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A Hidden Breathing Problem May Help Explain Chronic Fatigue's Exhaustion

Analysis by Dr. Joseph Mercola | January 06, 2026

STORY AT-A-GLANCE

- In a recent study, 71% of chronic fatigue syndrome (ME/CFS) patients tested had abnormal breathing patterns like hyperventilation or dysfunctional breathing, which were not seen in healthy controls
- Dysfunctional breathing was found in 42% of ME/CFS participants, leading to erratic, inefficient breathing during exertion, often without the person realizing it
- Low carbon dioxide (CO_2) levels from overbreathing reduce oxygen delivery to muscles and the brain, worsening symptoms like brain fog, pain sensitivity, and exhaustion
- A simple breath-hold test helps identify poor CO_2 tolerance, a key sign that your nervous system is stuck in "survival mode" and needs retraining
- Gentle breath retraining using nasal breathing, light breath holds, and CO_2 awareness can improve energy, reduce dizziness, and calm the nervous system

An estimated 17 to 24 million people globally are now living with chronic fatigue syndrome, also known as myalgic encephalomyelitis (ME/CFS).[1] Those who are affected deal with profound physical exhaustion that hampers their day-to-day activities, mental focus, and strength. The fatigue commonly intensifies following mental or physical activity, a phenomenon referred to as post-exertional malaise.[2]

Other symptoms, such as brain fog, shortness of breath, and dizziness, also occur in those with ME/CFS. But because its symptoms aren't particularly visible — there's no single cause, no obvious structural damage, and no clear biomarker — this condition is often called an "invisible illness."

For a long time, ME/CFS has been a mystery that confounds health experts and physicians; however, recent studies are now providing more insight into this peculiar but debilitating illness. One study, for example, points to how an unknown breathing disorder may be to blame for the exhaustion associated with ME/CFS.

Dysfunctional Breathing Isn't Just Common in ME/CFS — It's Predictable

A recent study published in Frontiers in Medicine examined how breathing abnormalities play a role in chronic fatigue syndrome symptoms. Conducted by researchers at the Icahn School of Medicine at Mount Sinai, the goal of the study was to understand whether breathing problems might help explain the profound fatigue, brain fog, and exercise intolerance associated with this condition.[3,4]

- **The study participants —** The research team followed 57 adults with ME/CFS who were between 25 and 60 years old, along with a control group consisting of 25 sedentary but healthy adults. Both groups were carefully matched by age, sex, body mass index (BMI), and physical activity level to eliminate confounding variables.

- **Both groups completed two days of cardiopulmonary exercise testing (CPET) —** This is a structured system that measures oxygen use, breathing, CO_2 levels, and heart function while exercising on a stationary bicycle. Unlike most fitness tests, CPET isn't just about performance; it reveals how the lungs, heart, and muscles work together during exertion. This makes it especially useful for uncovering hidden abnormalities that might not be obvious in routine physical tests.

- **The researchers were particularly interested in two breathing patterns —** They looked closely at hyperventilation (HV), which is defined as breathing faster or deeper than needed, leading to abnormally low levels of CO_2 in the blood, and dysfunctional breathing (DB), which refers to irregular or unstable breathing (such as rapid shallow breaths or oddly fluctuating patterns), as opposed to the smooth, efficient breathing expected during exercise.

  These breathing issues can produce symptoms that look remarkably similar to ME/CFS itself, including breathlessness, mental fog, dizziness, and worsening fatigue.

- **Breathing abnormalities were far more common in ME/CFS than in sedentary individuals —** A total of 71% of ME/CFS patients had at least one ventilatory abnormality — dysfunctional breathing, hyperventilation, or both — compared with just 32% of sedentary controls. Notably, nine ME/CFS patients exhibited both hyperventilation and dysfunctional breathing, while none of the controls had both issues. This points to a distinct, disease-related disruption in respiratory control.

- **Dysfunctional breathing was present in nearly half of ME/CFS patients —** 42.1% of ME/CFS participants met criteria for dysfunctional breathing — a pattern marked by erratic, unstable respiratory rhythms — compared with just 16% of sedentary controls. This irregularity may help explain symptoms such as dizziness, fatigue, and autonomic instability often seen in ME/CFS.

