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Why Proper Breathing Is the Key to Optimal Health

Analysis by Dr. Joseph Mercola | November 1, 2026

STORY AT-A-GLANCE

- Dysfunctional breathing habits are often learned in response to emotional challenges, sometimes including trauma. These learned patterns can become embedded in your brain circuits, and when you encounter triggers, they may activate specific breathing habits, some of which may significantly lower your carbon dioxide (CO_2) concentration level
- The higher the CO_2 concentration you can maintain while remaining within the biologically normal CO_2 concentration range, the greater the likelihood that your breathing is supporting your health and performance
- Breathing techniques such as belly breathing, deep breathing and Buteyko breathing may not address breathing triggers or why you developed an inappropriate breathing habit in the first place
- When you overventilate, you get numerous physiological changes. As a result, overbreathing can trigger a wide variety of physical and psychological changes, which, according to Litchfield, may be addressed by learning new breathing habits through breathing behavior analysis
- Breathing behavior analysts help you become conscious of your breathing habits, what's triggering them and how to resolve them. This is important, as improper breathing habits can unconsciously sabotage your health

Editor's Note: This article is a reprint. It was originally published January 21, 2024.

The interview above features Peter Litchfield, Ph.D., who is, in my view, one of the best breathing experts in the world. I've taken his breathing course, which gave me a deep appreciation for what he's teaching. None of the breathing experts I've

interviewed before compare to Litchfield when it comes to understanding respiratory physiology and its impact on your health.

Many of you who read this article may react in fear because the information may challenge your understanding of what others have told you to be true and you struggle trusting yourself to guide this new belief process. I strongly encourage you to watch the interview in its entirety.

I believe it will alleviate most of these fears as Dr. Litchfield is an excellent teacher in helping people trust themselves. It would be easy to react negatively to this information and choose not to view the interview, but I believe that would be a major mistake. I sincerely hope you avoid making that choice.

According to Litchfield — who has decades of experience in both respiratory physiology and behavioral psychology — dysfunctional breathing habits are learned, and in many cases they appear to develop in response to some type of emotional trauma. The habit can become embedded in your brain circuits, and when you encounter its trigger, it can activate them and lower your **carbon dioxide** (CO_2) level.

You may have been getting a hint over time that I really value CO_2. It's probably one of the most important molecules in your body. I've been going deeper into this topic, as strategies to increase your CO_2 are probably some of the best things you can do to optimize your health.

The higher the level you can get within the biologically normal optimal range, the better. Many of us may not be close to that. And, if you think you're already breathing well because you're belly breathing, deep breathing or doing Buteyko breathing, you're in for a surprise, because there's a lot more to optimal breathing than learning to slow down, lessen or deepen your breathing.

Behavioral Physiology

Litchfield has a long and varied professional history, but his primary interest is behavioral physiology, a field in which physiology is viewed as a programmable system. As he explains, your physiology self-regulates:

"It learns, in essence. It does something and there's a consequence, and based on that consequence it changes what it does. Physiology collects information, stores information. It uses information on all levels, not just on the level of the brain, but even on a cellular level. It's collecting and using data. That's what we call learning, ultimately; that is, physiology is behavioral, it's psychology in action.

Physiology really is psychophysiological because it's a learning system ... One of the things that's important in the work that we do in breathing behavior analysis, based on this, is that people need to learn to form a working partnership with their bodies ...

The body is a learning, living system. The day the first cell came into existence, psychology was born. That is really such an important thing to understand. It's not just 'you' who's doing the breathing. Your body is doing the breathing. These aren't just genetic or organic considerations. The body gets programmed constantly by virtue of what it does, and what results from what it does, and breathing is no exception.

Look at the habits we learn in our lives. Look at my hands. I'm moving my hands right now. Look at my head and how I move it. I learned this unconsciously. I'm a whole collection of amazing habits, thousands of habits that come into play at just precisely the right place and time.

So, the right thing happens at the right time, and I don't even have to think about it. That's the nature of a habit. But they don't always go well, they can go very wrong."

