Molecular Hydrogen Therapy

FxMED Webinar
Monday 20th March 2017
Dr Elen ApThomas MBBS DRANZCOG MACNEM
Who Is Dr Elen?

• Dr Elen ApThomas is a holistic medical doctor trained in both integrative and conventional medicine, based in the Gold Coast, Australia
• MBBS, Bachelors in Medicine and Surgery (Adelaide), Diploma Obstetrics and Gynaecology, Member of Australasian College Nutritional and Environmental Medicine
• Over 21 years of clinical experience
• Founding doctor of a large multidisciplinary medical practice, The Medical Sanctuary, that has holistic doctors, naturopaths, osteopath, chiropractor, homeopath, acupuncturist, hypnotherapist, reflexology and massage therapist
• Weekly surgical assistance to leading gynaecological surgeon, regular public speaking engagements both radio and in person, peer reviewing of holistic medical text books and performs research roles for companies involved in medical therapies
• Wife and Mother to three young girls, aged 7, 9, and 11
• As a holistic medical doctor, regularly treats patients with complex health issues that haven’t responded to other therapies and hence felt the need to explore obstacles to healing.
Analysis of so-called “Miracle Water” from all around the world showed similar findings. All of the waters had minerals and trace elements dissolved in the water. However, the most peculiar ingredient was MOLECULAR HYDROGEN. MOLECULAR HYDROGEN typically does not exist on its own on earth, but it is dissolved in these waters. The discovery of Molecular Hydrogen in these waters ignited the research into Molecular Hydrogen as a therapeutic modality.

It has been found that the health benefits of alkaline water actually come from its molecular hydrogen effects.
Molecular Hydrogen Research
Over 500 published peer review papers since 2007

Why Hydrogen is becoming so Important – See Review Article: ‘Therapeutic opportunities of hydrogen in a variety of disease models’

CHIEN-SHENG HUANG, TOMOHIRO KAWAMURA, YOSHIYA TOYODA and ATSUNORI NAKAO, Recent advances in hydrogen research as a therapeutic medical gas, Free Radical Research, September 2010; 44(9): 971–982
Molecular Hydrogen Review

- **Beneficial biological effects and the underlying mechanisms of molecular hydrogen - comprehensive review of 321 original articles.**
- Ichihara M¹, Sobue S¹, Ito M², Ito M³, Hirayama M⁴, Ohno K².
- **Author information**
- **Abstract**
- Therapeutic effects of molecular hydrogen for a wide range of disease models and human diseases have been investigated since 2007. A total of 321 original articles have been published from 2007 to June 2015. Most studies have been conducted in Japan, China, and the USA. About three-quarters of the articles show the effects in mice and rats. The number of clinical trials is increasing every year. In most diseases, the effect of hydrogen has been reported with hydrogen water or hydrogen gas, which was followed by confirmation of the effect with hydrogen-rich saline. Hydrogen water is mostly given ad libitum. Hydrogen gas of less than 4% is given by inhalation. The effects have been reported in essentially all organs covering 31 disease categories that can be subdivided into 166 disease models, human diseases, treatment-associated pathologies, and pathophysiological conditions of plants with a predominance of oxidative stress-mediated diseases and inflammatory diseases. Specific extinctions of hydroxyl radical and peroxynitrite were initially presented, but the radical-scavenging effect of hydrogen cannot be held solely accountable for its drastic effects. We and others have shown that the effects can be mediated by modulating activities and expressions of various molecules such as Lyn, ERK, p38, JNK, ASK1, Akt, GTP-Rac1, iNOS, Nox1, NF-κB p65, IκBα, STAT3, NFATc1, c-Fos, and ghrelin. Master regulator(s) that drive these modifications, however, remain to be elucidated and are currently being extensively investigated.
Specific Conditions with research

• Rheumatoid arthritis, reduced disease progression and oxidative stress markers, reduced DAS and IL-6 levels
• Cerebrovascular diseases, reducing hypoxic ischaemia and reperfusion injury, reduced apoptosis, reduced infarct ratio
• Nephritis and nephritic syndrome
• Diabetes and impaired glucose tolerance, improved IGT and reduced oxidative stress markers, reduced LDLs and FFAs
• Neurodegeneration: Alzheimer’s and Parkinson’s disease, restored neural proliferation and reduced oxidative stress
• Improved athletic performance
• When taken with chemotherapy agents and radiotherapy has shown a reduction in SEs (mortality, loss of appetite and body weight loss) and maintained anti-tumour activity
• Reduced pressure ulcers and skin radiation damage
• Interstitial cystitis
• Mitochondrial diseases and dermatomyositis
Molecular Hydrogen Review

