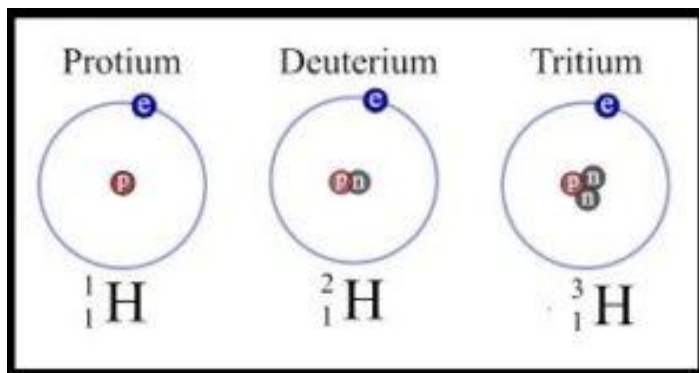


## INTRODUCTION

Hydrogen, the first element on the periodic table, has 3 stable isotopes—  $^1\text{H}$  (Protium),  $^2\text{H}$  (Deuterium) and  $^3\text{H}$  (Tritium). A deuterium atom has twice the mass of a protium atom. Similarly, oxygen also has 3 stable isotopes -  $^{16}\text{O}$ ,  $^{17}\text{O}$  and  $^{18}\text{O}$ . The most abundant forms of hydrogen and oxygen are their lightest atoms -  $^1\text{H}$  and  $^{16}\text{O}$ , respectively.



**Figure 1: Atoms of the three stable hydrogen isotopes**

Over 99% of the water molecules on Earth are in the form  $^1\text{H}_2^{16}\text{O}$ . Although only a small proportion of water is in the form of heavier hydrogen and oxygen isotopes, the daily intake of this 'heavy' water is harmful to the human body. Similar to how a few grains of sand in a car's engine can significantly reduce its performance, a few molecules of 'heavy' isotopes in water can affect the health and well-being of humans.

The isotope content in water is generally measured in ppm-D (parts per million of Deuterium). Water found in most of the inhabited regions of the world contains 150-155 ppm-D (Deuterium). However, the content of deuterium in natural water varies across the planet – meltwater from Antarctic ice (90 ppm-D), to 'closed reservoir water' in the Sahara Desert (180 ppm-D). Generally, it is said that the deuterium content in water is lower near the poles and higher at the equator. The Vienna standard indicates that average deuterium content in water is 155.76 ppm-D, across the world.

## SCIENTIFIC BACKGROUND

Within a minute after the Big Bang occurred, the first element was formed in the Universe – hydrogen. Each atom of hydrogen is made up of 1 proton and 1 electron. At a temperature of around 1 billion degrees, electrons and positrons combined to form photons, while protons and neutrons combined to form deuterons (the nucleus of a deuterium atom). A significant number of deuterons underwent nuclear fusion to form Helium nuclei. However, as the Universe began to cool, a small amount of deuterons remained isolated. These deuterons, along with hydrogen, became the main source of star energy. As the Earth formed, some of these deuterium atoms combined with oxygen ( $D_2O$ ), or with hydrogen and oxygen (HDO), resulting in heavier water molecules.

Water molecules have been composed of various isotopic combinations of hydrogen, well before life existed on this planet. However, it was assumed until the 1930's that hydrogen had no isotopes, and was only present in the form of  $^1H$ . It was then that a researcher named Harold Urey discovered a stable hydrogen isotope and called it deuterium, for which he was awarded the Nobel Prize in Chemistry.

Scientists have been investigating the effects of 'heavy' isotope water for many decades, and have conducted numerous studies on the same. The conclusion that 'heavy' isotope water deteriorates human health has been obtained on all occasions. Despite the knowledge that drinking Light Water (Deuterium Depleted Water / DDW) is desirable, it was not until recently that the production of this water was made commercially available. Due to the increased volume of production and acceptable prices achieved over the last few years, Light Water is now readily available to drink.

## HOW IT WORKS...

Research on deuterium and its application dates back to the 1930's. Since then, various researchers have performed studies to detect the effects of deuterium on the human body. It was not until 2006 that there were significant breakthroughs in explaining the mechanism that causes human health to deteriorate due to increased deuterium levels in the body.

Deuterium atoms cause a distortion in human DNA and also reduce the ability of cells to produce energy.

Molecules bind to one another via hydrogen bonds to create the base pair that forms the building block of the DNA double helix, and hence contribute to the folded structure of both DNA and RNA. Human DNA consists of 3 billion bases. There is around 1 deuterium for every 300 base pairs of DNA. In other words, there are 10 million atoms of deuterium in the genome, occupying the positions intended for protium. The added mass of deuterium in place of protium causes distortions in the optimal DNA shape.