Habits Serve a Purpose

As explained by Litchfield, habits always serve a purpose. You don't engage in a habit unless it serves you or your physiology in some way. This is why it's so important to form a partnership with your body, to explore your habits, and how or why you learned them in the first place.

In a sense, you could say that your physiological system is part of your unconscious or subconscious mind, or an expression thereof. The task is to become conscious of what's going on because your breathing habits may be unconsciously sabotaging your health.

> *"So, what we're really focused on in our work is observing and learning about breathing as a behavior,"* Litchfield says. *"We're not using breathing as a technique where you manipulate breathing so you can relax, or you manipulate breathing to achieve some otherworldly experience where you dissociate.*
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> *There are all kinds of reasons that people implement breathing techniques for presumed positive outcomes ... Our work isn't about breathing techniques.*
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> *Another thing that's very important, is that there is a trigger for every habit. Triggers are not there all the time. They show up at specific times. For example, in the statistics pointing the larger cities of the United States, like New York City, Chicago, Los Angeles, where surveys suggest that about 60% of the ambulance runs are a result of symptoms brought on by dysfunctional breathing.*
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> *And it's not as if this person is breathing dysfunctionally all the time. It's that at that particular moment, they breathe this way, that then precipitates these symptoms.*
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> *They don't understand where these symptoms and deficits are coming from. They don't think of their breathing. They call 911, if you're in the United States, and they end up in [the] emergency [room] ... A lot of what our work is about is identifying these habits."*

Editor's Note: *The 60% figure traces to a 1999 book by breathing researcher Robert Fried, as cited in Litchfield's 2022 article.*[1] *It is a survey-based estimate and could not be independently verified against current emergency medical services data.*

What Is a Breathing Habit?

So, how do you identify a breathing habit? There are many components to look at, including the following:

- **Motivation —** Behavior is motivated by something. There's motivation behind all habits, and any one of them can be tied up with your breathing.

- **Behaviors —** You need to identify the exact behavior involved. For example, you may be aborting the breath, meaning you inhale before you've fully exhaled.

  Often, it's rooted in a subconscious fear about not getting enough air. Whatever the cause, there's motivation embedded in the behavior. Aborting the breath and inhaling early may serve the breather by reducing worry or anxiety about not getting enough air.

  However, when you inhale too soon, air hunger sets in — a feeling like you can't get enough air — and that can trigger the very anxiety the habit is trying to avoid.

  > *"It's nothing to do with oxygen,"* Litchfield says. *"It's about claustrophobia. So, this person then develops a kind of claustrophobia that's now embedded in the breath.*
  >
  > *You'll find some people constantly reaching, trying to get that one good breath. They may suffer with air hunger for an extended period of time. As they breathe out, they abort [the breath] constantly, trying to get a satisfying breath as soon as possible."*

- **Outcomes —** What are the outcomes of your learned breathing behavior, and how are those outcomes serving you? For example, when you start taking larger breaths, you may think you're going to get more air.

  You may feel like you're in charge and in control, and that keeps you going. But what happens is you lose CO_2 without realizing it. You may experience symptoms that you and your healthcare providers may misinterpret and attribute to unrelated causes.

> In reality, you need far less air than you think. For every liter of blood you can move through your lungs, you can move 20 liters of air. But you only need 1 liter of air. So optimal breathing is usually not about getting enough oxygen. It's about regulating the CO_2 concentrations in your extracellular body fluids, like blood plasma.

What Deep Breathing Does to Your Body

Contrary to popular belief, deep breathing does not necessarily improve oxygenation. When deep breathing lowers your CO_2 below what your body needs, blood flow to your brain can actually decrease as a result of a tightening of the blood vessels (vasoconstriction) in the brain.

Additionally, the cytoplasm in your red blood cells can become too alkaline and the hemoglobin carried by the red blood cells can become unfriendly, that is, less willing to give up the oxygen it carries to the tissues that need it. So, deep breathing that tips into overbreathing can actually contribute to an oxygen deficit already in progress as a result of vasoconstriction.

