

Hydration, Electrolytes, and the Science of Molecular Hydrogen

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STORY AT-A-GLANCE

- › Molecular hydrogen is a lesser-known antioxidant studied by experts like Tyler LeBaron, Ph.D. Research suggests it may offer a range of benefits that can support your overall health
- › LeBaron discusses the importance of proper hydration, which depends on electrolyte balance, not just water intake. Sodium, potassium, and calcium help regulate nerves, muscles, and fluid balance, and keeping sodium in a healthy range helps guard against water intoxication
- › Molecular hydrogen appears to work by supporting your body's natural balance systems, not blocking stress entirely
- › Many studies, most of them small, have reported benefits related to inflammation markers, recovery, and overall function, though results vary by delivery method, dose, and population. More research is ongoing
- › How hydrogen is used appears to matter, including timing and dosing. These include drinking hydrogen-rich water promptly in spaced (pulsed) doses rather than constantly, avoiding overuse, and pairing it with healthy habits

Note: Editorial content reflects the author's perspective and is not intended as product promotion or medical advice.

Molecular hydrogen may be one of the most intriguing antioxidants that **most people have not heard about**. In previous articles, I've discussed research suggesting that it may help **strengthen endogenous antioxidant production**. One of the leading figures in the field of this research is Tyler LeBaron, Ph.D. To raise awareness of it further, he appeared in the Built for Growth podcast by Miesha Tate, a mixed-martial artist.

Together, they discussed the importance of hydration for children and adults, and the role of molecular hydrogen. As noted by LeBaron, it's important to understand its basics before jumping into conclusions so that you don't misconstrue the findings.

Why Water Alone Isn't the Whole Story

LeBaron and Tate start their discussion with the importance of hydration, especially under stressful conditions like intense training or weight-cutting to meet competition regulations. They cleared up common mistakes around drinking water and highlighted why hydration is not only about how much you drink, but how your body manages what you take in.

- **Electrolytes play a central role in how your body functions during movement and exertion** — Minerals like sodium, potassium, and calcium help your nerves send signals and your muscles contract properly. Without the right balance, those signals weaken or fail. LeBaron emphasizes that your body works constantly to keep fluids balanced, which allows your systems to run smoothly instead of spiraling into stress or shutdown.
- **How tightly your body controls sodium levels** — Your kidneys are always adjusting, either releasing extra sodium or holding onto sodium to keep levels steady. Some people release sodium easily, while others, whom LeBaron describes as "salt sensitive," hold onto it, which can affect how your body responds to salt intake.

This difference may help explain why one person handles salt well while another retains more fluid or sees a rise in blood pressure. LeBaron's practical advice is to measure your blood pressure — if it is consistently normal, there is generally no

need to go very low-sodium.

- **Don't overhydrate** — Drinking large amounts of plain or distilled water while cutting salt can dangerously lower sodium levels in your blood, a condition called hyponatremia that can cause seizures or even death. In fact, LeBaron says that when acute cases are compared, more deaths are attributed to water intoxication than to dehydration.

When rehydrating after an aggressive weight cut, drinking plain water too fast forces your body to defend itself, sometimes by flushing fluids out through diarrhea to prevent harm. Proper rehydration works best when water, minerals (electrolytes), and simple sugars such as glucose are taken in together, so a dedicated glucose transporter in your intestine can absorb them and move the water into your cells, restoring balance instead of overwhelming your system.

- **Even mild dehydration affects both your body and your brain** — According to LeBaron, a drop in hydration of just 1% impairs physical performance and mental performance, including focus and the ability to complete cognitive tasks. He adds that many people, older adults in particular, are probably slightly dehydrated without realizing it.
- **Tips to help children rehydrate** — LeBaron explains that kids participating in sports need to be reminded to drink water, instead of being pressured. Forcing them to drink isn't helpful, because you don't want them to drink too much, too.

