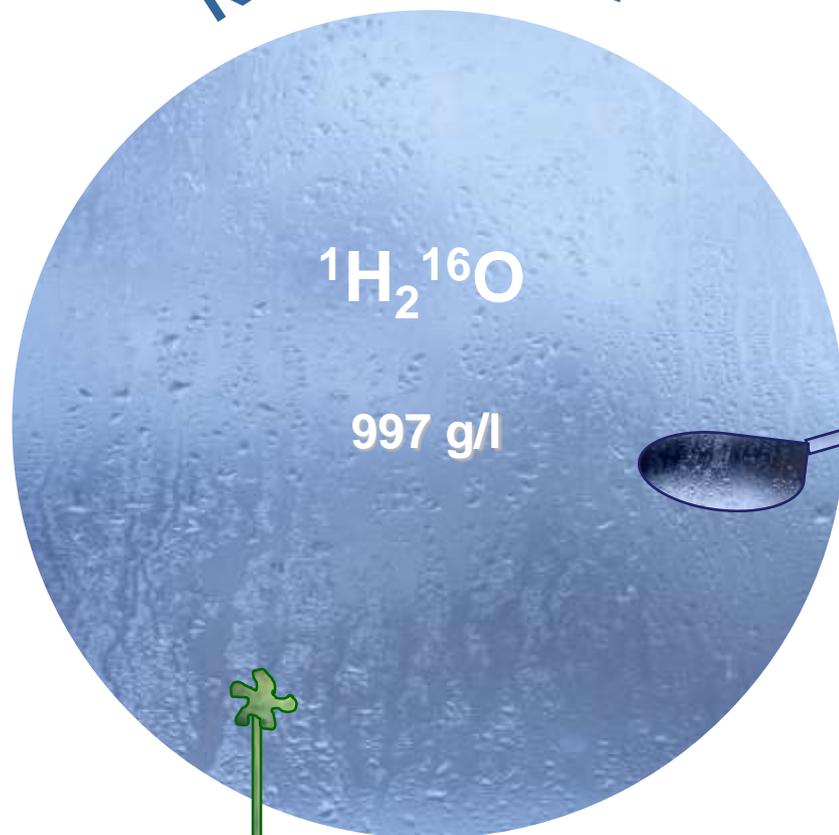
Isotopic "impurities" are heavy molecules of water.

Ordinary water contains about 2.9g / l.

For industrial removal of heavy molecules we apply low-temperature vacuum rectification.



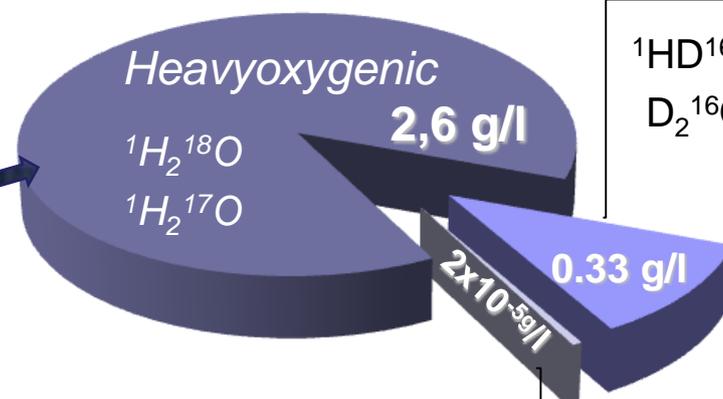
Natural water



Other impurities
0,5 g/l

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

Heavy water



Mixed

$D_2^{17}O$
 $^1HD^{18}O$
 $D_2^{18}O$
 $^1HD^{17}O$

Light water IS Ordinary water, minus heavy water

Light water is physically different water

Parameters	Light water D/H = 4 ppm O ¹⁸ /O ¹⁶ =757 ppm	Water with natural isotopic composition D/H = 140 ppm O ¹⁸ /O ¹⁶ =1966 ppm	Heavy water 99% D ₂ O
Density, g/cm ³	0,99692	0,99820	1,10424
Kinematical viscosity, mm ² /s	0,987	1,012	1,2742
Surface tension, mN/m	75,172	72,860	67,800
Melting point, °C	-1,5	0	+ 3,8
Time of spin-spin protons' relaxation - T ₂ , c	0,347 ± 0,024	2,000 ± 0,140	-
Contribution to the overall self-diffusion coefficient from collective motions (D _l x10 ⁹), m ² s ⁻¹	0,63	0,46	0,528
Lifetime of molecules in an oscillating condition around the center of balance (τ ₀ x10 ¹²), s	2,08	2,80	2,79

V. Goncharuk, et al. Physicochemical Properties and Biological Activity of the Water Depleted of Heavy Isotopes // Journal of Water Chemistry and Technology, 2011, Vol. 33, No. 1, pp. 8–13.

Physical properties of water differ in dependence from density (lightness)

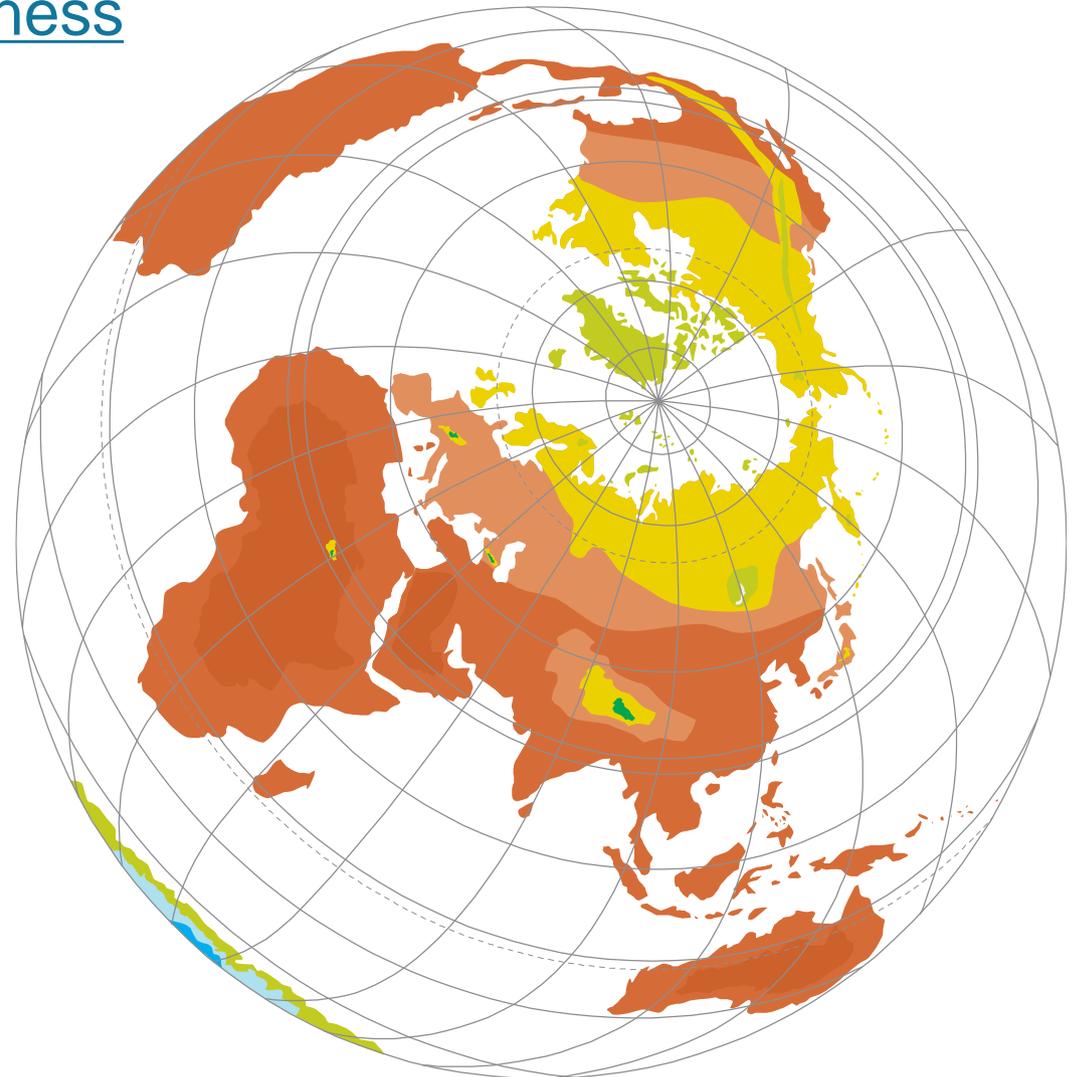
Natural water differs in it's lightness around the globe

Source of water	Relative lighting, mg/kg
Equatorial water (VSMOW)	0
Tap water - Moscow	-20
Thawed (snowy) water from the top of Elbrus	-80
Water from the Greenlandic ice (GISP)	-130
Water from the Antarctic ice (SLAP)	-290

heavier



lighter



$99.73 \text{ mol.}\%(\text{VSMOW}) < {}^1\text{H}_2{}^{16}\text{O} \leq 99.76 \text{ mol.}\% (\text{SLAP})$

VSMOW and SLAP — international (Vienna) standards of isotopic composition of natural water

Mountain thawed water is significantly lighter than oceanic water 6

Heavy water is used:

In nuclear industry



In diagnostic medicine



We haven't found any scientific proof indicating that heavy water plays any essential role in the biochemistry of living beings – on the opposite, there is plenty of evidence that heavy water is harmful for any live subjects.

Biological properties of heavy water

Tested objects	Concentration D ₂ O, %	Effect
Ounicellular algae (Scenedesmus)	38,5	cessation of growth and development
Higher plants (sunflower and wheat)	100 (watering)	seeds do not germinate
Lower animals: - paramececa - flat worms	92 90	- death in 48 hours - loss of activity after 2 hours, death after 3 weeks
Higher animals (mice)	99,5 (D ₂ O parenterally)	Death on the 5 th day

Y. Sinyak, D. Rakov, B. Fedorenko Institute of bio-medical studies,
Russian academy of Science

Heavy water is an inhibitor (decelerator, reducer) of biochemical reactions

Tobacco plants grown on various concentrations of heavy water



Tobacco plant (*Nicotiana tabacum*)
Katz and Krespi:
"Isotope Effects in Biological Sysytems"

Heavy water is an inhibitor of biochemical processes

Chemical reaction: $A \longrightarrow B$

Isotope effect = $A \rightarrow B(\text{H}_2\text{O}) / A \rightarrow B(\text{D}_2\text{O})$

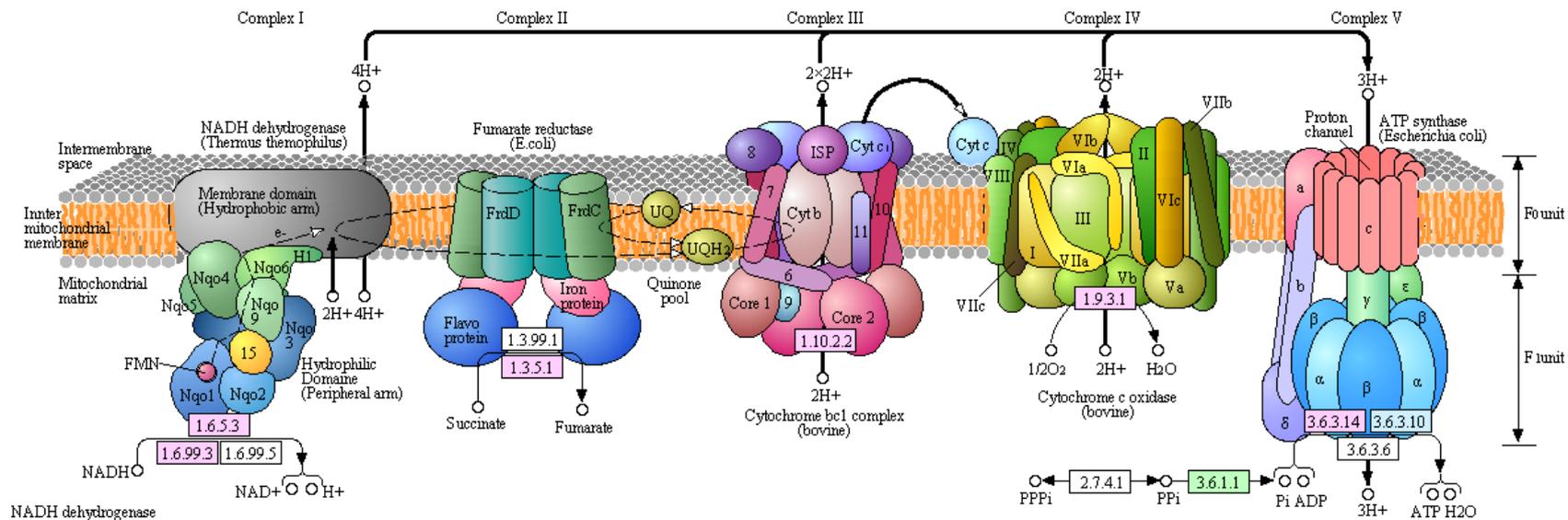
Reaction	Isotope effect
Enzyme catalysis	≈ 2
Oxidation-reduction reaction* (Transfer pair $\text{H}^+ - e$)	$30 \div 455$

* 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

Water consisting of heavy molecules slows the chemical reactions.