The vasoconstriction occurs because the primary vascular purpose of CO_2 is vasodilation. When you have sufficient CO_2 in your system, it can open your blood vessels, and may do so more favorably than nitric oxide, which has a dark side. It can bind to Complex IV in your mitochondria and inhibit the electron transport chain. So, ideally, you want the vasodilation to be done by CO_2 rather than nitric oxide.

Thus, the outcome of overbreathing can be reduced blood flow, less oxygen and glucose reaching the brain, and electrolyte changes in the brain that then set the stage for lactic acidosis in neurons. "Most people, lay or professional, have no idea that this is going on," Litchfield says.

These brain changes, in turn, tend to trigger disinhibition where emotions — oftentimes anger or fear — are discharged. This release of emotions can serve you by allowing you to cope with a challenging situation or environment. Overbreathing

(breathing that results in a CO_2 deficit) leads to an outcome (a reinforcement) that serves you and is thus a "solution" to a perceived problem, a successful coping mechanism.

> *"Maybe they've come from a very traumatic kind of a background, and the only way they could really cope with it is to get angry,"* Litchfield says. *"But usually there is fear operating in the background ...*
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> *There are things like this that, when you overbreathe, you get a symptom, a physiological change, and people have learned to respond to that change in their own unique ways. Some people, for example, when they get dizzy because they lose oxygen in the brain, when they overventilate, feel like they're losing control and freak out. They can't understand what's going on.*
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> *They can't focus. They don't remember what's happening. They feel unable to function. They're on the verge of a panic attack. The next person goes, 'Hey, this is kind of cool. I really like this.' They have a whole different response to it. So, one of the things we're always looking at are how people relate to the physiological changes brought on by breathing."*

Automatic Reflexes Regulate Your CO_2 Level

As explained by Litchfield, your CO_2 level is regulated by automatic reflexes. There are receptors in the brain and in the arterial system that are sensitive to CO_2 concentration and to the pH of various extracellular fluids, such as blood plasma and interstitial fluids (surrounding cells). There are receptor sites in the arterial system which are sensitive to oxygen concentration but, surprisingly, not in the brain.

This system wasn't designed to get out of whack just because you get stressed. Provided you haven't learned bad breathing habits, your breathing optimizes respiration regardless of most circumstances, e.g., while talking.

As Litchfield and his colleague Sandra Reamer explain in their 2022 article in the Journal of Holistic Healthcare and Integrative Medicine,[2] breathing regulates acid-base physiology in extracellular body fluids. Your body needs to have the capacity to

change your pH rapidly, almost immediately, because if it didn't, you would be in serious trouble and could even die. Although bad breathing habits can quickly bring on fainting, for example, there are safety mechanisms that protect us.

> *"There's a simple little equation ... that addresses how blood pH is regulated by the relationship of carbon dioxide concentration with bicarbonate concentration; 'together they regulate acid-based balance from breath to breath.'*
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> *The carbon dioxide is controlled by the way you breathe. So as soon as you start to take over breathing, you take the control away from the reflexes, the result of which can be determined by doing a breathing behavior analysis.*
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> *You might be OK because in the background breathing and respiration are being coordinated properly, but maybe not, like when I'm eating and talking, I'm breathing. They have to be coordinated and linked. This is behavior. They get linked.*
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> *Sometimes they get out of sync and then people are really in trouble. They're struggling whenever they eat. Their breathing is all wrong. When they're talking, the breathing goes wrong.*
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> *They get really lightheaded when they're talking because they're overventilating. They're constantly trying to take another breath while they're talking to people ... What's happening is that they're losing carbon dioxide. They're getting completely disoriented, can't function ..."*

Do You Overbreathe?