Articles

Molecular Hydrogen research reviews cont

Molecular Hydrogen as a novel antioxidant

Molecular Hydrogen Research: Human studies

Molecular Hydrogen research: Human Studies cont

Molecular Hydrogen Functions

- The most powerful selective Anti-oxidant (selective on hydroxyl radical and peroxynitrate) Does not disturb redox homeostasis ie doesn’t reduce signalling molecules
- Improves mitochondrial function increasing cell ATP energy production
- Has Anti-inflammatory properties, TNF, ILs, NF-Ks, reduces cytokines etc
- Has Anti-allergy functions, stabilises mast cells
- Improved insulin sensitivity and glucose uptake
- Cell signalling modulation via protein phosphorylation and regulates gene expression of pro-inflammatory cytokines and hormones likely via modulating peroxynitrite functions, NFKB, ILs, TNF, PGE2, FGF21, ghrelin
- Up regulates other antioxidants including through NRF2 activity
- Passes across blood brain barrier
- Alkalinising properties and enhancing (sparing) function of minerals
Molecular Hydrogen

Molecular Hydrogen (H2) is a molecule composed of two hydrogen atoms bonded to each other. This molecule does not commonly occur in nature. Most of the time, hydrogen atoms bond to other atoms. For example, two hydrogen atoms are bonded to a single oxygen atom to form a water molecule.
Periodic Table

THE PERIODIC TABLE

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The periodic table is a tabular display of the elements, arranged by atomic number in ascending order. Each element is represented by its symbol, and the table is divided into periods (rows) and groups (columns). The table is used to organize and understand the properties and characteristics of elements.
Molecular Hydrogen and Health

- Hydrogen (H) appears in the top left corner of the periodic table, and is denoted as 1. It contains one proton and one electron with no neutrons. This means that the element hydrogen is the smallest, simplest, and most fundamental element. This makes Molecular Hydrogen (H2) the simplest molecule in existence since it’s a bond of two of the smallest atoms.

Why have the benefits of Molecular Hydrogen not been promoted more heavily?

The benefits of H2 are hard to explain to the average person because “it’s too simple”. H2 can’t be patented, hence it’s not going to be profitable as a pharmaceutical drug. Therefore, not many resources have been allocated to promote H2 in mainstream media. Also, H2 seems to be “good for everything” at first glance. Since H2 works on the antioxidant defence system inside our cells, its effects vary from person to person. Free radicals affect each person in different ways. This can be a difficult concept to grasp for some people, and sounds “too good to be true”.

Despite these hurdles, progressively more academics and researchers have documented the undeniable evidence for the benefits of H2 on human health. The research on molecular hydrogen has grown exponentially over the past 10 years.
Molecular Hydrogen is the Perfect Antioxidant

- No other antioxidants have the ability to act in the multiple ways that Molecular Hydrogen (H2) does to protect from oxidative stress. H2 is the Perfect Antioxidant:
  - Zero Toxicity
  - Size
  - Selectivity
  - Synergy
  - Other non-antioxidant added benefits ie anti-inflammatory, cell signalling modulation etc
Why is Molecular Hydrogen So Effective? – Zero Toxicity

Hydrogen neutralizes free radicals and turns it into water, leaving no byproducts. (Other antioxidants turn into weaker free radicals themselves after neutralizing free radicals) The Hydroxyl Radical (•OH) is the most dangerous free radical because it directly attacks and damages cells, proteins, DNA, and Lipids.

\[
2 \cdot \text{OH} + \text{H}_2 = 2\text{H}_2\text{O}
\]

Notice how Ascorbic Acid (Vitamin C) becomes an Ascorbyl Radical once it reacts with \(R\cdot\) (Free Radical). Therefore even though Vitamin C and other antioxidants neutralize free radicals, they become weak free radicals themselves.
Molecular Hydrogen is so Effective due to its Size

Molecular Hydrogen is the smallest molecule in existence: Because hydrogen is so small, it can penetrate deep into the cells to eliminate free radicals at their source, in the mitochondria. (Representation of the molecular weights of different antioxidants vs. hydrogen shown below) Also due to its size, hydrogen can easily cross the blood-brain-barrier to eliminate free radicals in the brain.
Free Radicals and Selectivity

Low levels of superoxide and hydrogen peroxide are beneficial. They signal adaptation to stress and protect the cell from infections and themselves have antimicrobial properties. Important to not disrupt these. H2O2 regulates cell differentiation, the immune system, autophagy and apoptosis.