OXIDATIVE PHOSPHORYLATION

RESPIRATORY CHAIN OF MITOCHONDRIA

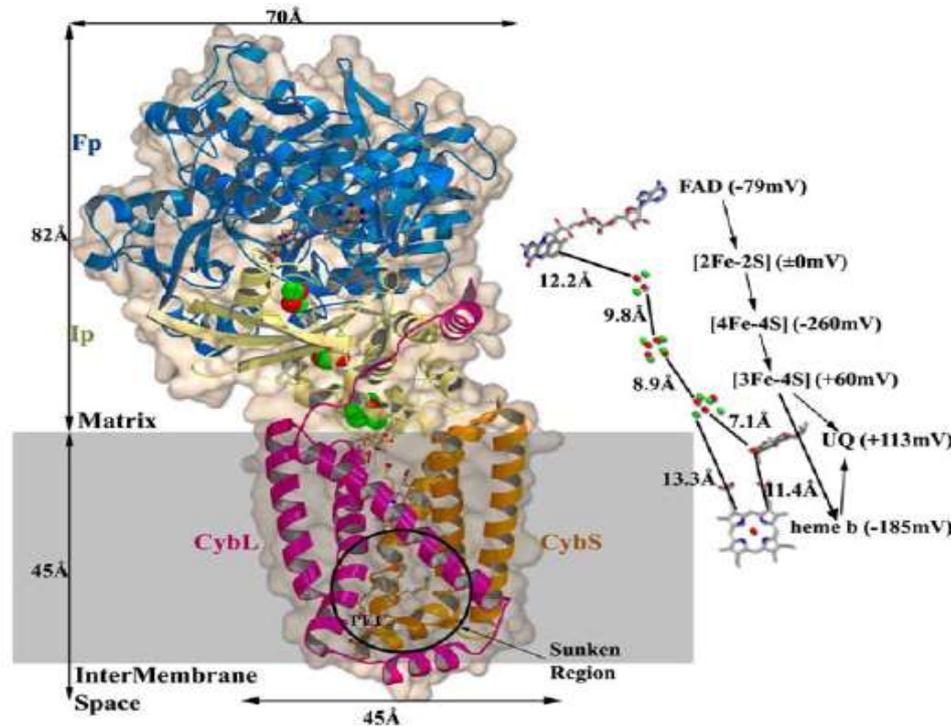


In biological systems where long sequences of reactions occur, processes of cooperative effects and amplification stages of receptor signals, 0.27% (usually imperceptible) begin to slow down significantly in the presence of heavy water.

The molecules of heavy water inhibit the reactions in the mitochondrial respiratory chain - the main energy reactions in most organisms.

The molecules of heavy water inhibit the reactions in the mitochondrial respiratory chain – the main energy reactions in most organisms

Complex II
Part of respiratory chain of mitochondria



Mitochondrial respiratory chain is distinguished by the cascade reaction

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



Reduction of heavy isotope loading leads to the better energy release in the cells and generally increases the energy in living organisms. The organisms can use these additional resources for better resolution of potential complications during it's living activity.

Prolonged use of light water in the Antarctic, Greenland and high altitude areas showed no adverse effects on human health.

Embryological study on the development of the grass frog (*Rana Temporaria*) in waters with different isotopic composition showed that all organ and tissue systems developed in accordance with the normal development of embryos and tadpoles of *Rana temporaria* - both in light water, and in control water.

The results of such pilot studies demonstrate the absence of negative (pathogenic) effects of light water on the growth and development of the grass frog.

S. Soloviev, S. Saveliev, A. Proshina

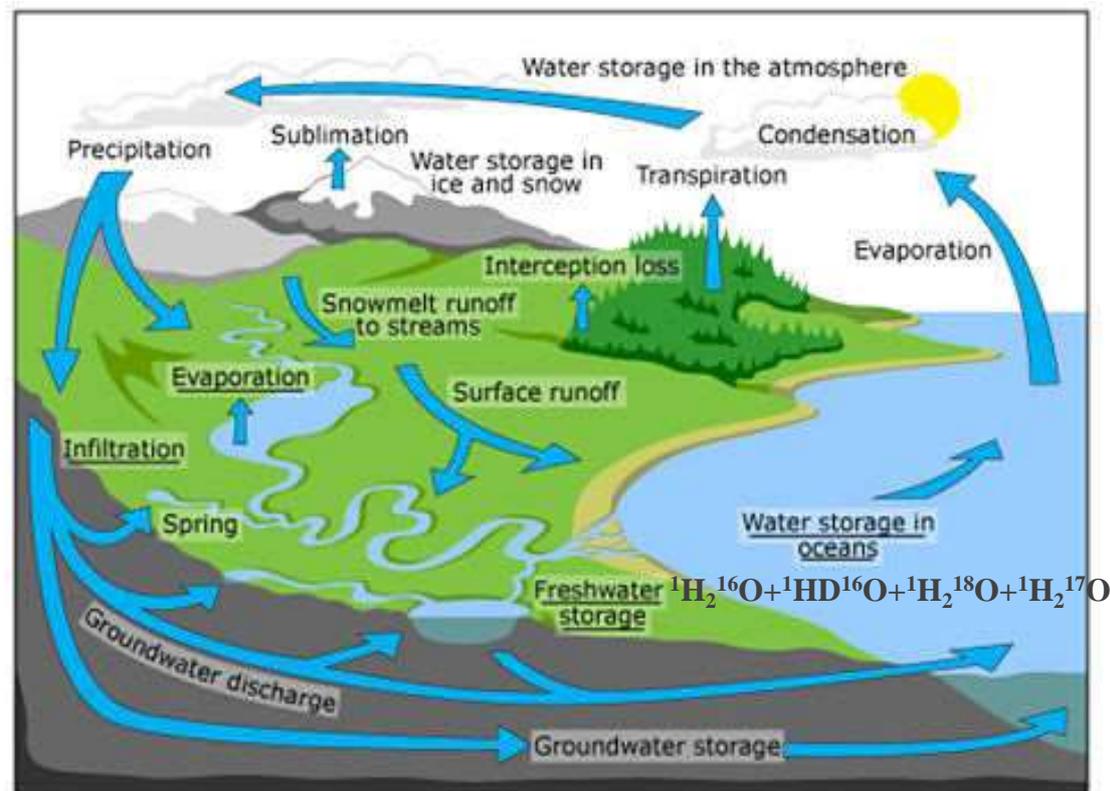
Institute of human morphology. Russian Academy of medical science

All living beings thrive in lighter and cleaner environment

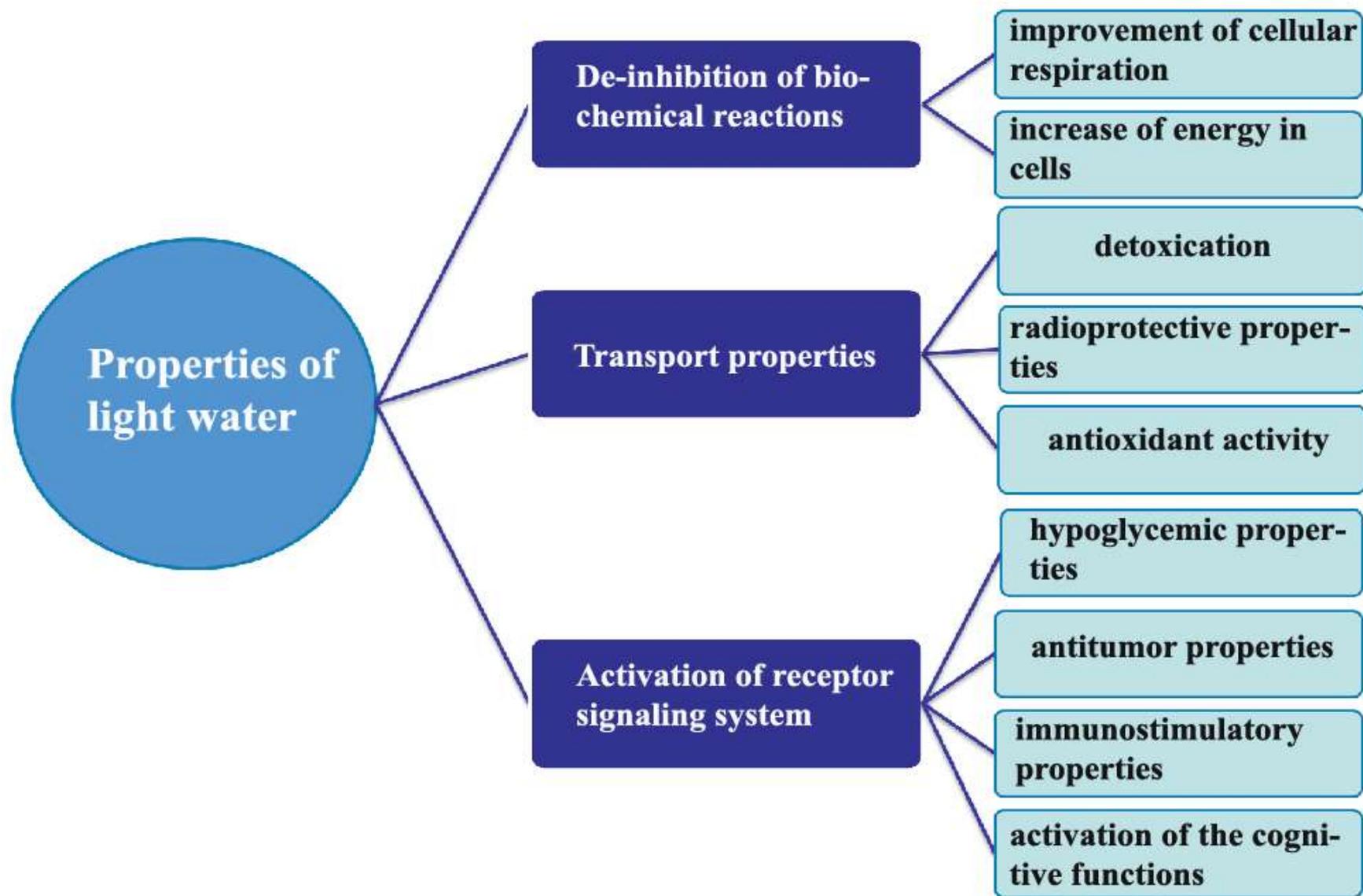
Almost all the water we drink is by 99.7% the light water

The technology of light water production by means of low-temperature multiple vacuum distillation simulates the natural water cycle.

We do not create or add any new chemical components to the water. Only "impurities" of heavy water are removed.