Symptoms of low CO_2 (hypocapnia), caused by overbreathing, include but are not limited to:

- Headache
- Nausea and vomiting
- Abdominal symptoms and bloating

- Fatigue
- Muscle pain and weakness, tetany, hyperreflexia, spasm, tingling in the hands and lips, numbness, trembling and difficulty swallowing
- Cardiovascular changes like palpitations, tachycardia, arrhythmias, angina, ECG abnormalities
- Cognitive changes, including attention deficit, difficulty learning, poor memory and brain fog
- Symptoms involving consciousness, such as dissociation, disconnecting from your environment, disconnecting from people, fainting and hallucinations
- Emotional changes associated with the reduction of blood flow in the brain
- Personality and self-esteem changes

If you frequently experience any of these symptoms, it is possible that hypocapnia, meaning low CO_2 levels, may be playing a role and — according to Litchfield — the most common reason for it is a learned breathing habit that responds to all kinds of triggers, such as stress.

In that case, the approach Litchfield recommends is to identify the faulty habitual breathing behaviors and then correct them. Because many of these symptoms — particularly chest pain, palpitations, an irregular heartbeat, fainting or hallucinations — can also signal other serious conditions, have them evaluated by a health care provider rather than assuming your breathing is the cause.

Optimizing Your CO_2 by Relearning Better Breathing Habits

You can measure the CO_2 concentration in your exhaled breath with a tool called a capnometer, the wellness-educational version of it known as a CapnoTrainer:

> *"Being able to measure carbon dioxide is obviously the best of all worlds. There are ways you can look at overbreathing without a capnometer, but it's quite limited. It may be that you're not aware of how you're being influenced,*

so it's very difficult without a capnometer or CapnoTrainer.

But ultimately, the idea is not to need technology. The idea is you understand that you've learned habits and that you identify what those habits are, their components, their motivation, their outcomes, your belief systems and all kinds of things around it so that you can learn about who you are from a breathing perspective.

It's not about a breathing technique. This is about learning techniques, about how you become a different being when it comes to the way that you breathe, and your habits optimize respiration, your habits optimize acid-based physiology.

If you want to have your CO_2 looked at from a perspective of habits that you may have learned, you can rent a device, which makes it affordable for many people. A CapnoTrainer is different in a certain way than a capnometer. A capnometer technically is used in medicine, in surgery and in critical care, emergency medicine and so on.

But a CapnoTrainer is used to learn about your breathing. How are you breathing? How is it affecting you? What habits do you have? How can you learn new habits? That kind of thing. So you can rent these devices and you can also buy them. There are different versions of them.

There are professional, basic and personal versions of them. They're all software-based, and you can operate these instruments on your cell phone and on tablets and Apple computers, PC computers, whatever, and really get to know your breathing in detail ...

What breathing behavior analysts do is they help you do that. Now, however, you can learn to do it on your own. We have a book out that can walk you through that ... The idea is to try to help you optimize your functioning. So many people just don't realize that they're breathing dysfunctionally and they attribute their symptoms to all kinds of other sources completely unrelated to breathing.

And so do the health care professionals because they don't know about it either. They're trying to figure out where these symptoms are coming from, but they don't think about the breathing ...

The breathing techniques out there generally don't address habits. They may, by accident, address a habit and then give credit to the technique rather than understanding it's about some kind of embedded learning that has occurred in the process — that fear was addressed, for example.

But they may think, well, it's the slowness of breathing. Breathing slow is really good. And so it's [about the] parasympathetic nervous system, and that's why it worked, when in reality what it was about was that you lost your fear associated with the end of the exhale, for example, because of the technique they were using.

But people aren't focusing on it that way ... They aren't looking at the experiential side of it, which is key to understanding breathing behavior."

Trust Your Body

Again, your body knows how to breathe. Problems tend to arise when you unconsciously override it with a learned breathing habit that throws the system out of whack. So, trust your body.

"That's totally fundamental," Litchfield says. *"That's what we work on — helping people build trust in that system. And that's what I was talking about at the very beginning about partnering with your body. That partnership is vital.*

You're not a victim of your body. You're in the body. This is who you are. You own this. You own your breathing. You're not a victim of your breathing. And that's often a problem. People think they're a victim of all of this."

