

# ***Hydrogen water - The Fountain of Youth & Health***

Dr. Kelly Halderman

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Hydrogen is #1 on the periodic table because it is the smallest element on Earth - but do not mistake its size for its ability. Hydrogen is three times more energy-dense than gasoline. It powers the sun, powers cars and powers our body. When two molecules of hydrogen are joined together it is referred to as **H<sub>2</sub>** and exists as a gas in nature. Its small size and gaseous form allows for easy diffusion into the brain, gut, lungs, membranes, joints, eyes, ears, etc. where it produces **widespread, safe scientifically-backed positive results**. In fact, hydrogen gas has been shown to have a therapeutic effect on over **150 human diseases**. In the ***Echo® Hydrogen Enriched Water System™***, H<sub>2</sub> gas is dissolved in the water. The water is the delivery vehicle for the H<sub>2</sub> gas which makes it safe, easy to use and economical. Hydrogen gas is so powerful that the Japanese government has now approved H<sub>2</sub> administration as an official medical procedure.

One of the ways H<sub>2</sub> exerts its positive effects is that it is a **selective antioxidant** -only decreasing the amounts of toxic ROS (Reactive Oxygen Species) in our body. Some ROS have important functions in the body, like nitric oxide but the Hydroxyl Radical (HO\*) ROS only damages our cells and spurs on aging & disease. When H<sub>2</sub> combines with 2 destructive HO\* molecules, 2 water molecule are formed, which are harmless to our system. When functioning properly, our bodies naturally create hydrogen gas in the gut through normal fermentation and digestion of food. Unfortunately, many people have issues such as leaky gut, infections and a poor diet that prevent their gut from working correctly. The gut is the foundation of health and if it is compromised beneficial hydrogen gas will not be produced. This can lead to severe metabolic consequences such as free radical damage and increased bodily inflammation. The root cause of all disease involves

inflammation. We can drastically decrease that inflammation with ***Echo®***  
***Hydrogen Enriched Water.***

### **Some Benefits of Molecular Hydrogen:**

- Reduction of toxic free radicals
- Reduction of oxidative stress and Inflammation
- Regulation of over 200 biomolecules in the body
- Stimulates gastric ghrelin to increase cognitive function
- Stimulation of anaerobic microflora in the intestinal tract
- Shown to help with many diseases such as Diabetes & Rheumatoid Arthritis

The widespread benefits of molecular hydrogen are irrefutable. Peer reviewed articles and studies have shown molecular hydrogen to reduce oxidative stress and inflammation. Studies have been conducted on 170+ human diseases and conditions including Cancer, Diabetes, Rheumatoid Arthritis, Autoimmune disease, Parkinson's, Alzheimer's, Autism, Bipolar, Schizophrenia & IGT. In addition to helping with existing conditions, molecular hydrogen can support the body to avoid susceptibility to diseases and conditions. It is truly one of the best health-promoting, anti-aging tools you can use.

### **I. Water Electrolysis: A Hydrogen Generator: How it works.**

In 1800, Dr. Anthony Carlisle, a surgeon in London, discovered the process of water electrolysis when he intended to make a hydrogen generator. He had learned that hydrogen had antioxidant properties. Traditional electrolysis devices convert water ( $H_2O$ ) to hydrogen gas ( $H_2$ ) and hydroxide ions ( $OH^-$ ) at the negative side (cathode), and oxygen gas ( $O_2$ ) and hydrogen ions ( $H^+$ ) at the positive side (anode). Most water electrolysis machines have standard membranes that separates the alkaline  $OH^-$  ions from the acidic  $H^+$  ions if you are separating the water streams. Moreover, a new method of electrolysis was designed to only produce  $H_2$  without changing the pH of the source water. In this method, the water

