

How Molecular Hydrogen Works to Benefit Your Health

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STORY AT-A-GLANCE

- › Molecular hydrogen is an active component in hydrogen water that provides therapeutic benefits to the body
- › The "Four H's" framework explains hydrogen water's benefits — actual hydrogen presence, improved health behaviors, better hydration, and hype effects, which is another term for placebo
- › Clinical trials demonstrate real health improvements including rheumatoid arthritis remission, better metabolic health, and improved blood lipid profiles
- › Hydrogen acts as a selective antioxidant targeting only dangerous free radicals while influencing gene expression and supporting mitochondrial energy production
- › Pulsed supplementation is more effective than constant use. For example, consume hydrogen water at specific times rather than continuously throughout the day

Water is an important building block of life. Without it, human life would cease to exist. That said, not all water is created equally.

In an interview with Isabel Friend for The Water Is Life podcast, Tyler LeBaron, Ph.D., founder of the Molecular Hydrogen Institute, shares how molecular hydrogen works to benefit your health in different ways. I encourage you to listen to the entire episode, as it contains many nuggets of wisdom about this fascinating subject. I've summarized the most pertinent points below.¹

From Alkaline Believer to Hydrogen Researcher

LeBaron begins his interview with Friend by explaining how he got into molecular hydrogen. He was fascinated by health, reading every naturopathic book he could find. Upon encountering the concept of hydrogen water and its potential for optimizing human health, everything clicked for him.

- **A curiosity for wellness** — LeBaron's journey into molecular hydrogen started at a young age. He developed an interest in naturopathic topics, like iridology. As his thirst for knowledge grew, he began to discover many fascinating notions about health and the human body. One thing he learned about was the concept that the body is slightly alkaline.

"And so, it's important to have an alkaline pH. And again, this was — we'll go into the science later on, but this is my understanding at the time. And I first came across alkaline water and I was like, 'That's so perfect' because that's exactly what we need. So, this is right after I basically got out of high school, and it just made a lot of sense to me."

- **Like other pioneers, there was initial pushback** — As a university student, LeBaron brought these ideas to his professors, who quickly challenged the premise:

"[O]n the one hand they were kind of dismissive and like laughing about it. But on the other hand, they were helpful. And it would explain, 'Well, this is the reason why alkaline water alone wouldn't benefit your body, basically.'"

You know, yes, it's true that the body needs to have a slightly alkaline pH, but the body already can do that really well by regulating the kidneys, by breathing, and water alone does not have the buffering capacity or the alkalinity needed to maintain this pH."

- **The eureka moment** — LeBaron's biochemistry professor pointed him toward molecular hydrogen as the real bioactive agent in these waters.

"[I]t was actually my biochemistry professor at the time when we were reviewing an article together on molecular hydrogen that can be dissolved in the water, where he said, 'Tyler, I think there's something here.'

When he said that, that's when I was like, 'Wow, this is what I'm missing. This is what I need to research.' And as I've continued research in molecular hydrogen, whether it's dissolved in water or inhalation as you're doing right now, just the hydrogen molecule is really so amazing. But you can just dissolve it into water. And so now my passion has continued expanding upon hydrogen in all its different forms and modalities and the benefits of water in general."

What Happens When People Start Drinking Hydrogen Water?

LeBaron frames the benefits of hydrogen that he has dubbed the Four H's. The detailed explanations are below:

- **Hydrogen** — Many products labeled "hydrogen water" don't actually contain enough H₂ to be therapeutic by the time you drink it. According to LeBaron:

"[N]umber one, hopefully that there's hydrogen gas present in the water because that's not always the case. There are some products that are often promoted as hydrogen water or can have hydrogen water. But by the time somebody ingests it, the concentration of molecular hydrogen is very low."

- **Health** — Once people become interested in hydrogen water, they often ditch soda, alcohol, or junk food. Thus, their health improves subconsciously:

"They're also learning about health in general. And they're starting to make changes, dietary changes. Maybe they're stopping drinking so many soda or energy drinks or alcoholic beverages or other things that are very

damaging for them. So, they improve their health. And obviously, as you improve your health and make those major lifestyle changes, then that's going to provide a lot of benefits, right?"

- **Hydration** — Just drinking more water — especially clean, filtered water — makes a big difference to your health, LeBaron says:

"A lot of people, they probably don't drink enough water, right? When you're slightly thirsty you're probably a little bit dehydrated. And so, by just drinking more water and preferentially water instead of an alcoholic beverage or a sugary drink or something, right? That's going to be better for you as well."