All living beings thrive in lighter and cleaner environment

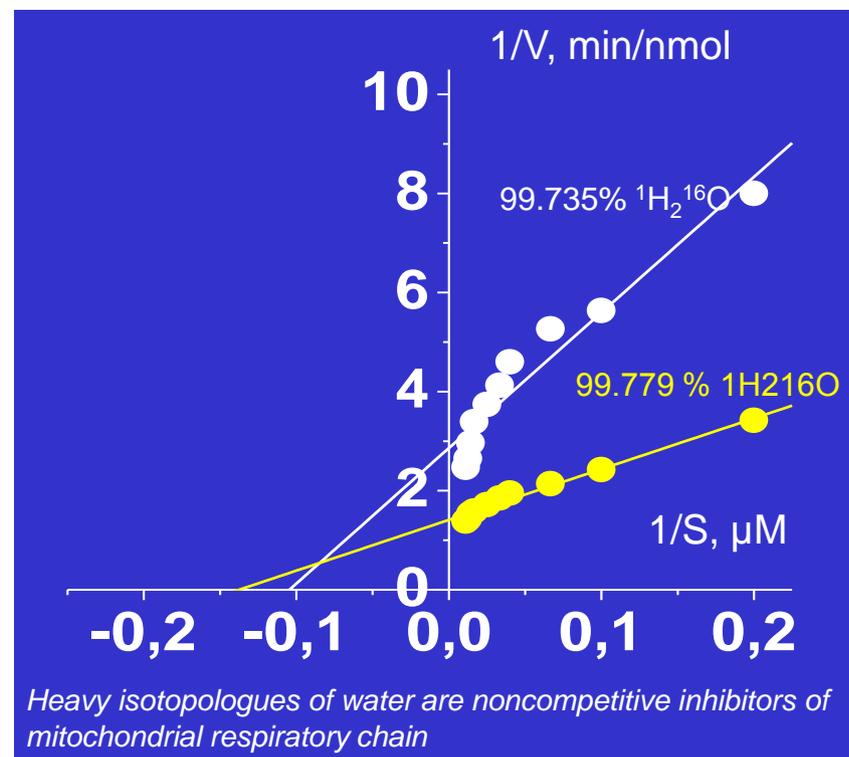
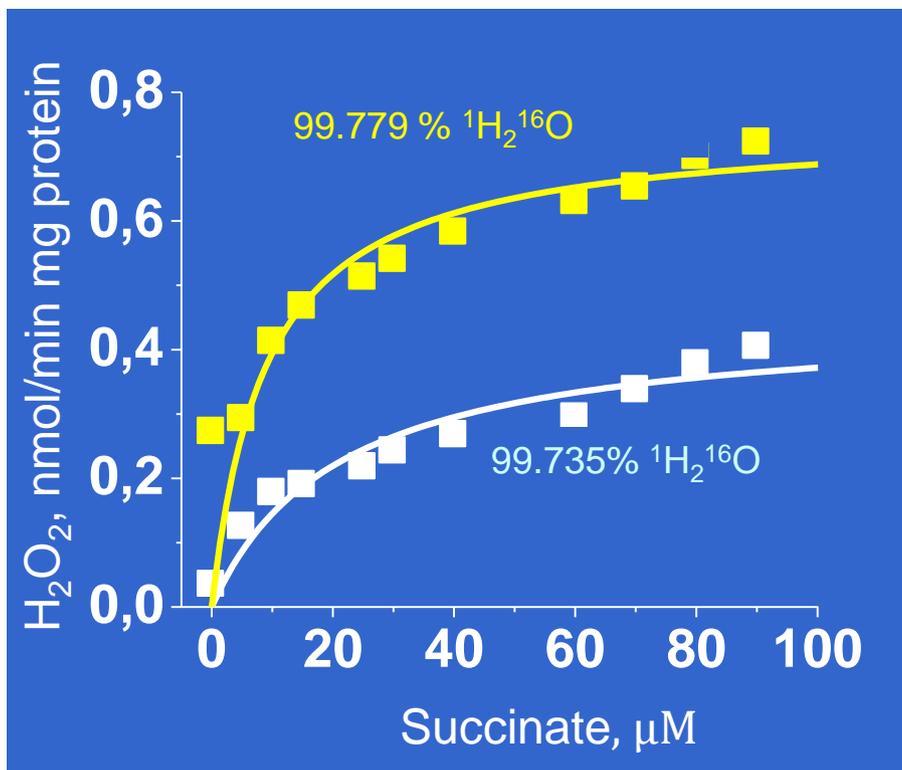


De-inhibition of biochemical reactions

Unlocking the reactions
of the mitochondrial
respiratory chain

Increase of all energy resources
of the whole organism

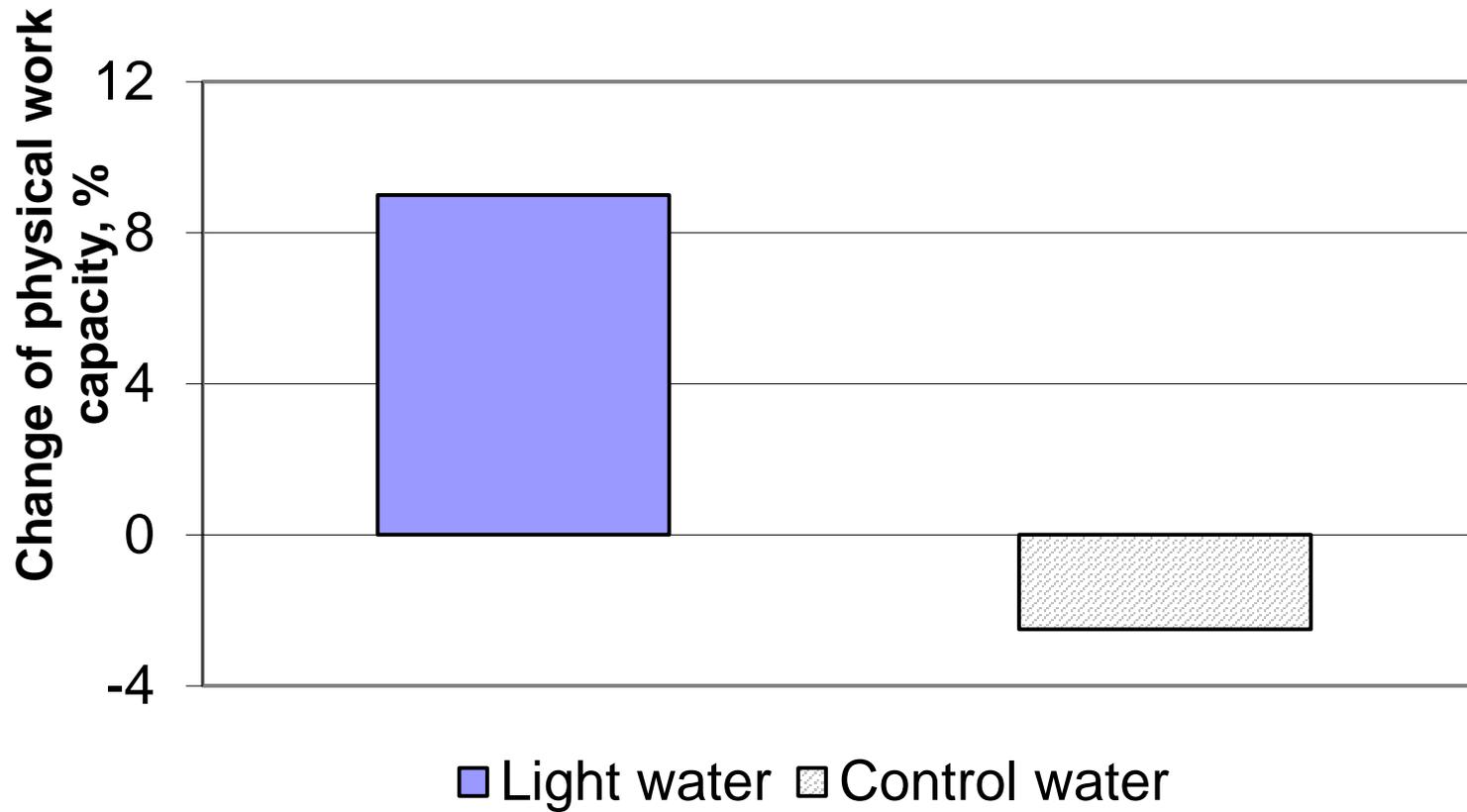
Kinetics of hydrogen peroxide generation as a marker of cell energy



Model - isolated rat liver mitochondria in the presence of 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

Light water deinhibits (unlocks) the enzymatic reaction during generation of hydrogen peroxide and improves cellular respiration

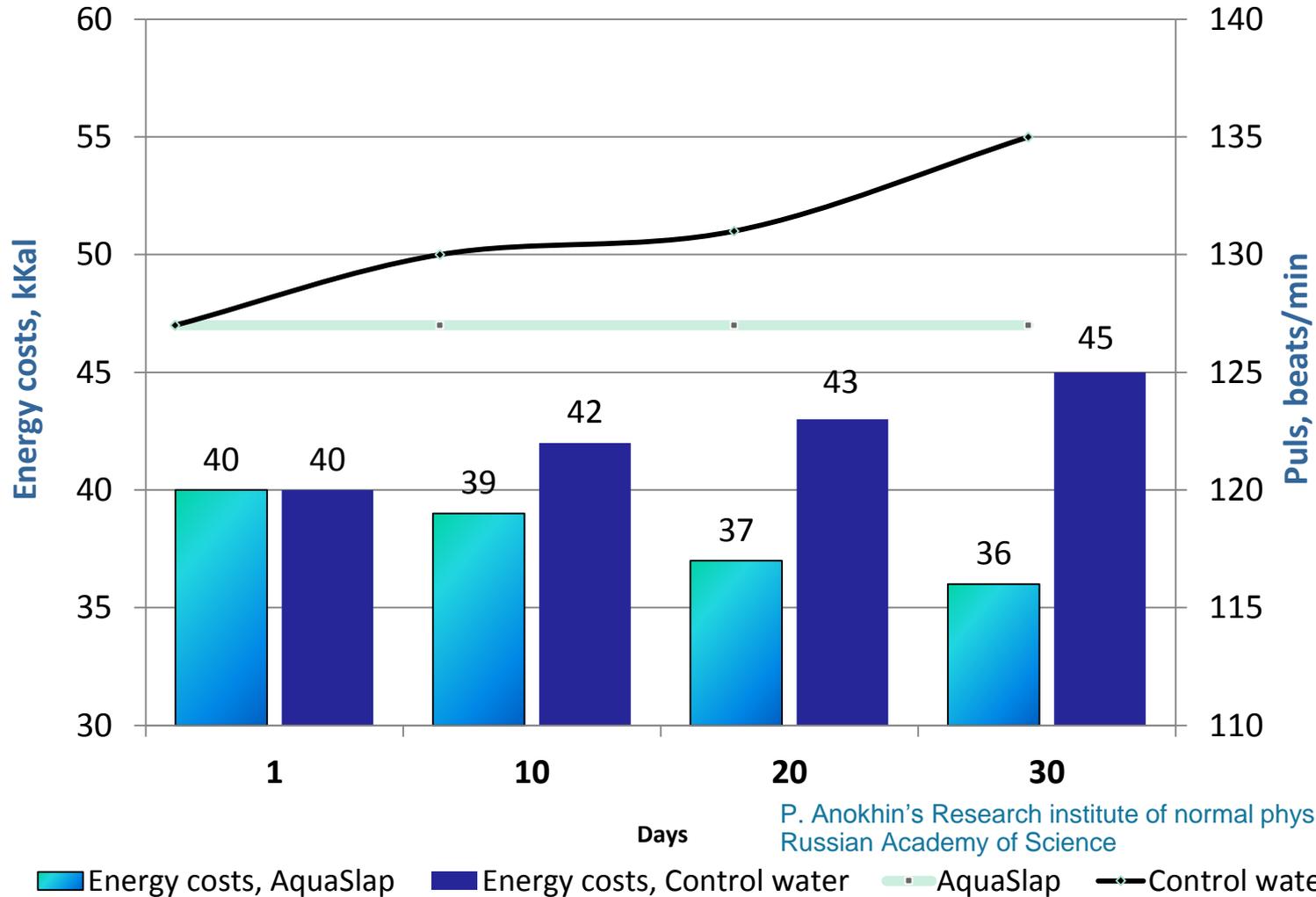
Change of physical performance after water consumption in humans



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 Light water	- 11	127	127
Group 2 Control water	+ 11	127	135

Effect of Light water consumption on physiological characteristics and efficiency of healthy people