Short games or practices do not require sugary sports drinks or heavy electrolyte mixes. Plain water works when intake is spread out naturally.

LeBaron notes that sports drinks offer a performance benefit mainly for elite athletes exercising for about 90 minutes or more at high intensity; for most people, salt from regular meals eaten throughout the day is enough. The key is balance, not volume, especially when kids are active, distracted, and having fun.

- **Proper hydration in older adults is essential for overall health** — Thirst signals weaken with age, meaning that by the time you feel strongly thirsty, you may already be quite dehydrated. Kidney function can also decline, which changes how the body handles fluids and sodium.

For older adults whose blood pressure is normal, LeBaron — who notes this is outside his core area of expertise — suggests that a little more salt may increase the drive to drink and help maintain blood volume and blood flow to the brain.

He stresses that this applies only if blood pressure is not elevated, so check your blood pressure and talk with your health care provider before changing your salt intake. The takeaway here is that proper hydration can support circulation, brain function, and overall stability as you age.

Hydrogen Is the Smallest Molecule, but Plays a Big Role

Before going deep into molecular hydrogen, it's important to get a working idea behind it. LeBaron breaks the topic down in simple terms, starting with what a molecule actually is.

- **Basics of molecular hydrogen** — It is made of two hydrogen atoms joined together, often written as H_2 . LeBaron explains that the two atoms are bound together to form a stable molecule — the same gas that draws interest as a clean energy source because burning it produces only water. What has drawn biomedical interest is that published research, including his own Ph.D. work, has reported a range of effects on the body.
- **How to use molecular hydrogen** — There are two main methods — breathing it in as a gas or drinking it after it has been added to water.

Hydrogen-rich water is the most commonly studied method in the research literature, and it is simple and easily fits into daily routines. When hydrogen dissolves in water, it stays there briefly before escaping into the air. The water

needs to be consumed right after it is prepared to deliver the hydrogen effectively.

- **Why hydrogen behaves differently than other gases** — It is far lighter and smaller than oxygen or carbon dioxide. Because of its size, it is generally described as diffusing quickly through the body rather than lingering in one place or building up.

Balance, Not Erasure, Drives Better Health

Molecular hydrogen may benefit your body at a basic level, especially when it comes to oxidation. Rather than framing oxidation as something to eliminate, LeBaron discusses why your body needs it in controlled amounts and what happens when that balance is disturbed.

- **A simple definition of oxidation** — LeBaron compares oxidation to how a sliced apple turns brown or how metal rusts over time. Inside your body, similar reactions happen constantly. Some of these reactions are helpful and even necessary.

Others become harmful when they happen too often or too intensely. Your body already has built-in defense systems, like glutathione, that keep these reactions under control without shutting them down completely.

- **Addressing a common misunderstanding around antioxidants** — Taking large doses of antioxidant supplements does not always help and has sometimes caused harm in studies. For example, LeBaron points to a trial in smokers that was stopped early because those taking 30 milligrams (mg) of beta-carotene and 25,000 international units (IU) of vitamin A daily— were developing lung cancer and dying sooner than those taking a placebo.¹

Studies of high-dose vitamin E, he adds, also failed to show the protective effects people expected, including a large trial using 400 IU a day of synthetic vitamin E.²

- **Molecular hydrogen works differently** — Instead of blocking all stress signals, molecular hydrogen appears to help your body stay balanced. As explained by LeBaron, some stress signals act like messengers, telling your cells to repair, protect, and strengthen themselves.

Molecular hydrogen may support this process by helping your body activate its own defense systems, such as the Nrf2 pathway, rather than replacing them — an idea we discussed in an earlier interview ([link below](#)). The intended result is regulation instead of shutdown, allowing your body to respond appropriately instead of being pushed too far in one direction.

Healing Requires the Right Kind of Stress

Inflammation is often maligned because of its damaging effects on your health. However, this is mainly a concern when it becomes chronic. In fact, short-term inflammation plays an important role in recovery and long-term health.