Molecular Hydrogen binds to OH- and turns it into water.
Why is Molecular Hydrogen So Effective? – Synergy

Hydrogen upregulates antioxidant systems that are already present inside our cells. Our cells contain antioxidant systems such as Superoxide Dismutase and Glutathione Peroxidase that neutralize free radicals such as the Superoxide Anion (O$_2^-$) and Hydrogen Peroxide (H$_2$O$_2$), an excess of which converts into the harmful Hydroxyl Radicals. Hydrogen increases the activity of these endogenous antioxidants. Link: http://bit.ly/1hZhqmJ

Molecular Hydrogen Increases the Activity of Endogenous Antioxidants (Source: http://1.usa.gov/1nqxK88)
Most Common Chronic Health Conditions

- Heart disease
- Stroke
- Cancer
- Mental Health
- Diabetes
- Obesity
- Alzheimer’s Disease
- Arthritis
- Osteoporosis
Disease is caused by lack of cell energy or oxidative tissue damage.
Where we create energy

\[ \text{~4\% of oxygen breathed become oxygen-derived "free radicals"} \]

\[ \text{~90\% of oxygen is used in the mitochondria, which are power plants within all living cells.} \]

\[ \text{~90\% of oxidation occurs in mitochondria.} \]
When Mitochondria Generates ATP, Free Radicals are produced as a byproduct of metabolism.

**Input:**
- Glucose \((C_6H_{12}O_6)\)
- Oxygen \((O_2)\)

**Combustion**

**Mitochondria**

**ATP (Energy)**

**Byproducts:**
- Carbon Dioxide \((CO_2)\)
- Water \((H_2O)\)
- Hydroxyl Radical \((\cdot OH)\)

**Damages:**
- DNA
- Lipids
- Proteins etc.
What Are Free Radicals? (Cause Oxidative Stress)

FORMATION OF FREE RADICALS

UV LIGHT
IONIZING RADIATION
SMOKING
METABOLISM
IONIZING RADIATION
INFLAMMATION
AIR POLLUTION

CELL DAMAGE
Oxidative stress has been linked to 90% of all diseases, as well as aging. As shown in the figure below, oxidative stress is the underlying cause of diseases such as cancer, diabetes, Alzheimer’s, Parkinson’s Disease, etc. You can find journals that link oxidative stress to each disease mentioned online.
Oxidation, Inflammation and Disease Are All Related
Oxidation and Inflammation

Oxidative Stress and Inflammation Are Inseparably Linked

- Oxidative stress
  - Antioxidant depletion
  - NF-κB activation
- Oxidized LDL
- Advanced Glycation End Products
- Oxidized Phospholipids
  - ↑ ROS production
  - Cytokines/chemokines
- Leukocyte/macrophage activation (inflammation)

How Oxidative Stress Causes Disease

ROS (Type of Free Radicals) Damage

ROS (Reactive Oxygen Species, Type of Free Radicals) are toxic by-products of energy production that can damage the cell membrane, mitochondria and DNA. This is the reason we need a good supply of antioxidants.
Cell Membrane Transportation

When membranes are damaged nutrients and toxins cannot get transported in or out.
When mitochondrial membranes are damaged they can’t make ATP efficiently.
DNA Damage

- Cellular Metabolism
- UV Light Exposure
- Ionizing Radiation
- Chemical Exposure
- Replication Errors

DNA Damage

- Cell Cycle Checkpoint Activation
- Transcriptional Program Activation
- DNA Repair
  - Direct reversal
  - Base excision repair
  - Nucleotide excision repair
  - Mismatch repair
  - Double strand break repair
    - Homologous recombination
    - Non-homologous end joining
- Apoptosis

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Calcium Regulation

Calcium channels on the cell membrane open in response to a stress trigger increasing the flow of calcium ions into the cell. This calcium triggers excitatory mechanisms to increase the activity of the cell in response to a stress.

This increased metabolic activity in the cell dramatically increases oxidative stress which in turn damages the cell and causes disease.