- **Hyperventilation was also significantly more frequent —** Roughly 32% of ME/CFS patients were found to hyperventilate — breathing out more carbon dioxide than their metabolic demand requires — while only 4% of control participants did. This imbalance can lower CO_2 levels and trigger a cascade of symptoms, including shortness of breath, tingling, and lightheadedness.

These irregular patterns often reflect inefficient use of the diaphragm, over-use of upper-chest breathing, or autonomic nervous system imbalance — all issues commonly reported in ME/CFS. According to Dr. Donna Mancini of the Icahn School of Medicine and the study's first author:

> *"While we know the symptoms generated by hyperventilation, we remain unsure what symptoms may be worse with dysfunctional breathing. But we are sure patients can have dysfunctional breathing without being aware of it. Dysfunctional breathing can occur in a resting state."*[5]

When Dysautonomia Disrupts Breathing, Energy Collapses

Some assume that ME/CFS patients feel breathless because they're simply deconditioned. However, the study found that oxygen use and exercise capacity were similar between ME/CFS patients and sedentary controls. That means the breathing differences weren't caused by being out of shape — they were specific to ME/CFS physiology.

According to Science Daily, the irregular breathing pattern seen in ME/CFS patients may be linked to dysautonomia. This refers to a disorder involving abnormal nerve control of blood vessels and muscles.[6]

> *"It is well known that chronic fatigue syndrome patients often have dysautonomia in the form of orthostatic intolerance, which means you feel worse when upright and not moving. This raises the heart rate and leads to hyperventilation,"* Mancini explained.

- **Nine of the ME/CFS patients had both dysfunctional breathing and persistent hyperventilation simultaneously —** This combination did not occur in any participant in the control group. The overlapping patterns were also associated with more intense shortness of breath as well as worsened symptoms like dizziness, heart palpitations, chest pain, mental fog, and profound fatigue.

- **The overlap matters even more when you look at efficiency —** Ventilatory efficiency is measured by something called the VE/VCO_2 ratio. Think of it as the cost of breathing — how much ventilation it takes to get rid of a unit of CO_2. A healthy VE/VCO_2 ratio is under 30, however, the ME/CFS group had VE/VCO_2 slopes of 34.7 on average. Those without hyperventilation had lower slopes, around 28.1.

Simply put, the higher the slope, the harder the body needs to work just to keep breathing steady. And the harder the respiratory system works, the less energy is left over for everything else.

- **The most important takeaway? Breathing problems are both measurable and modifiable —** The authors suggest that therapies aimed at improving breathing patterns, such as diaphragmatic breathing, respiratory physiotherapy, or pulmonary rehabilitation, may offer relief. Unlike medications, these methods are safer, support the nervous system, and reduce the load on respiratory muscles, especially during physical activity.

> *"Nearly half of our chronic fatigue subjects had some disorder of breathing — a totally unappreciated issue, probably involved in making symptoms worse,"* Dr. Benjamin Natelson of the Icahn School of Medicine, the study's senior author, said.
>
> *"Identifying these abnormalities will lead researchers to new strategies to treat them, with the ultimate goal of reducing symptoms."*

Low CO_2 Levels Quietly Sabotage Your Energy and Pain Tolerance

So what's going on behind the scenes? The mechanism here revolves around carbon dioxide, not oxygen. People tend to think that breathing is all about taking in oxygen. But CO_2 is actually the key that unlocks oxygen delivery at the cellular level.

In an article posted on his website, Adam Foster, a personal trainer and pain specialist behind "The Fibro Guy" program (designed to help individuals dealing with chronic pain), explored the often-ignored role of CO_2 in chronic illness and day-to-day wellness.[7]

- **Carbon dioxide plays several essential roles in the body —** It's not just a waste product that your body needs to expel; rather, it plays a vital role in pain management and chronic nervous system overload. CO_2 also supports a calmer

stress response and allows the brain to process pain in a more regulated, controlled way. In fact, when we exhale, we actually release more oxygen than CO_2.