- **Hype** — Belief in a new remedy can trigger physiological changes. LeBaron explains the thought process behind this phenomenon:

"[H]ype has reference to the placebo effect which is actually extremely powerful and really amazing. And it's not sometimes people think that the placebo effect is just — it's only something that you think in your mind something is happening, but it's not really happening.

Or they think, 'Well, I don't believe in it. And so therefore the placebo effect won't help me' or something. But actually that's not true. The placebo effect has a true physiological biological basis."

The Science Is Catching Up — Human Trials Show Real Results

While testimonials and anecdotal reports are helpful, science helps solidify and confirm the claims. And now, LeBaron is sharing the latest updates in this regard.

- **Hydrogen water benefits rheumatoid arthritis** — One of the most powerful studies came from a placebo-controlled, crossover trial on early-stage rheumatoid arthritis. Participants drank hydrogen-rich water for a few weeks. Even better, some of the participants had their condition go into remission:²

"[F]or the first four weeks, they would drink hydrogen water or placebo water, and then they would have a washout period of, say, four weeks, and then they would switch and then they would drink hydrogen water or placebo water and they had these subjects with rheumatoid arthritis and those with early-stage rheumatoid arthritis.

[S]ome of them entered into remission of the condition. So, they didn't have that disease score high enough to even satisfy the requirement to say they had the disease, and their symptomology went down a lot. The oxidative stress went down a lot. So that was very impressive."

- **Your metabolic health also benefits from hydrogen water** — LeBaron also shares a study that he conducted with other researchers, a six-month, double-blind, randomized trial of 60 people with metabolic syndrome.³ The participants drinking hydrogen-producing tablets saw improvements in different biomarkers, such as blood sugar levels, cholesterol ratio, inflammatory markers, oxidative stress, and reduction in body mass index (BMI).
- **Blood lipid profiles are also better** — LeBaron mentioned that molecular hydrogen benefits your blood lipid profiles.⁴ He noted:

"Sometimes, some clinical studies will show some pretty prominent effects. But when you look at the meta-analysis with an additional statistical power on it, you don't really see statistically significant effects anymore because everything's kind of averaged out. But in this case, there was still a statistically significant benefit showing that hydrogen had the suggested to have improvements with blood lipid profiles."

A Deeper Dive Into the Functions of Hydrogen

LeBaron has extensive knowledge of molecular hydrogen. Below, he explains how it works and how it supports your health in different ways:

- **Hydrogen gas is selective in how it interacts in the body** — It only targets the most dangerous free radicals, like hydroxyl radicals, and leaves helpful signaling molecules alone. LeBaron explains:

"[H]ydrogen is a very stable molecule. And so, it can't easily react with very many free radicals. It can only react with radicals that are extremely dangerous and harmful and oxidative, such as the hydroxyl radical. And that's what makes it a selective antioxidant. And also, because it is so small and its physical chemical properties, it makes it largely biologically inert."

- **On a deeper level, H₂ acts like a messenger** — It can influence gene expression and protein signaling, and even the behavior of microRNAs:

"So, it has a pleiotropic effect that influences gene expression, protein phosphorylation cascades. MicroRNA, which we published on as well. All of those together is what allows it to have critical downstream effects that, later on, have very important health beneficial effects, okay? So, it's not again, it's not a strong potent drug like that, but its benefits for the energy production like you're talking about with the mitochondria."

- **Hydrogen supports energy production** — LeBaron touches upon the impact of molecular hydrogen in the context of mitochondrial health:

"[M]olecular hydrogen has been shown to maintain the mitochondrial membrane potential. It can also help prevent the opening of this mitochondrial — there's a pore or a protein channel that causes the gradient to be lost."

And it prevents that from opening prematurely when things that can be compromised during times of pollutions or ischemic reperfusion or like just damage that can happen like during a stroke or something or other types of

closings of the blood vessels. So, hydrogen can do all these things as well as it can activate PGC-1 to increase PGC-1 α , which is a marker of mitochondrial biogenesis.”

How to Incorporate Molecular Hydrogen Into Your Routine

All that said, I highly recommend consider adding molecular hydrogen into your regimen because of its benefits and relatively safe profile. [I’ve interviewed LeBaron myself](#), and here are our recommendations on how to take advantage of this revolutionary particle:

1. **Consider daily supplementation** — While not everyone may need it, the potential benefits and lack of side effects make hydrogen a low-risk, high-reward option.
2. **Choose the right delivery method** — Hydrogen-rich water, particularly from tablets, offers a convenient and effective way to supplement.
3. **Timing matters** — Consume hydrogen-rich water immediately after preparation to ensure maximum benefit.
4. **Embrace other healthy habits** — Hydrogen therapy is most effective when combined with a healthy diet, regular daily movement, and other positive lifestyle factors.
5. **Stay informed** — As research in this field continues to evolve, staying up-to-date with the latest findings can help you optimize your use of hydrogen therapy.