This is responsible for reperfusion injury which is dramatically reduced by the presence of molecular hydrogen.
Research for Molecular Hydrogen and Diabetes Therapy


Effects of Molecular Hydrogen on Diabetes And Metabolic Syndrome

- Improved insulin function and reduced plasma glucose and TG, increased uptake into skeletal muscle.
- Reduced oxidative stress related tissue damage with inhibition of TNF induced monocyte adhesion to endothelial cells and endothelium protection from TNF induced apoptosis.
- Decreased levels of total and oxidised LDL, free fatty acids, and lipid peroxidation and raised HDL after 8-10 weeks.
- Improved fatty liver disease in db/db mice (type 2 diabetes mice model).
- Increasing levels of plasma adiponectin and superoxide dismutase.
- In 2/3 of patients with IGT molecular hydrogen normalised oral glucose tolerance test.
The Vicious Cycle of Insulin Resistance

Hyperglycemia causes tissue damage through multiple mechanisms including: increased flux of glucose and other sugars through the polyol pathway, increased intracellular formation of advanced glycation end products (AGEs), increased expression of the receptor for AGEs and its activating ligands, activation of protein kinase C isoforms, and over activity of the hexosamine pathway. All of these pathways contribute to increased free radical production ($O_2^-$) and eventually causes insulin resistance, Beta-Cell dysfunction, and diabetic complications. [Source]
It is more than ‘High GI’ food choices that cause metabolic syndrome.
Chronic oxidative stress causes mitochondrial damage causing insulin resistance.

Figure 2: Mitochondrial alterations in skeletal muscle do not precede the onset of high fat and high sucrose diet (HFHSD)-induced insulin resistance, but result from gluco/lipotoxicity-associated oxidative stress.
Mitochondrial damage causing insulin resistance

- mtDNA mutations (A3243G, A8344G)
- Imbalanced acetylation status of mitochondrial proteins
- Environmental toxins, POPs

Mitochondrial dysfunction
- Inefficiency of ETC and β oxidation

- Overproduction of ROS
- Accumulation of lipids

Disruption of insulin signaling pathway

Insulin resistance

Anti-diabetic drugs
Regular exercise
Natural products
Antioxidants
Pyruvate
Pancreatic Beta Cell

Pancreatic beta cells have one of the lowest levels of antioxidants in the body and hence are especially susceptible to damage by free radicals, which effects their ability to release insulin.

Beta-cell mitochondria serve as fuel sensors that link glucose exposure to insulin release:

1) GLUT2 transporters introduce glucose to mitochondria causing increased $\uparrow$ATP:ADP ratio
2) K+ gate closure $\rightarrow$ depolarization
3) Voltage sensitive Ca++ channels open
4) Exocytosis of insulin storage granules to bloodstream
Diabétés: Reducing Complications Risk by Reducing Oxidative Stress

Complications of Diabetes

**Macrovascular**
- **Brain**
  - Cerebrovascular disease
  - Transient ischemic attack
  - Cerebrovascular accident
  - Cognitive impairment
- **Heart**
  - Coronary artery disease
  - Coronary syndrome
  - Myocardial infarction
  - Congestive heart failure
- **Extremities**
  - Peripheral vascular disease
  - Ulceration
  - Gangrene
  - Amputation

**Microvascular**
- **Eye**
  - Retinopathy
  - Cataracts
  - Glaucoma
- **Kidney**
  - Nephropathy
  - Microalbuminuria
  - Gross albuminuria
  - Kidney failure
- **Nerves**
  - Neuropathy
  - Peripheral
  - Autonomic
Molecular hydrogen and brain protection


Molecular hydrogen and brain protection cont

Molecular Hydrogen and Athletes

• Reduces oxidative stress protecting cells and mitochondrial function
• Has anti-inflammatory properties that enhance tissue repair after training
• Reduces lactic acid build up and increases bicarbonate levels during exercise
• Increases muscle energy production by increasing measurable muscle torque during isotonic exercise
• Reduces free radical DNA damage substrates post exercise
Oxidative Stress is Linked to Fatigue and Inflammation, Enemies of the Athlete (Research)

“High levels of reactive oxygen species (Free Radicals) promote contractile dysfunction resulting in muscle weakness and fatigue”