Why Most Breathing Techniques May Not Address Your Breathing Habits

While we've already mentioned this, it bears repeating. What Litchfield is talking about is not learning a specific set of breathing techniques. It's not about the technique per se. It's about understanding why your breath gets dysregulated and how new habits can be learned. In regard to the Buteyko technique, for example, he comments:

> *"Most issues around breathing, when it comes to hypocapnia, are acute. It isn't chronic. Buteyko [breathing] is really limited to [chronic overbreathing]. Secondly, you have to ask yourself, where did that hypocapnia come from in the first place? Why is this person breathing like that, that you now have to train them to habituate to a higher level of CO_2? How did that happen? What's the history of that?*
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> *And if the history is that this is a way I can control my wife, if you're overventilating so you can get angry to control your environment, what good is Buteyko [breathing] going to do? That person isn't going to raise their CO_2 level. They want it down so they can get angry.*
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> *So you have to address the motivation behind the behavior and what the outcomes are that sustain it. Just because you can habituate to a higher level of CO_2 doesn't mean you've addressed the problem. The problem is the habit. You want to identify the habit, help the person through it, help them understand where it came from and what they can do about it.*
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> *And that may have a significant philosophical impact on them as well, their belief system about their physiology, the trust in their system and so on. So the [Buteyko breathing technique is] limited because you're not addressing history of the breathing. You're not addressing any of these various factors that we've been talking about. You're just looking at the CO_2 level — 'My god, it's too low. We need to raise it.'*
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> *Another problem with Buteyko is that they don't measure it. Some do, but it's not part of their curriculum. We have a lot of people who graduated from our program who are Buteyko workers and they measure it. When you think you've been successful with your client, you need to see that the CO_2 actually went up.*

If it didn't go up, you weren't successful. So it's very important to be able to assess it right from the start because Buteyko, when they do their assessment, they're looking at correlational findings ...

On the other hand, they really do a great job because when people get ... comfortable with allowing the breath to sit out there for long periods of time, they can build trust, and they may find the reflex in it. Identifying the reflex is what ultimately builds trust because you can feel it kick in.

If you can find that reflex, then you've won a significant part of the battle. And there's a good chance that can happen because of what the Buteyko people do. Desensitization to the transition time eliminates anxiety and air hunger during the transition time by doing Buteyko, so that's helpful."

The Breathing Behavior Analysis Procedure

In the course I took with Litchfield, he provided many impressive practical examples. One was of a young woman, about 19 years old, whose CO_2 level dramatically decreased when they began her breathing interview. Among the symptoms she'd indicated on the checklist was that she would get dizzy a lot, and when she gets these dizzy spells, she'd become frightened.

"So, we're talking and I see her CO_2 level go down. I say, 'Are you feeling dizzy right now?' And she says, 'Yeah, as a matter of fact, this is exactly how I feel in these kinds of situations.' 'Well, look at your CO_2 level. Look what happened here.'

This is what we call transactional psychophysiology. We're interacting with the person around their physiology, and they're seeing what's happening while they're behaving in the way they are. So, we explore that together. And then we do all kinds of testing together depending on who the person is and what the issues are.

A good example might be, we'll have them overbreathe on purpose. Now, this isn't as simple as it sounds. You need to do it the right way. There's a real right way to do it, and there are wrong ways to do it. We have someone overventilate on purpose. And what happens when you do that, they start to get symptoms, and they start to get deficits, and they're there and they're focusing on their experience.

They're not talking. I'm the one who's doing the talking. I'm asking them questions to think about the answers, not to interact with me, but just to think about the answers to the questions.

I'll ask questions like, 'Are there any emotions coming up right now? Are there any memories that are being triggered right now? Does this remind you of anything in your current life circumstances? Does this remind you of something that happened to you in the past?'

And I have a lot of information before I do this. I have this form. So they're not just random questions. They're really specific. They're about that person and their lives and what we've uncovered together. And then what often happens is, they're trapped. They can't get out. They're breathing that way and the CO_2 level simply does not come up no matter what they do. And this is what happens in their real life situation when they get trapped ...