Less Is More When It Comes to Benefits

Given the benefits of molecular hydrogen, it’s tempting to constantly do it and think you’re always maximizing the benefits. However, our discussion yielded an important takeaway — molecular hydrogen therapy works better when it is pulsed. In other words, you’ll get diminishing returns when you always do it.

- **Pulsing recommendations** — Here are some recommended strategies to effectively use molecular hydrogen:

- Drinking hydrogen-rich water at specific times during the day is more effective than sipping it constantly.
 - Short sessions (1 to 3 h) of hydrogen inhalation may be preferable to longer (20+ h), continuous exposure.
 - Allowing at least some hours without hydrogen supplementation could possibly enhance your body's response when it's reintroduced.
- **Additional words of caution** — LeBaron noted that one problem in molecular hydrogen therapy is measuring the concentration of hydrogen in water or gas. That said, he uses gas chromatography to record accurate figures during his research.

This means that for those using molecular hydrogen at home, you'll need to be cautious about product claims. The most reliable way to verify claims is to cross-reference methods verified in clinical trials. These include certain hydrogen-generating tablets that have been shown to produce therapeutic levels of hydrogen.

Frequently Asked Questions (FAQs) About Molecular Hydrogen

Q: What led Tyler LeBaron, Ph.D., to research molecular hydrogen?

A: LeBaron's journey began with a strong fascination for natural health and an early belief in the benefits of alkaline ionized water. Initially, the alkaline theory made intuitive sense to him, but his professors explained that the body's pH is tightly regulated by the lungs and kidneys, and that water alone does not have enough buffering capacity to change internal pH.

The turning point came when a biochemistry professor introduced him to molecular hydrogen dissolved in water, which turned out to be the actual bioactive component producing benefits in some "alkaline water" products.

Q: What are the “Four H’s” that explain why people feel better when starting hydrogen water?

A: LeBaron describes four main reasons people often report benefits:

1. The presence of hydrogen itself, as many products labeled as hydrogen water may not contain therapeutic levels by the time they are consumed.
2. People who start using hydrogen water often make positive health behavior changes, such as reducing soda, alcohol, and junk food intake.
3. The simple act of increasing hydration improves health.
4. The hype effect, or placebo response, can cause real physiological changes that contribute to how people feel.

Q: What does the research say about hydrogen water’s health benefits?

A: Controlled human trials have demonstrated encouraging outcomes. In one study on individuals with early-stage rheumatoid arthritis, some participants experienced remission and reduced oxidative stress.

Another double-blind trial involving people with metabolic syndrome found improvements in blood sugar, cholesterol ratios, inflammation, oxidative stress, and modest weight loss. Furthermore, a meta-analysis confirmed statistically significant improvements in lipid profiles, supporting the idea that hydrogen has measurable effects on metabolic health.

Q: How does molecular hydrogen work in the body?

A: Molecular hydrogen functions as a selective antioxidant, targeting only the most harmful free radicals, such as hydroxyl radicals, while leaving beneficial signaling molecules untouched. It influences biological processes by modulating gene expression, protein signaling pathways, and microRNA activity.

It also supports mitochondrial health by maintaining membrane potential, preventing premature pore opening under stress, and stimulating mitochondrial biogenesis through PGC-1 α activation.

Q: What are the best practices for using molecular hydrogen?

A: The most convenient and effective delivery method is often hydrogen-rich water, especially from tablets. It should be consumed immediately after preparation to ensure maximum potency. Rather than constant use, pulsing hydrogen intake at specific times during the day or using short inhalation sessions appears to maintain better responsiveness.

Users should also be cautious of exaggerated product claims and seek products that match the concentrations used in clinical research. For best results, hydrogen therapy should be integrated into an overall healthy lifestyle that includes good nutrition, regular physical activity, and other positive habits.

Sources and References

- ¹ [YouTube, Isabel Friend, December 6, 2024](#)
- ² [Med Gas Res. 2012 Oct 2;2:27](#)
- ^{3, 4} [Diabetes Metab Syndr Obes. 2020 Mar 24;13:889-896](#)