is not separated into alkaline and acid streams, which is much more environmentally friendly. Proton Exchange Membranes (PEM) are used instead of standard membranes. The advantage of the PEM is that it creates its own conductivity in water and can produce H<sub>2</sub> gas even in pure water with no minerals as in reverse osmosis or distilled water. The pH change comes if you separate the water streams. It is the H<sub>2</sub> gas that can be dissolved in the water that provides the therapeutic benefits not the alkalinity alone. Typically, electrolysis systems that separate the water streams into alkaline and acid water are not able to dissolve H<sub>2</sub> gas in the water longer than a few weeks. This is because the positively charged minerals have a natural affinity for the negatively charged cathode (see graphic above). If minerals build up on the cathode, which they frequently do, H<sub>2</sub> gas **will not** be dissolved in the water because the hydrogen bubbles will be too large to be dissolved. The H<sub>2</sub> gas will go into the atmosphere and the benefits go with it. **In the Echo® 9 Ultra H<sub>2</sub> system, the patented technology changes the polarity of the electrodes every time the machine is used. This makes it impossible for minerals to build up. This is the only system that guarantees H<sub>2</sub> gas will always be dissolved in the water.** With other electrolysis systems, minerals will build up within 2-3 weeks of use and the benefits will be gone. Other companies tell consumers that they have automatic reverse cleaning systems in their machines to be confusing. They say that their systems change the polarity of the electrodes to further confuse the issue but they don't do it every time the machine is used. They only change the polarity every 10L or 20L of water and by then the minerals are already bonded and the damage is done. With these inferior systems, the only way to keep the minerals off the cathode is to clean the system every 2 weeks with citric acid or commercial vinegar. Of course, you don't have to worry about this with any of the Echo® branded systems because it impossible for the minerals to bond to the cathode in the first place ensuring you are getting the hydrogen enriched water.

## II. **Benefits of Echo® Hydrogen Enriched Water™**

Most free radicals are damaging to our cells but some such as nitric oxide are critical in proper cell signaling and other metabolic processes that maintain health. It is only the cell damaging oxygen radicals (Hydroxyl Radicals) that we need to scavenge. H<sub>2</sub> selectively converts these cell damaging radicals into harmless water molecules. Taking large quantities of supplemental antioxidants that scavenge all forms of free radicals can be detrimental to health, as some are necessary to fight cancer and infection in our body.

### **Stimulation of Natural Antioxidant Production - *The Nrf-2 Pathway***

Molecular Hydrogen (H<sub>2</sub>) is able to activate what is known as the “**Anti-Aging**” or “Anti-Oxidant” pathway. As it known scientifically, the “*Nrf-2 pathway*” causes the production of the body’s own antioxidants such **glutathione**, catalase, superoxide dismutase (SOD) and several other cytoprotective enzymes and proteins. It is an extremely critical pathway for health and involved in a enormity of diseases, such as cancer and neurodegenerative diseases. Many supplements on the market tout to activate the Nrf-2 pathway but can be extremely expensive and can have downstream negative effects. ***Echo® Hydrogen Enriched Water* has no side-effects.**

### **Detoxification and Weight Loss:**

Echo® water supports healthy cleansing and weight loss. Our fat cells protect us by storing substances such as heavy metals that would otherwise harm us. When the toxins and wastes are flushed, the burden on the body is lessened and the fat will no longer be needed. Thus safe, natural weight loss will ensue. The feeling of hydration is a natural appetite-suppressant, therefore drinking Echo® water can increase weight loss program success, increase restorative sleep, increase energy, and decrease allergy symptoms. The University of Utah found that the ability to burn calories (metabolism) can decline by about 2% per day when people are dehydrated and increased by being properly hydrated. Water can also help to clean out the intestines and colon.

## **Men's Health:**

Erection is dependent upon proper levels of nitric oxide (NO). NO is our body's vasodilator (i.e. vessel dilator) signaling molecule that allows increased blood to flow to areas of our body. Medications such as *Viagra* decrease the normal elimination of naturally produced NO and can help to sustain erections. Hydrogen water can actually increase what is referred to as endothelial nitric oxide synthase (ENOS). ENOS is an enzyme in our body that **increases production of nitric oxide**. It has no side effects, as do medications and also is known to decrease amount of inducible nitric oxide - the enzyme that produces INOS which is harmful to our body in excess amounts.