- **Inflammation has two very different faces** — Short-term inflammation shows up after hard training, injury, or illness, and it plays a key role in repair. It brings immune cells and signaling molecules that help your body recover and adapt.

Chronic inflammation is different. It stays active without a clear reason and slowly wears the body down. LeBaron emphasizes that recovery depends on allowing the first type while keeping the second from becoming constant.

- **Molecular hydrogen as an inflammation modulator** — Research suggests molecular hydrogen may help modulate inflammation pathways. The clinical significance of these effects for everyday users is still being studied.

What the Science Shows

LeBaron explains what the research says about molecular hydrogen and how strong the current findings are. He notes there are about 200 human studies and roughly 3,000 scientific publications on molecular hydrogen, but most human trials are relatively small,⁵ typically 20 to 100 participants.* Many studies have reported benefits related to inflammation markers, recovery, and overall function, though results vary by delivery method, dose, and population. More research is ongoing.

LeBaron also points out that some of these studies use stronger designs, such as double-blind, placebo-controlled trials,^{6,7} in which neither the researchers nor the participants know who is receiving hydrogen and who is receiving a placebo, and crossover designs, in which each participant serves as their own control.

**These findings are from research conducted in clinical settings. Results may not apply to all individuals.*

The Importance of Understanding the Science

LeBaron shifts the focus from supplements and studies to education itself. His focus, he says, is research and education — helping people understand the science well enough that they are less likely to be misled by bold claims and dubious advertising.

- **Understand the fundamentals first** — LeBaron talks about the courses he teaches and the materials he creates, which start at the very beginning. He does not assume you already understand chemistry or biology. Instead, he starts with simple ideas like atoms and molecules and builds up slowly.

The goal is to help you understand what the terminology means before deciding whether a claim makes sense. When you understand the basics, health information becomes less confusing and far less intimidating.

- **Knowledge is power** — Toward the end of the conversation, Tate highlights LeBaron's courses on spotting bad science, which teach how research is often misunderstood, including the difference between two things happening at the same

time and one thing causing the other, and what a well-designed study needs to control for.

Without these basics, headlines sound convincing even when the science behind them is weak or incomplete. Learning how studies work protects you from believing claims that sound exciting but fall apart under closer inspection.

- **A clear message about responsibility** — LeBaron explains that his goal is not to sell products or tell you what to take. In the interest of transparency, he also notes that he consults for some companies in the hydrogen space while trying to remain objective about the research. Instead, he wants you to ask better questions and demand better evidence.

When you understand the basics, you stop relying on trust alone and start relying on logic. This approach puts the power back in your hands, helping you make informed health decisions instead of reacting to fear, hype, or social media trends.

Using Molecular Hydrogen the Right Way

LeBaron explains how hydrogen supplements are used in everyday settings. Again, his goal is to help people understand what works, what does not, and why proper timing and handling matter to make the most out of molecular hydrogen.

- **Drink hydrogen water right away** — One popular form of molecular hydrogen comes as tablets that react when dropped into water. Once it hits the water, hydrogen gas is released, which briefly becomes trapped in the liquid. This creates a cloudy look, which signals that the hydrogen is still present. Now, it's important to remember that hydrogen escapes quickly. If you wait too long, the gas leaves the water and the amount of hydrogen you get drops sharply.
- **Caution against swallowing the remaining tablet** — LeBaron stresses that swallowing the tablet, or what is left of it, is something you don't want to do. The reaction that releases hydrogen gives off heat, and Tate describes feeling it burn

when she swallowed the last bit of a tablet. In light of this, let the tablet dissolve fully in the water before you drink.

- **Clearing up confusion about breathing in the gas that escapes from the glass —** LeBaron explains that you probably won't get much benefit from inhaling the gas that escapes from the glass, though it won't harm you. What matters is drinking the water while the hydrogen is still dissolved, not trying to capture what floats away.