Oxidative stress causes inflammation, and inflammation in turn causes more oxidative stress. This cycle occurs because oxidation causes various protein dysfunctions, and that hinders the operation of functions that restore a healthy oxidant/antioxidant balance.
Link: http://bit.ly/SeOXDx

However, “Heavy and sustained exercise training generates large quantities of free-radicals that likely outstrip the buffering capacity of the system, leaving these individuals susceptible to oxidative stress…” writes Harshal R. Patil, M.D.
Link: http://bit.ly/1j0o0ta
Molecular Hydrogen for Athletes - Research

Effects of drinking hydrogen-rich water on muscle fatigue caused by acute exercise in elite athletes
Author:
Aoki et al, 2012
Link: http://1.usa.gov/1hRNfQx

Hydrogen water decreased the elevation of blood lactate during heavy exercise. Furthermore it inhibited the early decrease in peak torque during maximal isokinetic knee extension. Athletes consuming regular water did not experience this inhibition.
A way of using hydrogen-containing water for athletes

Author: Noriki Nagao M.D., PhD.
Link: http://bit.ly/1hYUlva

Consumption of hydrogen-containing water before exercise reduces the level of 8-OHdG (breakdown product of free radical induced DNA damage) excreted in urine by 20% compared with consumption of mineral water.

Therefore consumption of hydrogen containing water before exercise reduces DNA damage caused by reactive oxygen species (hydroxyl radical).

Hydrogen-containing water is an efficient method to reduce DNA damage and fatigue caused by physical stress and extreme training.
The hydrogen water supplemented group had significant increases in fasting arterial blood pH (0.04) and serum bicarbonates (2.5 μmol/L) as compared with the baseline after 14 days of intervention. A significant increase in postexercise pH (0.07) was also observed.

- Higher post exercise pH potentially indicates a better environment for repeated muscle contraction, as water buffers inorganic cations generated by exercise.
- No volunteers withdrew before the end of the study, and no participant reported any vexatious side effects of supplementation.
- These results support the hypothesis that hydrogen water administration is safe and may have an alkalizing effect in young physically active men.
Oxidative stress linked to Chronic Fatigue
Efficacy of Molecular Hydrogen for Skin


**Summary**

- UVA radiation contributes to skin aging via the induction of collagenase mRNA (a matrix metalloproteinase enzyme) which increases ROS production and reduces Type I collagen in fibroblasts and keratinocytes. Degradation of collagen type I in the dermis leads to formation of wrinkles.
- Consuming hydrogen water significantly increased human embryo fibroblast Type I collagen production.
- Hydrogen water was found to significantly suppress UVA-induced reactive oxygen species in OUMS-36 fibroblasts.
- Consuming hydrogen water prior to UVA irradiation increased cell viability from 29% to 35%. In human keratinocytes.
- Subjects bathing in hydrogen water displayed a significant decrease in wrinkle areas across the body.
- Therefore, warming hydrogen water to 41°C dilated hair follicles and allowed hydrogen to penetrate the dermis where it decreased intracellular levels of ROS induced by irradiation. This process inhibited cell death and DNA damage as well as promoted type I collagen production.

**Efficacy of Molecular Hydrogen for Skin**

**Hydrogen-rich electrolyzed warm water represses wrinkle formation against UVA ray together with type-1 collagen production and oxidative-stress diminishment in fibroblast and cell-injury prevention in keratinocytes**

Kato S, Saitoh Y, Iwai K, Miwa N.
(Laboratory of Cell-Death Control BioTechnology, Faculty of Life and Environmental Sciences, Prefectural University of Hiroshima, Nanatsuka 562, Shobara, Hiroshima 727-0023, Japan.)

Link: [http://1.usa.gov/1gdEE78](http://1.usa.gov/1gdEE78)
Efficacy of Molecular Hydrogen for Skin

Medical Gas Research 2013, 3:20

Hydrogen water intake via tube-feeding for patients with pressure ulcer and its reconstructive effects on normal human skin cells in vitro
Kosuke Aoki, Atsunori Nakao*, Takako Adachi, Yasushi Matsui1 and Shumpei Miyakawa

Link: http://bit.ly/P6BwUQ

Summary

Administering hydrogen water to hospitalized elderly patients with pressure ulcers, showed a decrease in wound size (91.4% reduction) and early recovery (113.3 hospital days vs. 155.4 hospital days, p < 0.05). Results above are attributed to the anti-inflammatory and antioxidant properties of hydrogen water and reducing intracellular ROS and facilitation of type-I collagen construction in dermal fibroblasts and epidermal keratinocytes.
Hydrogen as a New Class of Radioprotectant