## **Athletic Performance:**

*Echo® Hydrogen Enriched Water™* has been scientifically proven to help athletes increase performance. In a recent double-blinded placebo control crossover control study in soccer players found that drinking hydrogen rich water was effective at preventing the early fatigue, decreasing lactate production as well as improving their overall performance. Importantly, it did not decrease the markers of oxidation as to blunt the therapeutic effects of exercise. When a person, especially an athlete is properly hydrated with *Echo®* hydrogen-enriched water, they perform at peak levels for longer periods of time.

## **Immune Boost:**

The effectiveness of the immune system and the digestive system are directly linked to the level of hydration. Being properly hydrated is one of the best ways to boost your immune system and prevent disease. Your body is composed of 60-75% water. The type of water you drink is of critical importance and can directly influence the way you feel & how your body functions. *Echo® Hydrogen Enriched Water™* can stimulate anaerobic microflora to naturally restore gut health. The health of your gut is directly related to the strength of your immune system and the susceptibility to disease and sickness.

## **Intrinsic Energy and Frequencies:**

Many people understand that energy and frequencies surround us in our environment - electromagnetic frequencies (EMFs), radio frequencies, cell phone frequencies, Infrared energies, etc. There are beneficial energies that promote health and negative energies and frequencies, like EMF that can harm the body. The Echo® Water System has hundreds of positive, health-promoting energies and frequencies. They deliver their benefits by providing protection from harmful frequencies and by balancing chakras to aid in the natural, innate healing. This protection and energetic boost is sometimes palpable, especially to those who are sensitive to energy fields. Countless professionals in Energy Medicine - Cranial Sacral Therapists, Reiki Masters, acupuncturists, etc. personally own, enjoy and recommend Echo® water because of these beneficial energies and frequencies.

## **Increased Cognitive Function - Ghrelin: Help with Neurological Conditions**

Studies show that H<sub>2</sub> gas stimulates Ghrelin secretions. Ghrelin positively affects many things in the body including cognitive function, hunger, weight regulation, anti-inflammatory function. This is accomplished by stimulation of the hippocampus, hypothalamus and the brain stem. Specific studies have shown that water with H<sub>2</sub> gas can be helpful with neurologic issues like Parkinson's, Alzheimer's, Bipolar Disease, Schizophrenia and Autism.

### **III. Study references:**

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4. Ishibashi, T., et al., Consumption of water containing a high concentration of molecular hydrogen reduces oxidative stress and disease activity in patients with rheumatoid arthritis: an open-label pilot study. *Medical Gas Research*, 2012. 2(1): p. 27.
5. Kajiyama, S., et al., Supplementation of hydrogen-rich water improves lipid and glucose metabolism in patients with type 2 diabetes or impaired glucose tolerance. *Nutrition Research*, 2008. 28: p. 137-143.

6. [www.synergyscience.com/research.html](http://www.synergyscience.com/research.html)

7. [www.synergyscience.com/research.html](http://www.synergyscience.com/research.html)

### **Disclaimer:**

*There are hundreds of studies showing molecular hydrogen to have therapeutic benefits. Please visit [www.synergyscience.com/research.html](http://www.synergyscience.com/research.html) or [www.hydrogenstudies.com](http://www.hydrogenstudies.com) to read additional clinical studies which are continually being added. The studies below are shared for educational purposes only. They are not shared to indicate any expected outcome for anyone with a similar or same disease or pathology. The results achieved in the studies should not be taken as an indicator of results you will experience. The study shows potential outcomes. There are no protocols, drugs, natural methods, or techniques that are 100% effective. Every individual is different and diseases are complex.*

**nature  
medicine**

## **Hydrogen acts as a therapeutic antioxidant by selectively reducing cytotoxic oxygen radicals**

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Acute oxidative stress induced by ischemia-reperfusion or inflammation causes serious damage to tissues, and persistent oxidative stress is accepted as one of the causes of many common diseases including cancer. We show here that **hydrogen (H<sub>2</sub>)** has potential as an antioxidant in **preventive and therapeutic applications**. We induced acute oxidative stress in cultured cells by three independent methods. H<sub>2</sub> selectively reduced the hydroxyl radical, the most cytotoxic of reactive oxygen species (ROS), and **effectively protected cells**; however, H<sub>2</sub> did not react with other ROS, which possess physiological roles. We used an acute rat model in which oxidative stress damage was induced in the brain by focal ischemia and reperfusion. The inhalation of H<sub>2</sub> gas markedly suppressed brain injury by buffering the effects of oxidative stress. **Thus H<sub>2</sub> can be used as an effective antioxidant therapy; owing to its ability to rapidly diffuse across membranes, it can reach and react with cytotoxic ROS and thus protect against oxidative damage.**