As I work with them, I use certain kinds of experiential paradigms that I implement so they can raise the CO_2 level. The symptoms go away and they're amazed. Someone will say something like ... 'My God, it seemed like I wasn't even breathing. I feel so much better and I was hardly breathing at all. How can that be?'

It's because their belief system was that they weren't getting enough oxygen and couldn't possibly be OK breathing with these very small kinds of breaths.

In fact, this is what allowed the trap to break open so they could allow those reflexes to operate, to trust the system so they get to where they need to be from a respiratory point of view. And this may all happen in one short session, if you know what you're doing."

A Quick Rescue Method

According to Litchfield, one simple check for whether your symptoms may be related to a CO_2 deficit is to breathe into a paper bag. If the symptoms ease, overbreathing may be playing a role. Never use a plastic bag, as it can cause suffocation. Always use a paper bag, about 6 inches by 15 inches. If it's too small or too large, it won't work.

Place the paper bag over your nose and mouth and hold it in place with your hands as you breathe into it. The CO_2 will accumulate in the bag, thereby raising your CO_2 level as you breathe it in.

Important Safety Note

Paper bag rebreathing is not appropriate for everyone. Symptoms such as chest pain, shortness of breath, a racing or irregular heartbeat or fainting can also signal serious conditions, such as a heart attack, an asthma attack or a blood clot in the lungs, and breathing into a bag can lower your oxygen level.

If you have any of these symptoms, or if you have a heart or lung condition, seek medical care rather than self-testing, and stop using the bag if your symptoms worsen. Talk to your health care provider about whether this testing is appropriate for you.

> *"I remember a woman we met in Georgia, in the United States, my partner Sandra and I. She had this irritable bowel syndrome kind of problem with major anxiety around it, so she wanted some advice. There wasn't much I could offer her, but one of them was a paper bag.*
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> *About four months later she wrote back and said her whole life had completely changed. She no longer had to suffer with these episodes. She hadn't had any for months, and she couldn't believe it. But of course, she was dependent on the bag. She wasn't learning a new habit. She just grabbed the bag when she needed it, unfortunately."*

Editor's Note: *This is a single anecdotal account. It does not show that paper bag rebreathing treats irritable bowel syndrome, and, as Litchfield points out, relying on the bag is not the same as learning a new breathing habit.*

Negative Practice

Another simple technique, which is part of the core of Litchfield's program, is something called "negative practice." Litchfield explains:

> *"What you do is you become an expert at performing the bad habit. So you're not a victim of the bad habit. You own it. You take ownership of it because you can do it whenever you want to. And if you can do it whenever you want to, you can disengage it.*
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> *So you learn to do it, disengage it, do it, disengage it. And there are specific ways of doing this. We use biofeedback in this whole process. That's an important part of it. So, then you're not afraid anymore of the symptoms because you can turn them on, you can turn them off, you don't really care. It's not a big deal.*
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> *In that process, you get highly reinforced. Again, that's how physiology works. The outcome of what it does determines what it can do within the potential it has. The idea is that there's a positive outcome for restoring good respiration.*
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> *On the other hand, it can be much more challenging because if someone is overbreathing to get angry at their husband, that's a more complex issue. You have to address that. So it can be very simple or it can be quite complex, but nevertheless, it works wonders for people."*

More Information

To learn more, visit:

- **Better Physiology Ltd.** at betterphysiology.com for information about and purchase of CapnoTrainer instrumentation for personal and professional applications

- **RespiMatters** at www.CapnoLearning.org for information regarding online breathing behavior analysis services available worldwide

- **Professional School of Behavioral Health Sciences** at www.bp.edu and www.e-campus.bp.edu for information regarding professional training in breathing behavior analysis

- **Breathing Science Inc.**, a nonprofit publisher, at www.theBSJ.org, where you can purchase the book "CapnoLearning: An Introductory Guide"

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

Sources and References

- [1, 2] Journal of Holistic Healthcare and Integrative Medicine, Summer 2022, Volume 19, Issue 2