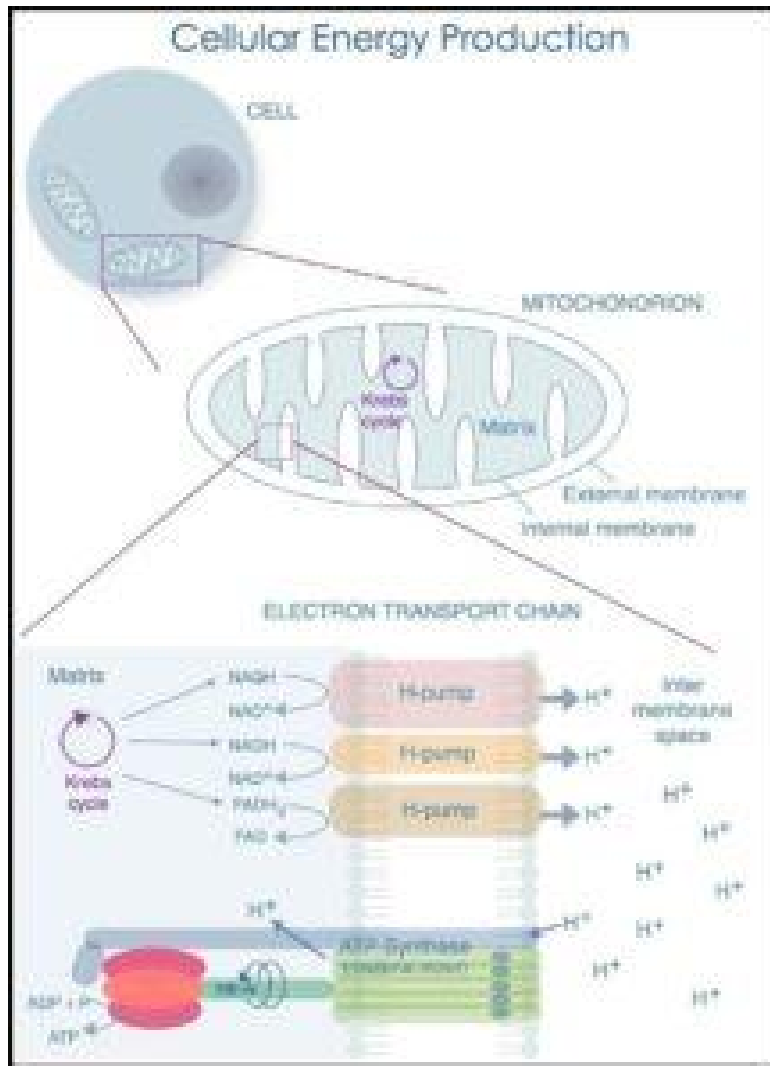
The distortion of DNA sequence is unfavourable, but the most critical effect of deuterium is its ability to alter the production of energy in all living species. Our cells are made of up various organelles. One such organelle is mitochondria, which has a function of generating the chemical energy that powers the cell. The energy produced by the mitochondria is stored in a small molecule called adenosine triphosphate (ATP). An enzyme called 'ATP synthase' is responsible for the production of ATP. This enzyme forms ATP from adenosine diphosphate (ADP) and inorganic phosphate (P), through a process where nutrients are oxidized.

Within the mitochondria, there are nanoscopic natural motors that rotate very fast. The rotation speed of these spinning heads determine how efficiently our cells can generate and use energy. The faster the motor rotates, the more the energy produced by our cells. The slower the motor rotates, the less the energy produced, hence leaving the body to be more susceptible to chronic mismatch diseases and faster ageing.

This motor requires hydrogen ions as the fuel. Hydrogen enters the mitochondria's inner membrane and slots comfortably into the top of the spinning head. As hydrogen is fed into the spinning motor, it rotates and produces healthy levels of energy in our bodies. Hence, hydrogen is very important to optimal human survival, when explained at a quantum level.

Deuterium is an isotope of hydrogen, but it behaves differently inside the body when compared to hydrogen. The nanoscopic motors in the

mitochondria are specifically designed by nature to accept protons ( $H^+$  ions). The presence of a neutron in deuterium slows down the spinning of the motors and hence reduces the body's ability to generate energy efficiently.



**Figure 2: Energy production mechanism in the mitochondria**

The above figure depicts the mitochondria's energy production mechanism in detail. Since deuterium levels in the body can significantly affect the production of energy, a reduction in these deuterium levels will lead to various health benefits. These benefits include reduced growth of tumours, reduced obesity, improvement in mental health, slower ageing process and

reduction in various other chronic diseases such as diabetes, hypertension and coronary heart diseases.