## **Hydrogen–water enhances 5-fluorouracil-induced inhibition of Colon Cancer**

Runtuwene et al. (2015), Hydrogen–water enhances 5-fluorouracil-induced inhibition of colon cancer. PeerJ 3:e859; DOI 10.7717/peerj.859. 2015 April 7

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ABSTRACT

Oxidative stress is involved in cancer development. Hydrogen (H<sub>2</sub>) is a potent antioxidant and exhibits anti-inflammatory and potentially anticancer-like activities. This study aimed to investigate the role of H<sub>2</sub> in combination with 5-fluorouracil (5-FU) in cancer treatment both in vitro and in vivo using the colon 26 cell line. The survival rate was determined using the Kaplan–Meier survival test, and cell viability was assessed using cell viability imaging kit and the MTT assay, and activation of the cell apoptosis pathway (Phosphorylated adenosine monophosphate activated protein kinase (p-AMPK), Apoptosis-inducing factor (AIF) and Caspase 3) were characterized by western blots. Hydrogen water administration improved the survival of mice with colon 26-induced cancer. Furthermore, hydrogen water enhanced cell apoptosis in cancer cells, resulting in a marked increase in the expression of p-AMPK, AIF and Caspase 3 in colon 26 cells. Hydrogen water also increased the inhibitory effect of 5-FU on colon 26 cells with respect to cell survival rate and anticancer functions. Additionally, high-content hydrogen water exhibited stronger antioxidant and anticancer activity than did the natural hydrogen water. In conclusion, high-content hydrogen water can inhibit colon cancer, particularly in combination with 5-fluorouracil.

## Supplementation of hydrogen-rich water improves lipid and glucose metabolism in patients with type 2 diabetes or impaired glucose tolerance

Nutr Res, 2008 Mar;28(3):137-43. doi:10.1016/j.nutres.2008.01.008.

Kajiyama S, Hasegawa G, Asano M, Hosoda H, Fukui M, Nakamura N, Kitawaki J, Imai S, Nakano K, Ohta M, Adachi T, Obayashi H, Yoshikawa T

Oxidative stress is recognized widely as being associated with various disorders including diabetes, hypertension, and atherosclerosis. It is well established that hydrogen has a reducing action. We therefore investigated the effects of hydrogen-rich water intake on lipid and glucose metabolism in patients with either type 2 diabetes mellitus (T2DM) or impaired glucose tolerance (IGT). We performed a randomized, double-blind, placebo-controlled, crossover study in 30 patients with T2DM controlled by diet and exercise therapy and 6 patients with IGT. The patients consumed either 900 mL/d of hydrogen-rich pure water or 900 mL of placebo pure water for 8 weeks, with a 12-week washout period. Several biomarkers of oxidative stress, insulin resistance, and glucose metabolism, assessed by an oral glucose tolerance test, were evaluated at baseline and at 8 weeks. Intake of hydrogen-rich water was associated with significant decreases in the levels of modified low-density lipoprotein (LDL) cholesterol (ie, modifications that increase the net negative charge of LDL), small dense LDL, and urinary 8-isoprostanes by 15.5% (P < .01), 5.7% (P < .05), and 6.6% (P < .05), respectively. Hydrogen-rich water intake was also associated with a trend of decreased serum concentrations of oxidized LDL and free fatty acids, and increased plasma levels of adiponectin and extracellular-superoxide dismutase. In 4 of 6 patients with IGT, intake of hydrogen-rich water normalized the oral glucose tolerance test. In conclusion, these results suggest that supplementation with hydrogen-rich water may have a beneficial role in prevention of T2DM and insulin resistance.

## Selective stimulation of the growth of anaerobic microflora in the human intestinal tract by electrolyzed reducing water.