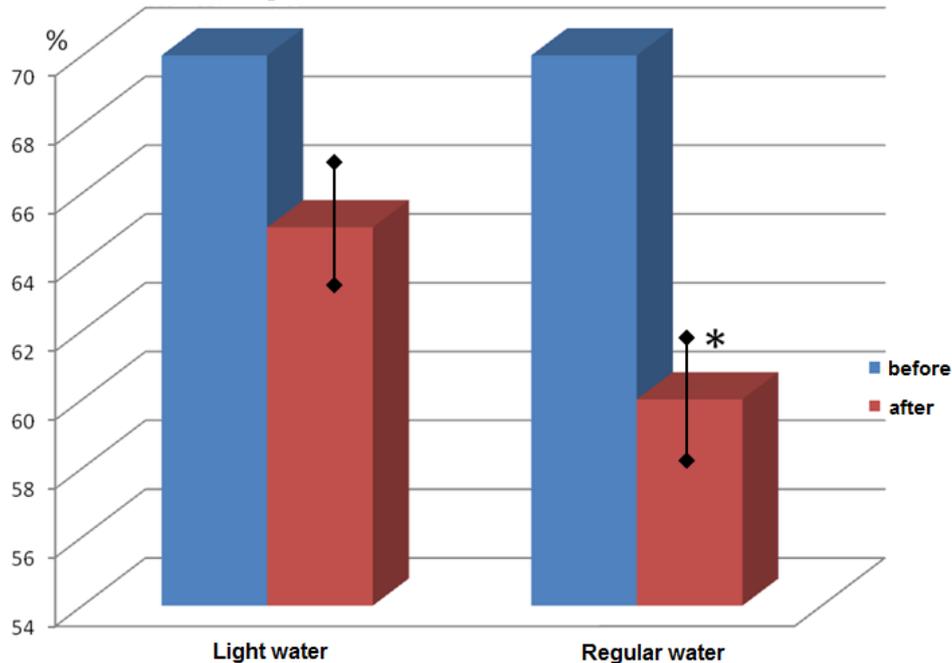


P. Anokhin's Research institute of normal physiology
Russian Academy of Science

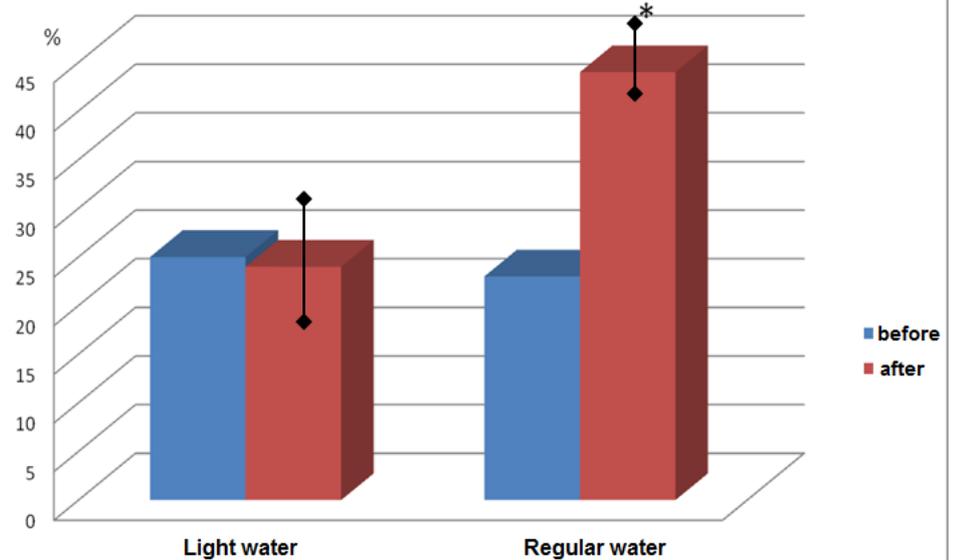
**De-inhibition of biochemical reactions is a basic property of light water.
By drinking light water one can increase the body's energy resources.**

Human reaction adequacy after ingestion alcohol and drinking light water afterwards

Picture 3-A. Human operational memory index (%): before and after intake of alcohol (vodka, 1g/kg ethanol to body weight), with following intake of regular water and light water.



Picture 5-A. The total of car crashes after testing subjects on virtual "Auto racer" simulator before and after intake of alcohol (vodka, 1g/kg of ethanol to body weight scale), with following intake of regular water and light water.



* - the difference was monitored by Wilcoxon test at $p \leq 0,05$ as compared to initial setup (before intake) and is correct

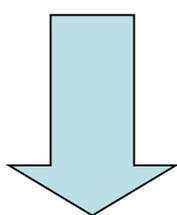
All tested subjects reported little or no hangover at all when taking light water after drinking alcohol
 Russian NHS narcology research center. Laboratory of toxicology.

Light water seemingly normalises psycho-physiological functions during post-intoxication period

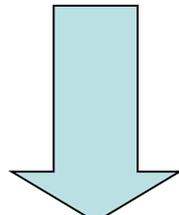
- **Water enriched with $^1\text{H}_2^{16}\text{O}$ facilitates mitochondrial respiration due to the de-inhibition of proton-coupled electron transfer**
- **The de-inhibition of proton-coupled electron transfer provides involvement of previously “arrested” mitochondrial activities thus increasing natural energy production in cells**
- **An improvement of energetic metabolism with $^1\text{H}_2^{16}\text{O}$ enriched water seems to underlie major biological effects of the water**

**Drinking $^1\text{H}_2^{16}\text{O}$ enriched Water has a
significant potential
in increase of human energy resources - and
offers
a promising approach
in improvement of human life quality and life
span in general**

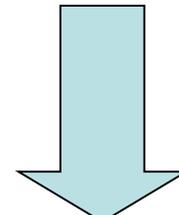
Transport properties of light water



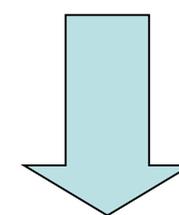
Effective delivery
of different substances
and media



Accelerated withdrawal
of harmful
substances
from the body



Radioprotective
properties



Antioxidant
properties

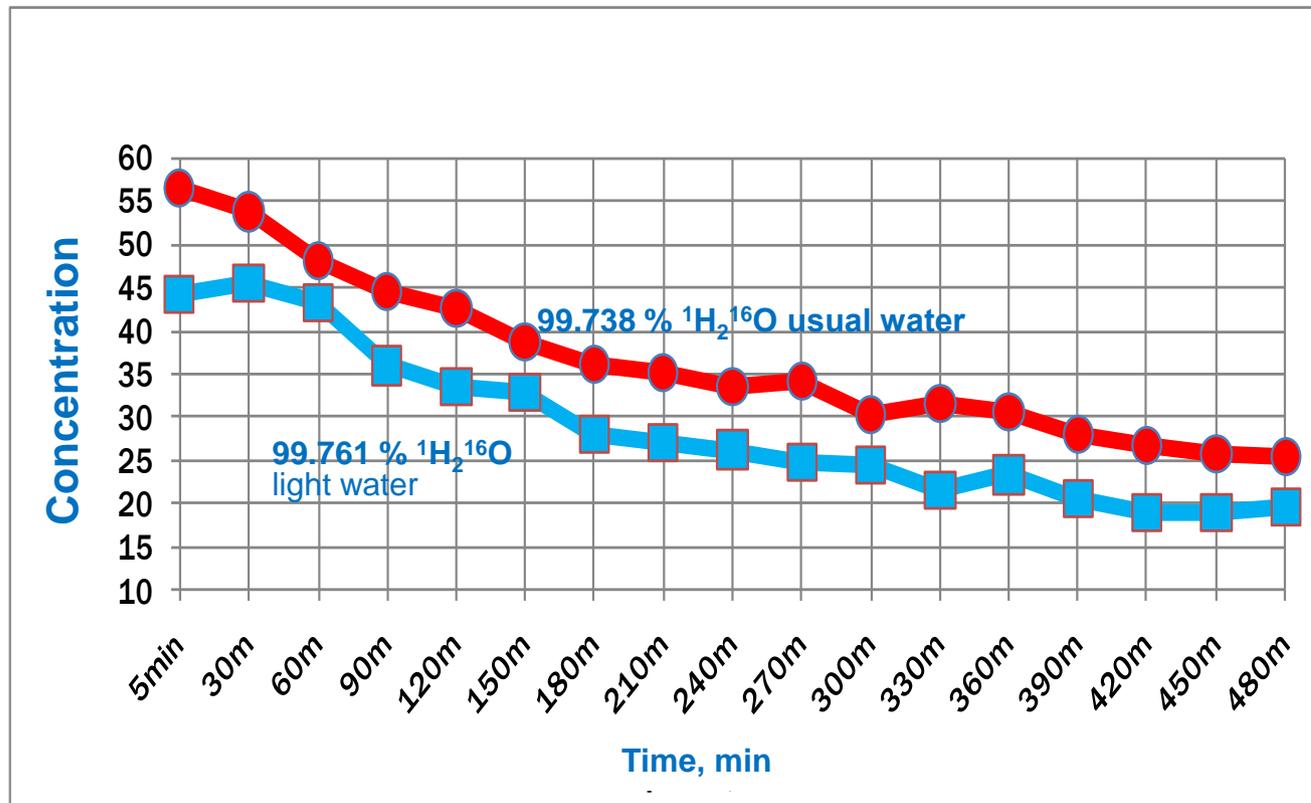
The effectiveness of preparation delivery

<u>Recombinant interferon-alpha</u>		
Method of delivery	Control water	Light water
	The concentration of interferon in the plasma, mg/ml	
Transdermally (through the skin)	0,4	3,6
Transmucosal (through the mucosa)	3,7	15,0
<u>Recombinant insulin</u>		
Method of delivery	Control water	Light water
	Blood glucose level, mmol / l	
Transdermally (through the skin)	10,7	8,3
Transmucosal (through the mucosa)	9,7	7,3

FMBA Russia

Light water provides a more efficient biological delivery of various substances and media

The elimination rate of "methylene blue", dissolved in the light and control water



Model - the olfactory paired organ of albino clawed frog larvae

T. Burdeynaya, A. Chernopyatko, E. Grygoryan. The effects of light water on elimination of marked dye from olfactory system of *Xenopus laevis* larvae. *Water: chemistry and ecology*, 2011. - №9 - C.86-91

Light water provides a rapid withdrawal of harmful substances from the living organism

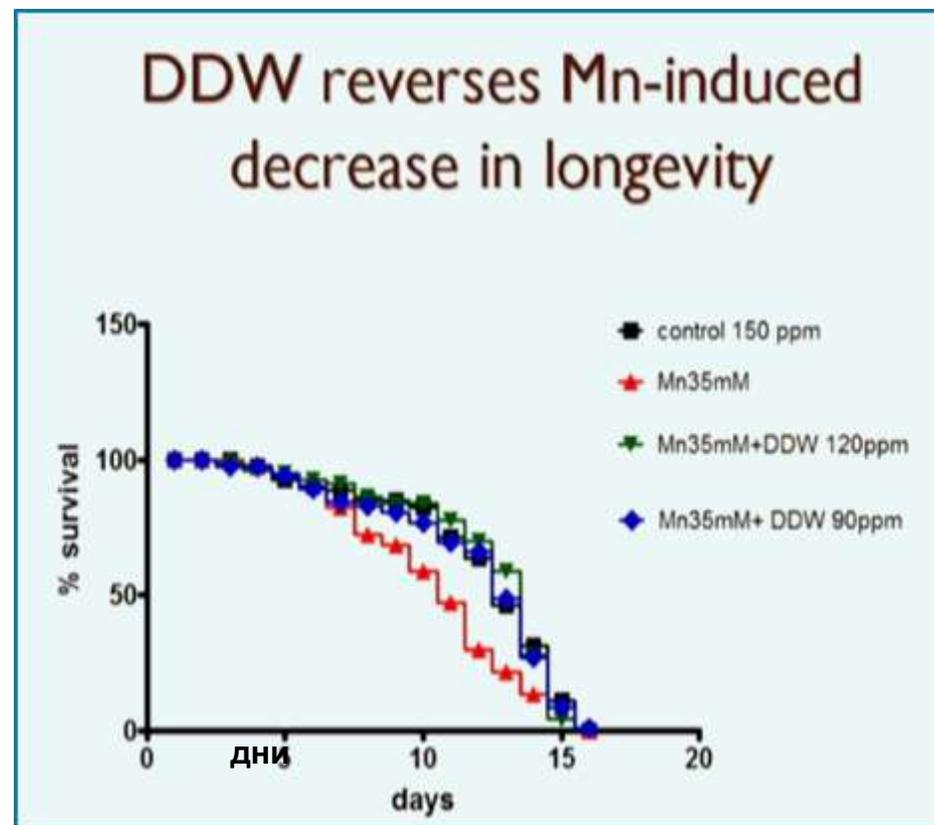
Protection from environmental hazards

Concentration of cadmium in rat liver after intoxication

Terms of protocol	Cd mkg/g in liver
Control	0.020 ± 0.006
Intoxication with cadmium using control water as an ingestion and detoxifying media	45.65 ± 5.34
Intoxication with cadmium, using light water as a detoxifying media	17.46 ± 3.48
Intoxication with cadmium, using control water as an ingestion and detoxifying media	2.09 ± 0.59

Olariu L., Petcu M.D., et al.
The influence of deuterium depleted water in the experimental cadmium chloride intoxication on liver function in rats. *Lucrări Științifice Medicină Veterinară* Vol. XL, 2007, P.270-274.