Majority of the human body is composed of water. The hydrogen in our bodies are essential in generating energy that allows us to perform our daily functions, and the presence of deuterium can disrupt these functions significantly. Due to the increased deuterium content in water all around the globe, most people have a deuterium level of 150-155 ppm-D in their bodies. A strongly recommended goal for deuterium levels in a healthy adult is 120 ppm-D or below. This optimization of deuterium levels in the human body has been proven to have desirable health benefits.

## HEALTH BENEFITS OF LIGHT WATER

'Light Water' is a term given to a unique composition of water, in which the content of heavier hydrogen ( $^2\text{H}$ ) and oxygen ( $^{18}\text{O}$ ) isotopes are lower than the levels across the world. The deuterium content in Light Water must be at least 20% lower than the Vienna standard of 155.76 ppm-D.

As aforementioned, the deuterium levels in living organisms affect the energy generation mechanism in each cell. Not only does the reduction in deuterium content lead to specific improvements in various organ functions and diseases, it can also significantly enhance the overall physical and mental health, while slowing down the ageing process. Various studies have been conducted on animals and humans over the last few decades, and the results are extremely promising. Some of the key findings are compiled below –

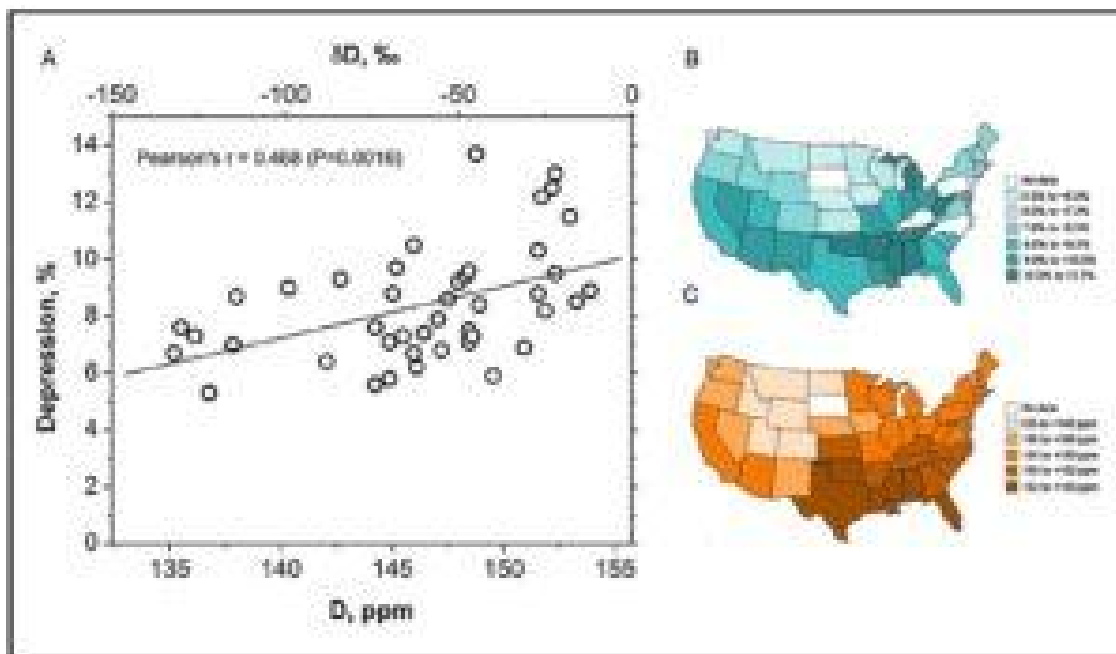
### LONGEVITY

- When the Hunza people of northern Pakistan were investigated for their increased longevity (up-to 145 years) and lack of illness, it was determined by Russian scientists that the deuterium content of their water (from the glaciers of Mt. Ultar) was about 133 ppm-D, a deviation of 14% from the 155 ppm-D global standard.

- While the average number of centenarians in all of the Soviet Union was less than 10 per million, there was a striking number of centenarians in Siberia – 324 per million people. Additionally, most of the population of Altai and Yakutia (Northern Russia) enjoyed great health and vitality, well into their old age. The deuterium content in Northern Russian and Siberian water is 135-140 ppm-D.