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96-99% of the "friendly" or residential microflora of intestinal tract of humans consists of strict anaerobes and only 1-4% of aerobes. Many diseases of the intestine are due to a disturbance in the balance of the microorganisms inhabiting the gut. The treatment of such diseases involves the restoration of the quantity and/or balance of residential microflora in the intestinal tract. It is known that aerobes and anaerobes grow at different oxidation-reduction potentials (ORP). The former require positive E(h) values up to +400 mV. Anaerobes do not grow unless the E(h) value is negative between -300 and -400 mV. In this work, it is suggested that prerequisite for the recovery and maintenance of obligatory anaerobic microflora in the intestinal tract is a negative ORP value of the intestinal milieu. Electrolyzed reducing water with E(h) values between 0 and -300 mV produced in electrolysis devices possesses this property. Drinking such water favors the growth of residential microflora in the gut. A sufficient array of data confirms this idea. However, most researchers explain the mechanism of its action by an antioxidant properties destined to detox the oxidants in the gut and other host tissues. Evidence is presented in favor of the hypothesis that the primary target for electrolyzed reducing water is the residential microflora in the gut.

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# Pilot study: Effects of drinking hydrogen-rich water on muscle fatigue caused by acute exercise in elite athletes

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## Abstract

**Background:** Muscle contraction during short intervals of intense exercise causes oxidative stress, which can play a role in the development of overtraining symptoms, including increased fatigue, resulting in muscle microinjury or inflammation. Recently it has been said that hydrogen can function as antioxidant, so we investigated the effect of hydrogen-rich water (HW) on oxidative stress and muscle fatigue in response to acute exercise. **Methods:** Ten male soccer players aged  $20.9 \pm 1.3$  years old were subjected to exercise tests and blood sampling. Each subject was examined twice in a crossover double-blind manner; they were given either HW or placebo water (PW) for one week intervals. Subjects were requested to use a cycle ergometer at a 75 % maximal oxygen uptake ( $VO_2$ ) for 30 min, followed by measurement of peak torque and muscle activity throughout 100 repetitions of maximal isokinetic knee extension. Oxidative stress markers and creatine kinase in the peripheral blood were sequentially measured.

**Results:** Although acute exercise resulted in an increase in blood lactate levels in the subjects given PW, oral intake of HW prevented an elevation of blood lactate during heavy exercise. Peak torque of PW significantly decreased during maximal isokinetic knee extension, suggesting muscle fatigue, but peak torque of HW didn't decrease at early phase. There was no significant change in blood oxidative injury markers (d-ROMs and BAP) or creatine kinase after exercise.

**Conclusion:** Adequate hydration with hydrogen-rich water pre-exercise reduced blood lactate levels and improved exercise-induced decline of muscle function. Although further studies to elucidate the exact mechanisms and the benefits are needed to be confirmed in larger series of studies, these preliminary results may suggest that HW may be suitable hydration for athletes.

## Effectiveness of Hydrogen Rich Water on Antioxidant Status of Subjects with Potential Metabolic Syndrome

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### Summary:

Metabolic syndrome is characterized by cardio metabolic risk factors that include obesity, insulin resistance, hypertension and dyslipidemia. Oxidative stress is known to play a major role in the pathogenesis of metabolic syndrome. The objective of this study was to examine the effectiveness of hydrogen rich water (1.5–2 L/day) in an open label, 8-week study on 20 subjects with potential metabolic syndrome. Hydrogen rich water was produced, by placing a metallic magnesium stick into drinking water (hydrogen concentration; 0.55–0.65 mM), by the following chemical reaction;  $Mg + 2H_2O \rightarrow Mg(OH)_2 + H_2$ . The consumption of hydrogen rich water for 8 weeks resulted in a 39% increase ( $p < 0.05$ ) in antioxidant enzyme superoxide dismutase (SOD) and a 43% decrease ( $p < 0.05$ ) in thiobarbituric acid reactive substances (TBARS) in urine. Further, subjects demonstrated an 8% increase in high density lipoprotein (HDL)-cholesterol and a 13% decrease in total cholesterol/HDL-cholesterol from baseline to week 4. There was no change in fasting glucose levels during the 8 week study. In conclusion, drinking hydrogen rich water represents a potentially novel therapeutic and preventive strategy for metabolic syndrome.



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