Life expectancy of flatworms after manganese intoxication



Avila D.S., Aschner M (Vanderbilt Medical Center, Nashville TN, USA)
Protective Effects of DDW in a *C.elegans* model
1st International Symposium on Deuterium Depletion
13-14 May 2010, Budapest, Hungary

Light water helps can increase life expectancy in organisms living in dangerous environments by neutralising the negative effects of ecopollutants

Radioprotective properties of light water

In an experiment with mice (line Balb/c), which were irradiated by a 1000 rad dose, and then drank the light water, it was observed:

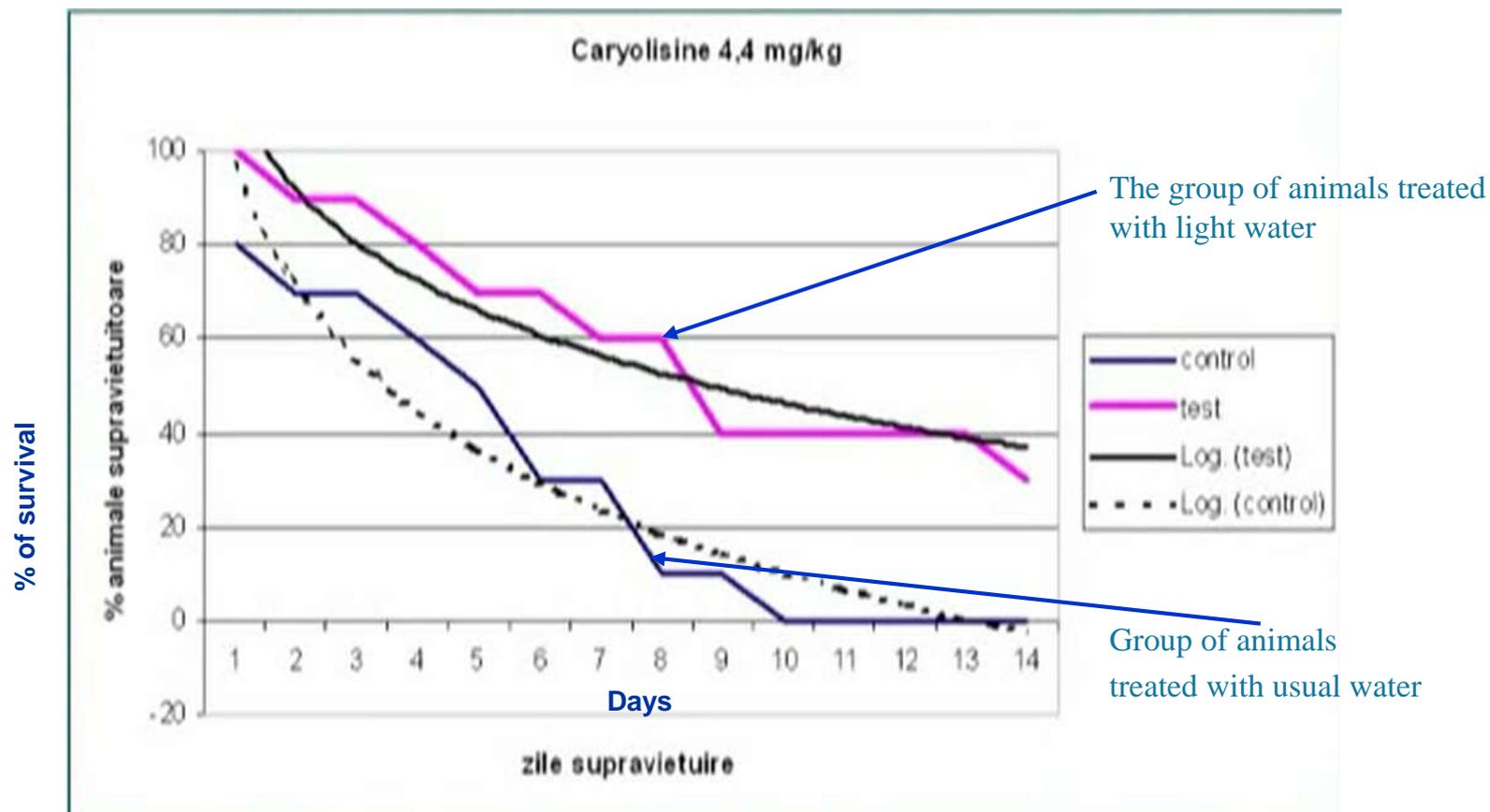
- increase in life expectancy
- less dramatic decrease in body weight compared with control animals

In mice (line Balb/c), which were irradiated by a dose of 550 rad and then drank the light water it was observed:

- increase in life expectancy
- increase in thymus weight compared with control animals
- decrease in mortality percentage in comparison with control group

Institute of medico-biological research in cooperation with Research institute of cancerogenesis
Russian Academy of Science.

Survival of test animals after sublethal doses of radiation



W. Bild, V. Bild, I. Haulica Environmental deuterium and cell proliferation: implications in radiobiology. 1st International Symposium on Deuterium Depletion 13-14 May 2010, Budapest, Hungary

Light water shows its radioprotective properties by reducing the damage caused from radiation exposure

Activation of receptor signaling system

hypoglycemic properties

immunostimulatory properties

antitumor properties

activation of cognitive functions

Medicinal use of Light water

Diabetes and metabolic syndrome

Infectious diseases

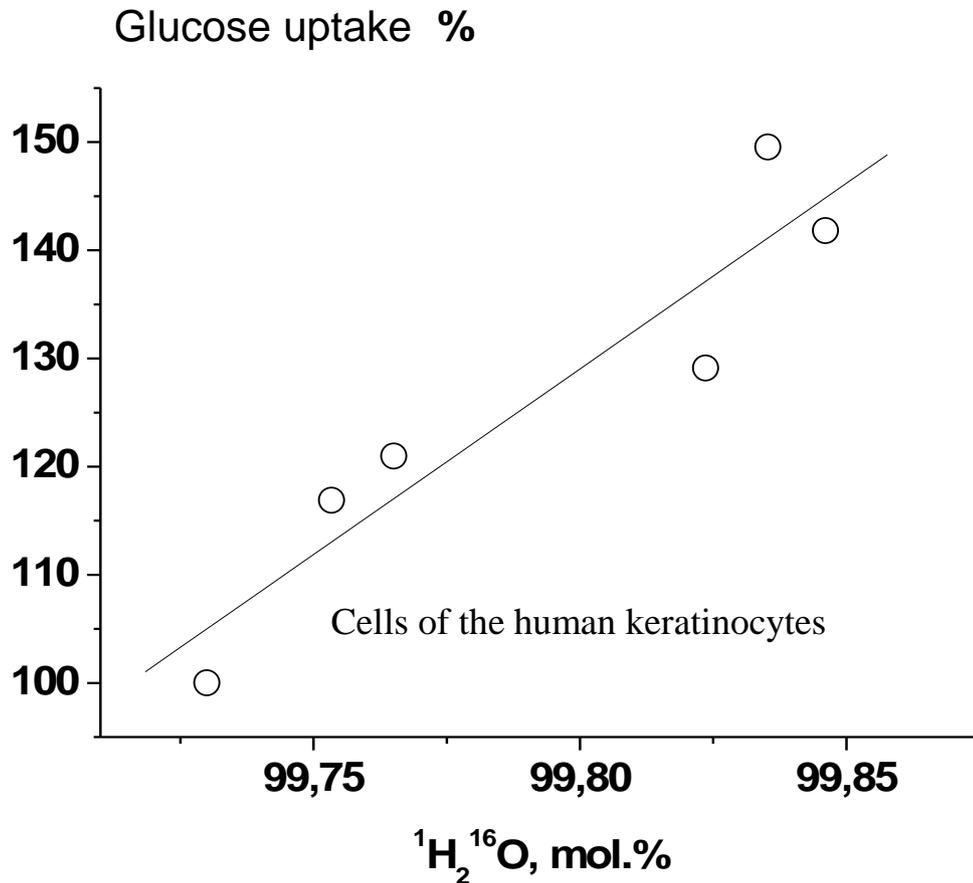
Oncology treatment

Alcohol and chemical detoxication

Cognitive disorders

Light water can be used as an additive to medical nutrition and help potentiate the curative effect in complex treatment of various disorders

The dependancy rate of glucose uptake by cells with different measures of "lightness" of water

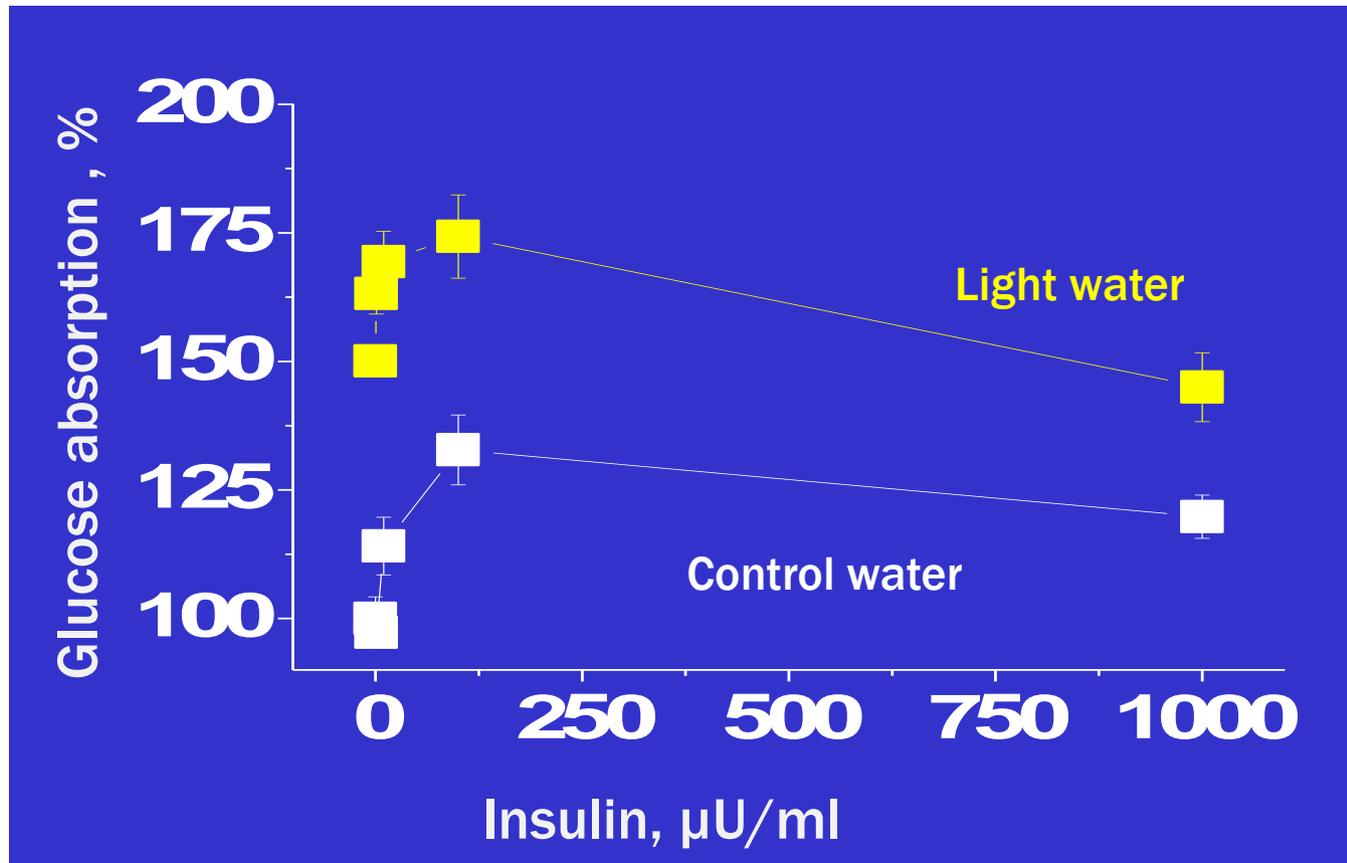


Reduced glucose uptake in cells is an indicator of metabolic disorders - such as diabetes, metabolic syndrome, increased insulin resistance.