### MENTAL AND PHYSICAL WELL-BEING

- A research conducted by a large group of international scientists, including numerous researchers from the University of Oxford, has been published in 2014. This publication clearly showed an evident correlation between the level of deuterium in drinking water and depression: the 'lighter' the water is in a particular region, the less people who live there suffer from depression. It concluded that low-deuterium drinking water could present a novel prophylactic strategy for depression. The figure below shows the USA map with some of the results, indicating the regions of reported depression (blue map) and the regions of deuterium content in water (orange map). A strong co-relation between deuterium levels and depression can be observed -



**Figure 3: Deuterium level vs depression; A – Graph showing co-relation between deuterium level in water and depression percentage; B – USA map showing depression across states;  
C – USA map showing deuterium level across states.**

- A notable Hungarian doctor and molecular biologist conducted double-blind clinical trials to study the effect of deuterium on cancer. Firstly, he proved that Deuterium Depleted Water was free of any side effects. Secondly, he showed that consuming Deuterium Depleted Water was an excellent complementary adjuvant to conventional radiation and chemotherapy. His work revealed that healthy cells respond well to reduced amounts of deuterium in water, but cells with chromosomal mutations (cancer) are more responsive to reduced deuterium levels. Low deuterium content in the body resulted in several fold increase in the mean survival time (MST) of cancer patients during oncotherapy. Along with his colleagues, he also studied Deuterium Depleted Water for metabolic disorders—particularly diabetes—with highly favourable results. Between 1992 and 1999, his team administered around 350 tons of Deuterium Depleted Water to approximately 1,200 patients, generating over 12,000 pages of documented records. By 2019, he had more than 2,200 successful case studies on patients receiving Deuterium Depleted Water.
- A single Deuterium Depleted Water treatment was administered to 179 breast cancer patients, while 53 patients repeated the treatment. Patients who were treated with Deuterium Depleted Water at least twice had a mean survival time (MST) of 293 months (24.4 years) whereas those who received a single Deuterium Depleted Water treatment had an MST of 108 months (9 years).
- Another study was conducted to test the anti-cancer effects of Deuterium Depleted Water on 129 lung cancer patients. In the entire population of lung cancer patients in Hungary between 2002 and

2005, the MST of males was 7.5 months, with a 5-year survival probability of 10%. In females, the MST was 11.3 months, with a 5-year survival probability of 20.5 %. In the study (Deuterium Depleted Water), which lasted for 17 years, the MST increased to 25.8 months in males and 74.1 months in females. The 5-year survival probabilities also increased to 19% for males and 52% for females.

- Research conducted to investigate the effects of Deuterium Depleted Water on prostate cancer had the following conclusion – “based upon the pre-clinical toxicological investigations, the prospective and retrospective clinical studies, the application of Deuterium Depleted Water seems to be completely innocuous, and can act as a highly effective tool in cancer therapy, which can be easily integrated in the treatment regimens. Consequently, the application of Deuterium Depleted Water in the most affected population might reduce the mortality of prostate cancer since it is able to delay progression as well as to prolong MST in patients with histologically confirmed prostate cancer.”
- In a study measuring deuterium variation in human blood, it was seen that the blood serum deuterium level was lower (by 5-7 ppm-D) in cancer patients than healthy individuals. Hence, it was deduced that tumour cells consumed deuterium for their growth.

#### **DIABETES AND OTHER METABOLIC DISTURBANCES**

- A Russian patent on Light Water therapy presented various results, showing its effectiveness on diabetes. The duration of the therapy was between 28 and 45 days. It was conducted on 52 patients with type 1 and type 2 diabetes of medium and light severity (age of the disease was 3 to 15 years, with a mean of 8.2 years). All the type 2 diabetic patients suffered from obesity. There were no adverse reactions from this therapy.



## **Results of type 2 diabetes**

Significant benefits were observed from drinking Light Water, and the greatest therapeutic effect was achieved in type 2 diabetic patients.

The hypoglycemic effect was evident with a decrease in all values of the glycemic curve and daily glycosuria. Also, values of fat metabolism improved - there was a decrease in body weight, body mass index and a reduction in the amount of adipose tissue. The blood rheological properties also improved, due to a decrease in the initially elevated levels of platelet aggregation and haematocrit.

### *A case study –*

- Female patient (age – 46 years, weight – 90 kg, BMI – 33.5)
- Duration of disease – 8 years, moderately severe
- Duration of therapy – 30 days
- Effects of therapy –
  1. Weight decreased by 5.4 kg, the amount of fat tissue, by 2.5%.
  2. Glycemic curve decreased from 8.9 – 11.7 – 10.5 mM/l (before) to 5.8 – 7.1 – 6.0 mM/l (after). Glycosuria decreased from 24 to 8 g/day, which indicates a normalizing effect of water on carbohydrate metabolism.
  3. There was an improvement in the initially elevated level of triglycerides (2.75 mM/l to 1.5 mM/l), total cholesterol (7.8 mM/l to 5.8 mM/l) and various other related parameters.
- Duration of remission, after discontinuing the treatment, was 6 months.