Liren Qian, Jianliang Shen, Yunhai Chuai, Jianming Cai

Link: http://bit.ly/1cDAncu

Summary

Ionizing radiation damage is caused by hydroxyl radicals (•OH) created by radiolysis of H2O.  
• Molecular hydrogen (H2) has antioxidant activities by selectively reducing •OH and peroxynitrite (ONOO-).  
• Treating cells with hydrogen before irradiation significantly inhibited radiation induced cell apoptosis (decr. ROS and caspase 3 activation) in human intestinal crypt cells as well as human lymphocyte cells.  
• Increased levels of anti-oxidants superoxide dismutase and glutathione-peroxidase  
• Hydrogen significantly reduced the severity of dermatitis caused by radiation, accelerated tissue recovery, and reduced the extent of radiation-induced weight loss.  
• Following brain irradiation, the hydrogen water group showed decreased hippocampal damage and decreased levels of 8OHdG and MDA as well as increased levels of superoxide dismutase.

Figure 1. Free radicals generated during radiolysis of water and cytotoxic oxygen radicals that hydrogen could selectively reduce. Initial radiation chemistry of ionization and excitation is to generate H2O+ and e’ from the ionization of H2O, and hydrogen atom (H+) and hydroxyl radical (•OH) from the excited H2O. •OH is the cytotoxic oxygen radical that hydrogen could selectively reduce which caused most of the IR-induced cellular damage.
Methods of Hydrogen Intake

- Hydrogen-Enriched Saline
- Hydrogen Gas Inhalation
- Hydrogen-Rich Water
- Hydrogen Forming Capsules
Molecular Hydrogen Options

- Hydrogen gas infused water is one option but saturation of water from a gas is limited and it dissipates quickly.
- Oral silica hydride releases large amounts of hydrogen gas (microbubble size) rapidly that also disperse and escape the body quickly before the cells can respond to the molecular hydrogen.
- **Hydro-ReGen** is a more therapeutically potent option that produces molecular hydrogen in smaller (nanobubble size (100X smaller than microbubbles)), making this a more water stable form delivering hydrogen to and within the cells for over a 24 hour period, allowing for higher intracellular concentrations than other delivery options. One capsule of **Hydro-ReGen** produces more hydrogen than 2 L of hydrogen infused water.
Ingredients in Hydro-ReGen

- The Hydro-ReGen proprietary blend contains free magnesium ions that produce Molecular Hydrogen when they react with water in the intestine.

- Activated magnesium and calcium carbonate “contain” the free magnesium ions that donate free electrons to the hydrogen ions in water in the intestine. Hydrogen ions that take up an electron become hydrogen atoms and two hydrogen atoms combine to become stable molecular hydrogen.

- Selenium is added to enhance the production of Glutathione Peroxidase.
Hydro-TeleGen produces Hydrogen Nano-Bubbles

Our special formula containing a blend of alkaline minerals produces Hydrogen Nano-Bubbles (H2 Nano-Bubbles) when it interacts with water. This addresses the two limitations of Hydrogen-Rich Water:

1. H2 Nano-Bubbles do not escape, they stay stable in a "stabilized form". The H2 Nano-Bubble is so small that the electrical charges around the Nano-Bubble allow it to be stable for an extended period of time. This is especially important because H2 needs to be stable until it is inside the body where it can begin to do its work inside the cells.

2. H2 Nano-Bubbles are also so small that Henry’s Law of Gas solubility does not apply. Electrolysis and Gas Saturation can only produce H2 Macro-Bubbles and H2 Micro-Bubbles, both of which are subjected to dissipate quickly. H2 Nano-Bubbles are so small and so stable that we can have up to 8.5 ppm of Molecular Hydrogen saturated in the water. That’s up to 5 times more hydrogen! Since any excess Molecular Hydrogen dissipates from the body, consuming the highest potency of Molecular Hydrogen will be the most effective.
Evidence of Hydrogen Nano-Bubbles

- Evidence that Hydrogen Nano-Bubbles are produced by our product was confirmed using NMR (Nuclear Magnetic Resonance) analysis.
- The figure to the left indicates a broader spectrum caused by hydrogen nano-bubbles. The control is the dotted line and the thick line indicates a difference in hydrogen nano-bubble content. Notice the thicker line is wider, indicating a chemical shift that is evidence of nano-bubbles of hydrogen.
- Macro-Bubbles and Micro-Bubbles do not stay in solution long enough to cause this shift. Therefore, the presence of nano-bubbles is clear.
- Our product not only generates high concentrations of hydrogen, it generates Nano-Bubble hydrogen that can deliver optimal results to the user.