FMBA Russia

Light water increases the metabolism of glucose

Glucose absorption by cells in presence of insulin

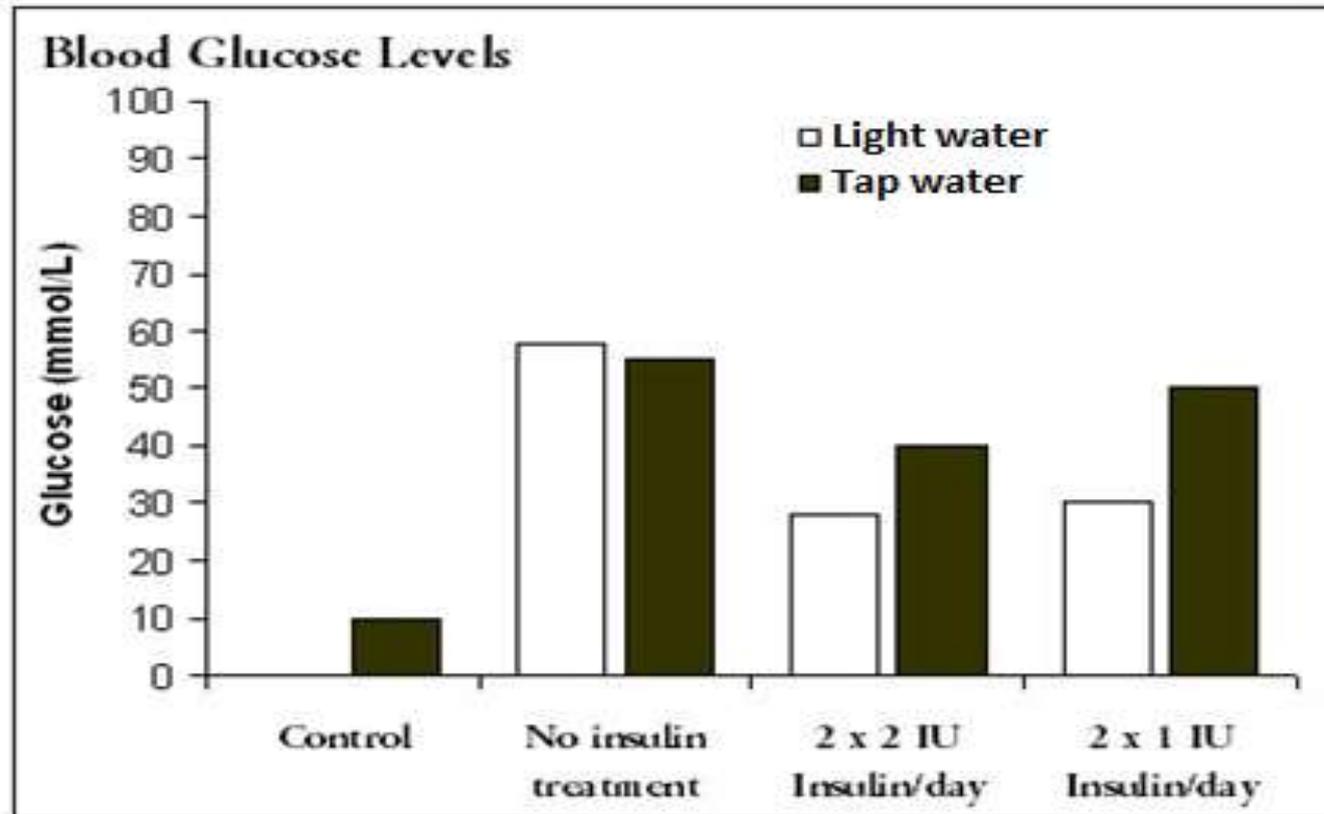


Cells of human cardiomyocytes

FMBA Russia

Light water enhances the performance of insulin

Effect of light water on the metabolism of glucose

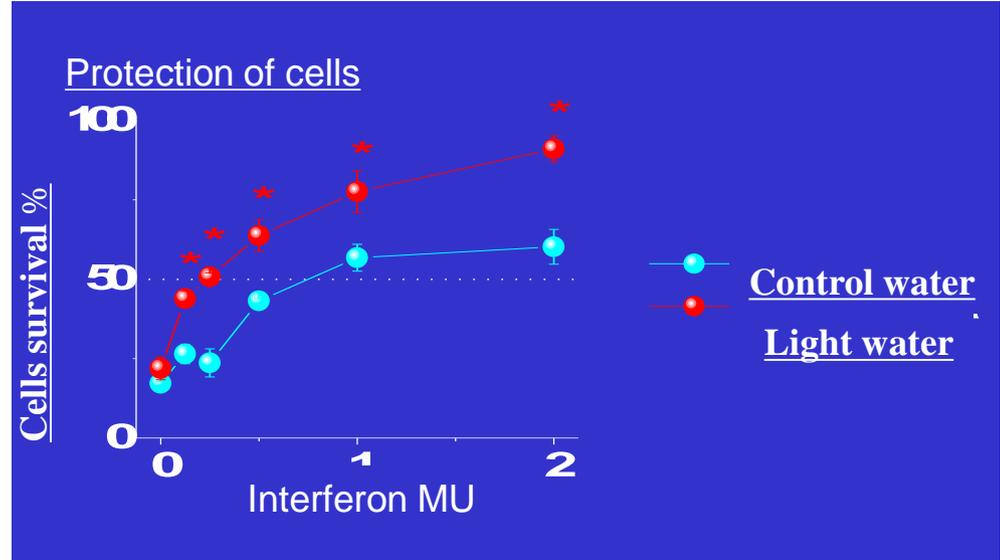
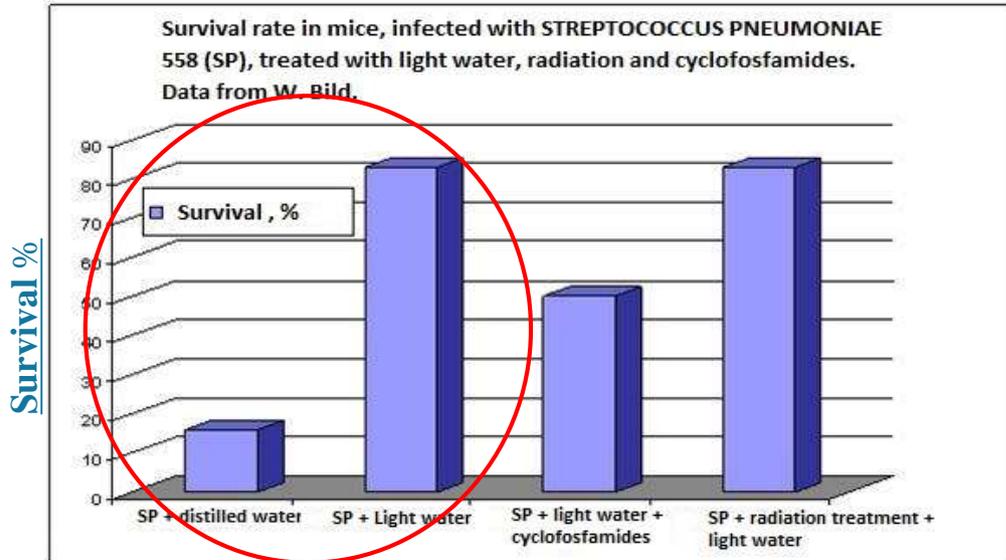


M. Molnár, K. Horváth, T. Dankó, G. Somlyai Effect of deuterium oxide (D₂O) content of drinking water on glucose metabolism in STZ-induced diabetic rats
 1st International Symposium on Deuterium Depletion 13-14 May 2010, Budapest, Hungary

Light water enhances the performance of insulin

Protection against infectious diseases

The antiviral effect of interferon-alpha



Human epithelial cells

FMBA Russia

Bild W, Stefanescu I, Haulica I, et al.
 Research Concerning the Radioprotective and Immunostimulating Effects of Deuterium-depleted Water.
 Romanian Journal of Physiology, 1999 Jul-Dec; 36(3-4): 205-18

Light water improves immunal activity and enhances the effect of antiviral drugs

Condition of patients with prostate adenoma (after 4 months of light water intake, as compared to the placebo group)

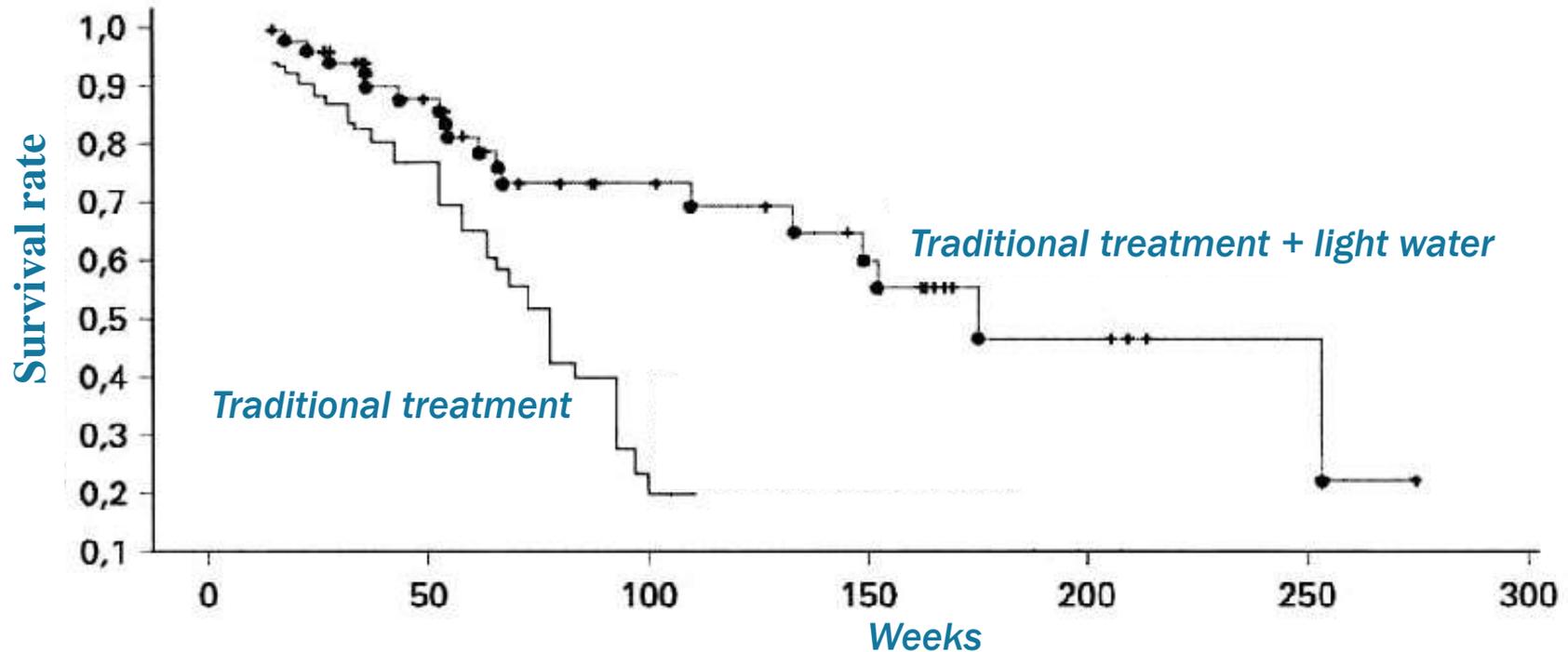
Changes in condition of patients	Light water	Placebo
The decrease in prostate volume (number of patients)	18	11
No change in prostate volume (number of patients)	1	5
The increase in prostate volume (number of patients)	2	5
The overall decrease in prostate volume, cm ³	171,6	108,1
The overall increase in prostate volume, cm ³	11,3	54,1

A.Kovács, et al.