Practical Considerations if You Use Molecular Hydrogen

Research on hydrogen suggests it may offer a range of benefits. [In my own interview with LeBaron](#), we discussed practical considerations for anyone who uses this small but intriguing molecule:

1. **Daily use is an option some people explore —** Not everyone will need it. In the research to date, molecular hydrogen appears to have no known side effects when used properly, though its benefits for healthy people are still being studied.⁸
2. **Delivery method matters —** Hydrogen can be inhaled or dissolved in water. Hydrogen-rich water is the most commonly studied form and the most convenient for daily life.
3. **Don't let hydrogen escape —** Hydrogen-rich water should be consumed right away before the hydrogen dissipates.
4. **Embrace other healthy habits —** Don't rely on molecular hydrogen alone to support your health. It is not a substitute for the fundamentals, such as a healthy diet, regular movement such as an hour of walking each day, and other positive lifestyle changes.
5. **Stay informed —** More studies continue to be published about molecular hydrogen. Staying updated in this field will help you make informed decisions.

Why Pulsed Doses May Work Better Than Constant Use

After learning about the potential benefits of molecular hydrogen, you might be tempted to use it constantly, to the point of going overboard. However, when it comes to dosing, less may be more. In my earlier discussion with LeBaron, he explained that molecular hydrogen may work better when pulsed. Points from that discussion include:

- Drinking hydrogen-rich water at specific times during the day may be more effective than sipping it constantly.
- Short sessions (one hour to three hours) of hydrogen inhalation may be preferable to longer (more than 20 hours), continuous exposure.
- Allowing at least some hours without hydrogen supplementation could enhance your body's response when it's reintroduced.

One issue in molecular hydrogen research is measuring the concentration of the actual hydrogen itself in water or gas. LeBaron uses gas chromatography to measure it precisely in his research,⁹ and many commercial measuring devices aren't sensitive or accurate enough. For you, this means being cautious about product claims.

It would be wise to compare the claims printed on a product's packaging with the methods and concentrations used in clinical trials. That way, you'll be better able to judge whether a particular product lives up to its promise.

Frequently Asked Questions (FAQs) About Hydration and Molecular Hydrogen

Q: What is molecular hydrogen, and why are people talking about it?

A: Molecular hydrogen is a molecule made of two hydrogen atoms. Research suggests it may support your body's natural antioxidant defenses and help maintain

balance without shutting down normal biological processes.

Q: Why isn't drinking water alone always enough for proper hydration?

A: Hydration depends on balance, not just volume. Your body needs electrolytes like sodium and potassium to move water into cells, support nerves and muscles, and prevent dangerous dilution of blood sodium.

Q: How does molecular hydrogen work differently from typical antioxidants?

A: Instead of blocking all stress, molecular hydrogen appears to help your body regulate it. This may allow helpful signals for repair and adaptation to continue while limiting excessive oxidative damage. Its effects on chronic inflammation in people are still being studied.

Q: What does research show about molecular hydrogen's benefits?

A: There is a growing body of human research on molecular hydrogen, with findings that vary by delivery method, dose, and study design. Studies using hydrogen-rich water tablets specifically are a subset of this literature.

Some preliminary studies have observed carry-over effects in certain markers after hydrogen use, though more research is needed to understand when, for whom, and under what delivery method this occurs.

Note: Published studies on molecular hydrogen use a variety of delivery methods and doses. Results may differ from those of any specific supplement product. Study findings referenced in this article reflect the broader research literature and are not specific to any single product, dose, or delivery format.

Q: What is the safest and most effective way to use molecular hydrogen?

A: Hydrogen-rich water is best consumed immediately after preparation, and the research LeBaron has discussed suggests small, spaced doses may work better than constant use. Hydrogen-rich water is convenient, but timing matters, and more is not better.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified healthcare provider before making changes to your health regimen.

Sources and References

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