## **Results of type 1 diabetes**

There were significant benefits for type 1 diabetic patients as well. There was a decrease in glycemia and glycosuria, one hour after breakfast. There was also a decrease in body weight and fat tissue, without significant changes in the lipidogram. Additionally, the improvement of blood rheological properties was reliable in terms of plasma tolerance to heparin. The main effect was achieved in the course of the auto-immune processes.

*A case study –*

- Female patient (age – 28 years, weight – 49 kg, BMI – 20)
  
- Duration of disease – 23 years, severe, receives 42 – 46 insulin units daily
  
- Duration of therapy – 30 days
  
- Effects of therapy –
  1. Weight not changed.
  2. Glycemic curve decreased from 10.9 – 13.1 – 9.9 mM/l (before) to 7.8 – 8.1 – 7.8 mM/l (after). Glycosuria decreased from 35 to 12 g/day.
  3. There is an improvement in initially elevated level of triglycerides (1.9 mM/l to 1.1 mM/l), total cholesterol (6.8 mM/l to 4.6 mM/l) and various other related parameters.
  
- Duration of remission, after discontinuing the treatment, was 5 months.

Along with the aforementioned benefits, a reduction of the therapeutic dose of hypoglycemic drugs, until their complete cancellation (in some cases), was observed.

In conclusion, these studies have shown that Light Water therapy for treating diabetes allows achieving the following results -

- improvement of the general condition, weight loss due to fat tissue reduction, positive dynamics in the therapy of concomitant diseases.
- improvement of carbohydrate and fat metabolism, which is the most pronounced in case of a relative deficiency of insulin.
- compensation of vascular disorders due to antiaggregant effects.
- Pre-clinical investigations proved that Deuterium Depleted Water decreases serum glucose concentration. The glucose disposal significantly increased, and insulin resistance decreased in 11 tested patients. This study confirmed the pivotal role of naturally occurring deuterium in the regulation of physiological processes.
- A 53 year-old female was able to decrease her deuterium level down to 134 ppm-D and increase her resting metabolic rate (RMR) by 44%, after drinking water with 85 ppm-D (Deuterium) for only a week. A 60 year-old male demonstrated a 41% increase in his RMR with a deuterium level drop to 137 ppm-D, after a week of drinking 105 ppm-D water. They both also reported that they are able to sleep a lot better and have less aches and pains since reducing deuterium levels in the body.

### HEART DISEASES AND BLOOD PRESSURE

- Data of 30 enrolled patients in an open-label human study proved that the consumption of Deuterium Depleted Water:
  - significantly decreased serum deuterium concentration
  - significantly increased HDL concentration
  - significantly decreased serum Na<sup>+</sup> concentration, and blood pressure

## MODERN-DAY DISORDERS

- Below are the results from a study conducted on various disorders. This study, conducted in USA, shows the correlation between the body deuterium level and disorder prevalence - an increase in deuterium level corresponds to an increased prevalence of disorders.

*Table 1: Various disorders and the effect of deuterium level on their prevalence*

Disorder		Prevalence (%)	
		< 140 ppm vs. > 150 ppm	
		Absolute (% of population)	Relative (% of population)
Mental disorders	Psychosocial Distress	3.0 vs. 5.5%	-45%
	Depression	7.1 vs. 10.0%	-29%
Metabolic disorders	Diabetes	6.7 vs. 9.8%	-31%
	Obesity	23.7 vs. 30.0%	-21%
Cardiovascular disorders	Hypertension	25.0 vs. 31.7%	-21%
	Coronary Heart Disease	5.4 vs. 6.9%	-22%
	Stroke	2.1 vs. 3.3%	-36%
	Myocardial Infarction	3.6 vs. 4.3%	-16%
Tooth Loss	Loss of 6 or more teeth	36.4 vs. 47.0%	-23%
	Complete tooth loss	17.4 vs. 23.5%	-16%

Since the proven existence of deuterium in 1932, there have been hundreds of published studies on its biological effects, all arriving at the same observation: water that contains heavier isotopes is an impairment on life.

## PRODUCTS

We offer the following products, which refer to the deuterium content in the water. Our Light Water therapy ensures that the deuterium levels in your body are reduced gradually, as recommended by various research papers

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Level 1 – 100 ppm-D water

Level 2 – 75 ppm-D water

Level 3 – 50 ppm-D water

Level 4 – 25 ppm-D water

For more information on the products and procedures, please contact us.