Deuterium Depletion May Delay the Progression of Prostate Cancer
Journal of Cancer Therapy, 2011, 2, 548-556

***Light water is an effective tool in supporting therapy
of prostatic hyperplasia and prostatitis***

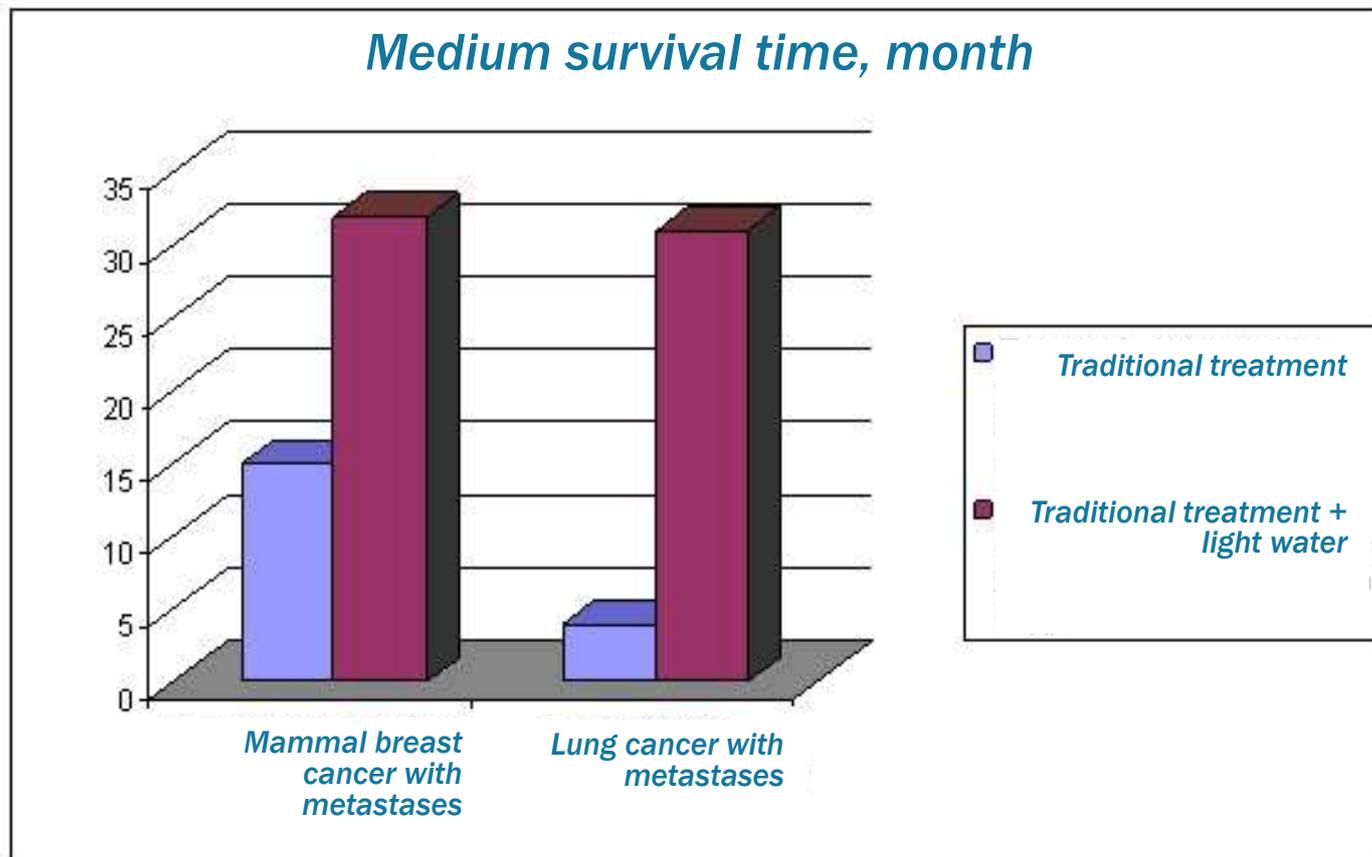
Effect of light water consumption on the level of survival of cancer patients



Gabor Somlyai, The Biological Effects of Deuterium Depletion, HYD Ltd., 2001

Light water is an effective additional tool in the complex antitumor therapy

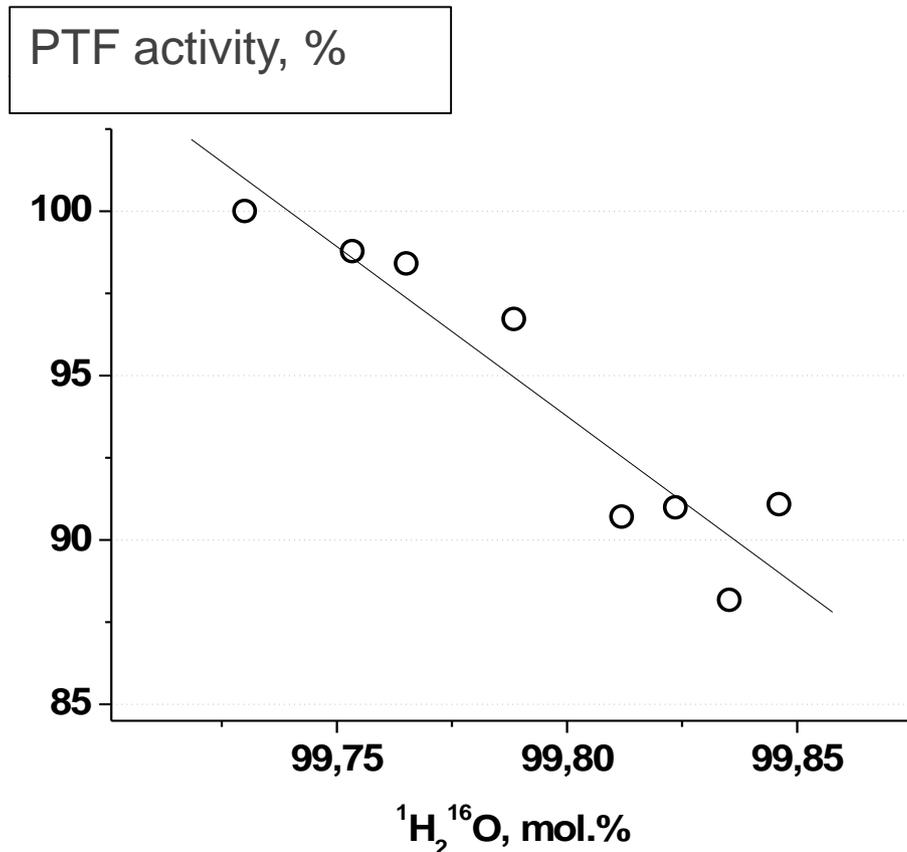
Results of the clinical tests carried out in Hungary



From October 1992 to August 2004 more than **1500 patients** with various types of cancer took part in clinical and pre-clinical studies in Hungary

Light water is an effective additional tool in the complex antitumor therapy

The dependence of enzyme activity according to the "lightness" of water



Protein-tyrosine-phosphatase (PTF) – enzymes are involved in negative regulation of cell receptors.

With age, or after stress, and in many other situations, the speed of signal transmission is reduced - which leads to various cognitive disabilities and behavioral disorders.

State research institute of pure Biochemical materials,
FMBA, Russia

Light water can be used as signal enhancing media for human receptors, tackling different cognitive disorders

Cognitive functions and behavioural reactions in mammals

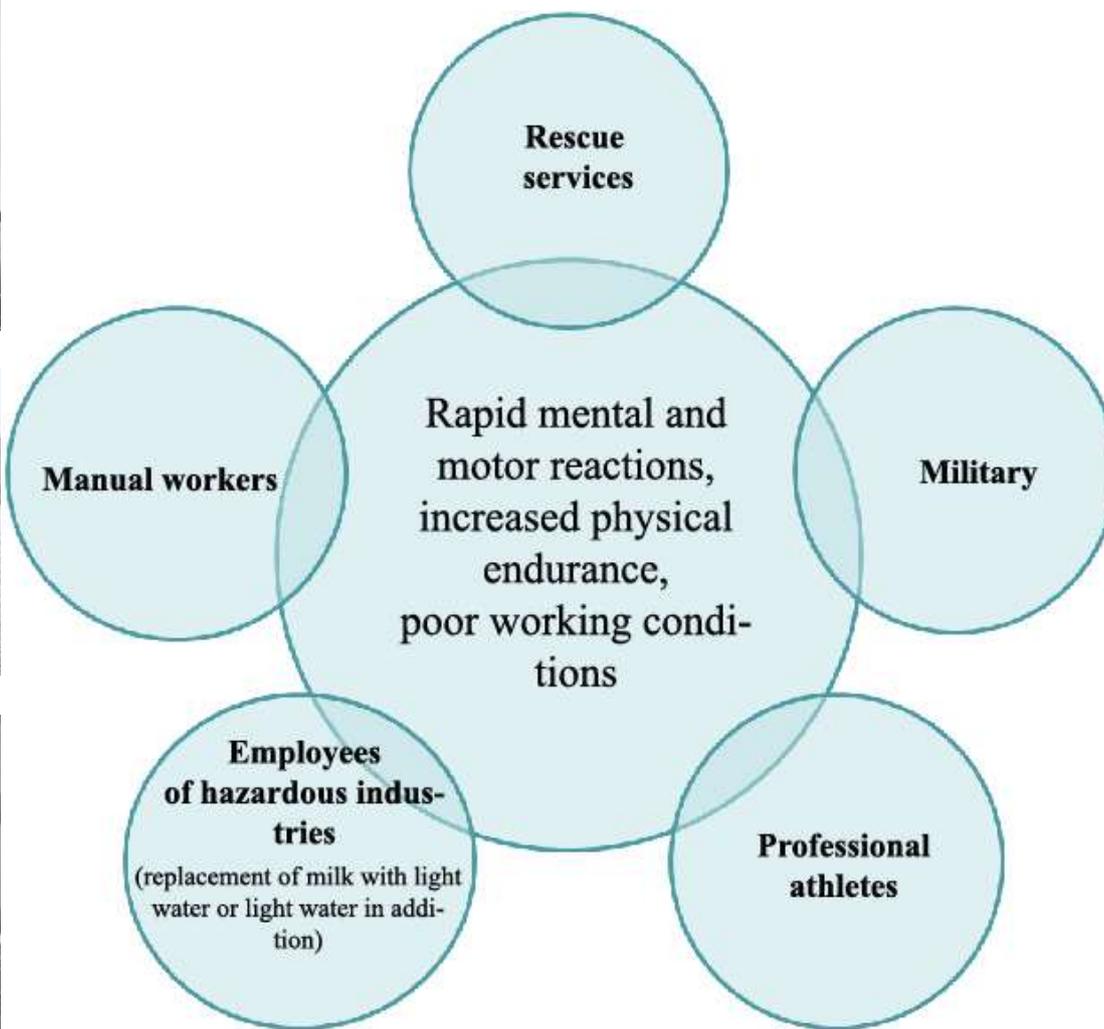
A significant positive effect of light water on cognitive and behavioral functions in mammals was demonstrated during a comprehensive joint experiment, conducted by the Lisbon Research Center during 2011 - 2012

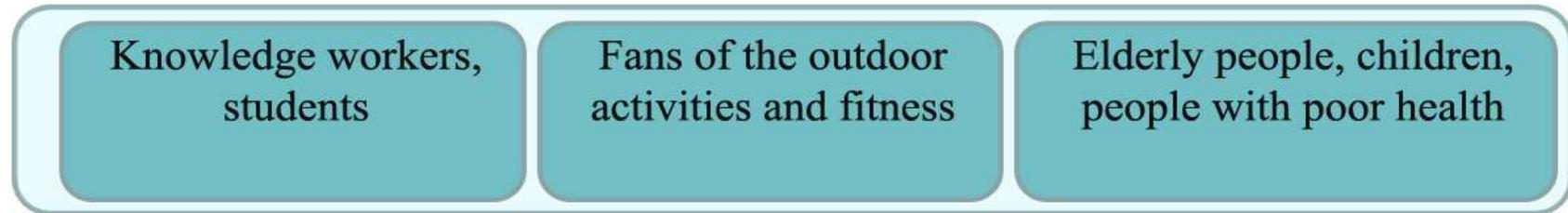
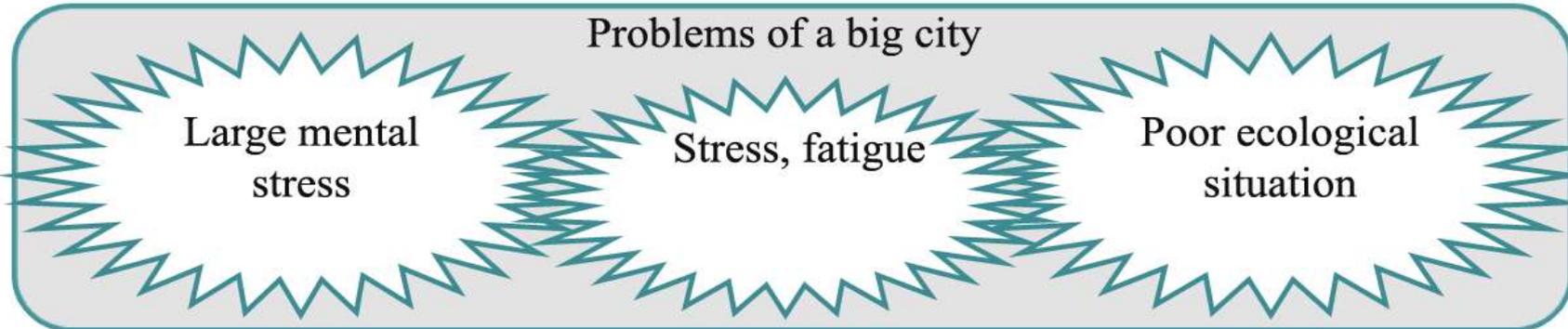
It is completed the analysis of 18,000 genes expression in variations of experiments.