Product Safety Data

• H2 has no toxicity even at high doses. Hydreliox 49%, H2 50%, Helium and 1% oxygen is used to prevent decompression sickness during deep technical diving.

• Oral Molecular Hydrogen Product tested on mice 2gm/kg dosing

• No negative effects observed on clinical observation or on autopsy.

• This equates to 1,400 capsules/day for an average 70 kg patient.
Specific Clinical Conditions with high oxidative stress showing good clinical responses (my experience)

- Chronic Fatigue (watch for detoxification symptoms)
- Fibromyalgia, arthritis and generalised aches and pains
- PCOS and prostaglandin related period pain
- Autoimmune conditions, seen reduction in hashimotos Ab titres and ANA titres
- Improved conversion of thyroxine (T4) to triiodothyronine (T3)
- Resistant Dysbiosis and inflammation (Probiotics and anti-inflammatory therapies not effective)
- Improved mental focus, ADHD (dopamine highly sensitive to oxidative stress)
- Athletic enhancement, over training syndrome (exercise burn out)
- Skin inflammatory conditions (eczema, psoriasis)
Some More General Benefits of Hydro-ReGen

- Increases energy, mental clarity, and focus through brain antioxidant effect and improved dopamine functioning
- Stabilises blood sugar levels, improved protein absorption and fat metabolism
- Helps with polycystic ovarian syndrome (insulin resistance and oxidative stress)
- Improves circulation
- Improves gut health and bowel movements
- Reduces general inflammation and allergic response
- Improves skin health generally
- Decreases body odors and flatulence
- Improves the function and utilization of minerals
- Reduces general myalgias
- Reduces snoring
Dosage

- Average dose 1-2 morning and night
- Very toxic (and obese) patients $\frac{1}{2}$-1 capsule daily and increase as tolerated to twice daily dosage
- Children from 2 years of age $\frac{1}{4}$ - $\frac{1}{2}$ capsule daily mixed in cool liquid
- Dosage can be up to 3 capsules 3 times daily for maximal results (esp athletes)
- Once clinical results have been achieved then maintenance dose is 1-4 capsules daily in divided doses depending on oxidative stress load to be managed
Common Detox Symptoms Experienced

• Reaction will be dose and toxic load dependant, usually within first few days but can occasionally build up over a few weeks. Resolved with gut enterocyte repair, liver detoxification and anti-inflammatory support
• Bloating or change in bowel habits
• Lethargy, mild weight gain (if impaired liver detoxification processes)
• Emotionally labile (teary), mental “fuzziness”
• Headaches and myalgias
• If these symptoms occur cease capsule for 1-2 days then restart at a lower dose (symptoms commonly dissipate over 1-2 days)
Clinical Practicalities

• Symptom results can be experienced within days to weeks but benefits improve over time (months)
• No contraindications or medication interactions (but do check patients on warfarin INR levels frequently)
• Warn patients of potential usual symptoms of detoxification if toxic and stress load is high
Molecular hydrogen’s take home unique properties

- Its small size, can cross blood brain barrier
- Selective and synergistic antioxidant
- Anti-inflammatory
- Enhancing cell signalling and gene expression
- Enhanced energy and mental clarity
- Synergy with all other supplements
- Preventive, anti-aging and therapeutic applications
Some Useful Links For Further Research

• PUBMED Molecular Hydrogen Research
  https://www.ncbi.nlm.nih.gov/pubmed?term=molecular%20hydrogen%5BTitle%5D

• Medical Gas Research
  https://medicalgasresearch.biomedcentral.com/articles

• Molecular Hydrogen Studies
  http://www.molecularhydrogenstudies.com/

• Molecular Hydrogen Videos with Dr Elen
  https://www.youtube.com/channel/UCxu4ISDndhXW_J1NXZYyBkA

• Molecular Hydrogen Foundation
  http://www.molecularhydrogenfoundation.org/
Thank you for your time