We see it will make a vast impact on the medical industry and drug manufacturers.

Scientific centers, engaged in researches of properties of light water

<u>USA</u>	Vanderbilt Medical Center, Nashville TN University of California, SiDMAP LLC., Los Angeles
<u>Hungary</u>	HYD Ltd. for Research and Development, Budapest HYD LLC for Cancer Research and Drug Development, Budapest Sемmelweis University Medical School, Budapest University of Szeged, Department of Plant Biology, Szeged Biological Research Center of the Hungarian Academy of Sciences, Laboratory of Functional Genomics, Szeged KFKI Atomic Energy Research Institute, Budapest Alpha-Vet Veterinary Hospital, Székesfehérvár University of Pécs, Department of Public Health & Preventive Medicine, Pécs
<u>China</u>	Shanghai Jiaotong University, Department of Biotechnology, College of Life Sciences and Technology
<u>India</u>	Bhabha Atomic Research Centre, Radiation Biology and Health Sciences Division, Mumbai
<u>Romania</u>	University of Oradea, Faculty of Science, Biology Department University of Medicine and Pharmacy Iași, Department of Physiology National R-D Institute for Cryogenics and Isotopic Technologies – ICIT Rm. Vâlcea Oncology Institute “Prof. Dr. Alex. Trestioreanu” University of Medicine and Farmacie „Victor Babes”, Faculty of Veterinary Medicine, Faculty of Animal Sciences and Biotechnologies, Timisoara National Institute of Research-Development for Isotopic and Molecular Technologies, Cluj-Napoca Laboratory of Experimental and Applied Physiology of the Romanian Academy, Iasi S.C. Mecro System S.R.L. Bucharest
<u>Iran</u>	Molecular Research Lab, Department of Pharmacology and Toxicology, Faculty of Pharmacy, Department of Medical Biotechnology, School of Advanced Medical Sciences, Tehran University of Medical Sciences Research Center, Atomic Energy Organization (AEO) Office of Pharmaceutical Research and Development, Food and Drug Administration, Ministry of Health and Medical Education (MOHME), Tehran





LIGHT

WATER

Morphometric characteristics of Arabidopsis plants grown under irrigation with water of different deuterium concentrations
(calculated per plant, n = 40)

№ п/п	Morphometric characteristics	Variations of water used		
		Light water $\delta D = - 815 \text{ ‰}$	control (distilled water) $\delta D = - 72 \text{ ‰}$	water with high content of deuterium $\delta D = + 355 \text{ ‰}$
1	number of scions	$2,37 \pm 0,93$	$1,35 \pm 0,66$	$1,00 \pm 0,00$
2	number of leaves in the rosette	$6,2 \pm 0,2$	$5,3 \pm 0,1$	$4,8 \pm 0,3$
3	length of the pod, mm	$11,2 \pm 1,5$	$8,3 \pm 0,9$	$6,2 \pm 1,1$
4	number of pods	$11,5 \pm 2,5$	$6,8 \pm 0,9$	$5,3 \pm 1,3$
5	number of seeds in a pod	$28,0 \pm 6,3$	$20,7 \pm 2,3$	$17,9 \pm 5,1$
6	total seed production per plant	322	141	95

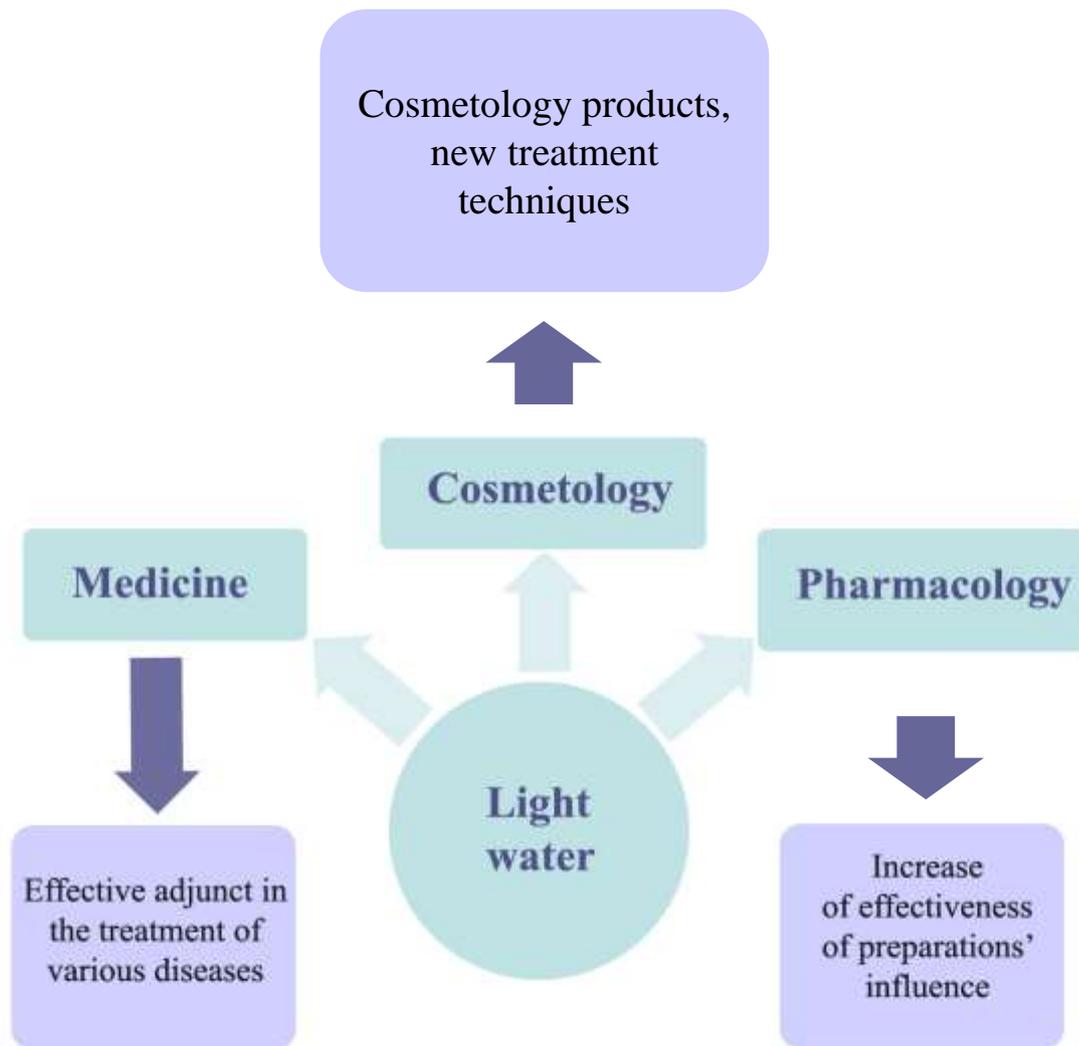
Y. Sinyak, D. Rakov, B. Fedorenko. Institute of medico-biological studies, Russian Academy of Sciences

Indexes of mobility of the suspension of granulated bull semen in different water samples

Water	Plumbing	Bidistillate (control) D/ ¹ H, ppm	Light water, D/ ¹ H, ppm	
		145	120	60
Index of spermatozoons' motility % to control	70±5	100	120±5	155±5

Martynov A.K
 Evaluation of biological activity of DDW.
 Materials from international participation conference
 Petrozavodsk, June 23-25, 2003, p. 57

Light water — a source of vital energy



We hold intellectual property rights in world's leading countries, including:

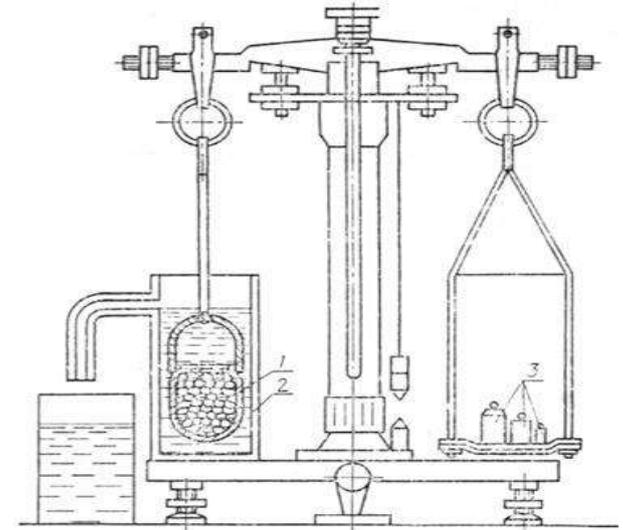
- production technology rights
- rights for food containing Light water
- cosmetic and pharmaceutical products based on Light water
- main medical applications rights
- some technical applications



Methods for quantitative measurement of isotope-modified water

Mass spectrometry
 Gravimetry (weighing)
 Spectrum absorption measurements

There are reason to believe that it is possible to create a simple universal indicator of the lightness of water – such as a litmus paper.



We are working on the Russian state Registry of Measuring Instruments – introducing an isotopic analyser of water to the national water analysis system (this analyser uses the method of the spectrum absorption)



«Lightness» of water can be practically measured

Our work

- ❖ The invention and continuous improvement of the manufacturing technology of light water
- ❖ Engineering and construction of our own facilities
- ❖ Certification of LW products, measurement systems and quality management
- ❖ Maintenance of international intellectual property rights
- ❖ Industrial production of light water with almost any molecular structure
- ❖ Bottling and water conservation with use of liquid nitrogen
- ❖ Storage and logistics



One can only build strong on a solid ground

Certified industrial production of Light water in Russia



ISO 9001 certification is in process

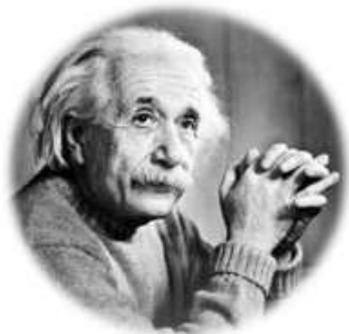
We are the world's first certified industrial manufacturer of Light water

Accomplished by our team

- ❖ We came up with a scientific definition of Light water and it's properties, both exact and expanded definition were given
- ❖ We brought up the concept of Light water as a product of universal value
- ❖ Systematic collection and evaluation of information about the effects of light water with different isotopic compositions is an achievement of our team
- ❖ We created our own research unit for studies of physical and biological properties of Light Water
- ❖ We put together a package of international intellectual property rights
- ❖ Went all the way from experimental prototype to full scale industrial technology for light water manufacturing
- ❖ We own a unified, standardised and certified Light water manufacturing factory (with no world analogues), fully assembled and operational
- ❖ For the first time in the world, we used the method of laser absorption spectroscopy for measurement of isotope-modified water
- ❖ New certificated products for humans and animals with Light water are already introduced to the market by our team

It works
even if you don't
believe in it

Niels Bohr



«There are no indications at all than atomic energy will one day be available to the humanity»

Albert Einstein, 1932

«Cinematograph possesses no commercial value»

Auguste Lumiere, 1895



«A rocket will never be able to reach the moon»

Nikola Tesla, 1932

«One should not waste time on developing the ideas of television»

L. Forrest, vacuum tube inventor, 1926

«I get annoyed by the people who write about rockets that can fly from one continent to another.»

USA presidential advisor on technology and science V. Bush, 1945

«There can't be any reasons for a man to have a personal computer at home»

President of Digital Equipment Corporation, 1977

As published by Experts Speak
445 pg. of expert faulty opinions
Villard Publishing, 1998