- **One of CO_2's most important jobs is helping transport oxygen —** When you breathe, oxygen doesn't automatically enter your muscles, brain, and organs; rather, your body relies on CO_2 to actually use oxygen by signaling red blood cells to release oxygen from the bloodstream to areas of the body where it is needed most. This process is called the Bohr effect.

- **What happens when you don't have enough CO_2?** When CO_2 levels are healthy, oxygen is released easily where it is needed most. When CO_2 levels drop too low, oxygen stays tightly bound to the blood and becomes less available to the tissues.

  This helps explain why deep/rapid breathing or overbreathing, such as when you hyperventilate, does not always make people feel better. In some cases, it can actually worsen symptoms by lowering CO_2 too much, reducing oxygen delivery to the brain and muscles.

- **The medical term for low CO_2 in the blood is hypocapnia —** This often results from overbreathing or when breathing is too fast, too deep, or simply excessive for the body's needs. Hypocapnia can cause a wide range of symptoms, including dizziness, chest tightness, muscle cramps, anxiety, and pain sensitivity.

- **Hypocapnia also causes blood vessels in the brain to narrow —** This reduces blood flow to areas involved in emotional regulation and pain processing, and creates a powerful feedback loop: Pain and stress alter breathing, altered breathing lowers CO_2, and low CO_2 makes pain and stress feel even worse.

Carbon Dioxide Tolerance and Its Role in Breathing Dysregulation

Foster also explains the concept of CO_2 tolerance — This refers to how well the body can handle rising levels of carbon dioxide before triggering the urge to breathe. A person with good CO_2 tolerance can tolerate small increases without distress. Their breathing

stays calm, steady, and efficient.[8]

- **What happens when you have low CO_2 tolerance?** Basically, low CO_2 tolerance can lead to discomfort. Even a slight rise in CO_2 can trigger air hunger, rapid breathing, or feelings of panic. As a result, they may breathe more than their body actually needs — often without realizing it. Over time, this pattern of overbreathing can keep the nervous system locked in a state of heightened alert.

- **Low CO_2 tolerance is especially common in people with chronic, hard-to-explain conditions —** In addition to ME/CFS, Foster also says that people with illnesses like Ehlers-Danlos Syndrome (EDS), Postural Orthostatic Tachycardia Syndrome (POTS), and hypermobility are also prone to this condition. And because the breathing system is overreactive, the nervous system remains stuck in survival mode.

- **One simple way to estimate CO_2 tolerance is a gentle breath-hold test —** While this test is not diagnostic, it can offer useful insight into how the breathing system is functioning. Foster describes how to do this protocol:

> *"You begin by sitting comfortably and breathing normally for a minute or two. Then you take two gentle, quiet breaths through your nose and, after your second exhale, you hold your breath. You are not holding until you cannot bear it any longer.*
>
> *You are simply holding until you feel the first clear urge to breathe or any small shift in your body that tells you it is time to stop. That might be a twitch in your diaphragm, a swallow, or just a subtle discomfort that breaks the stillness.*
>
> *Your time is then measured in seconds. A breath hold of less than ten seconds usually indicates very poor tolerance. Ten to twenty seconds is still considered low. Twenty to forty seconds is the range where some people begin to function a little better, but there is often still room for improvement. If you can hold for forty to sixty seconds, you are doing well."*

- **What makes this test so valuable is it provides insights on how your nervous system is functioning —** A shorter breath-hold time often signals heightened sensitivity to CO_2. Even small increases can trigger an exaggerated breathing response, locking the body into patterns of overbreathing. In contrast, a longer hold time suggests greater tolerance and stability, supporting more efficient oxygen delivery and calmer day-to-day regulation.

The encouraging news is that CO_2 tolerance is not fixed. It can be improved through careful, gradual breathing retraining. Approaches that focus on gentle nasal breathing, reducing overall breathing volume, allows CO_2 to rise slightly and safely.

One noteworthy method is the **Buteyko breathing method**. When done correctly, this kind of retraining can improve oxygen delivery, calm the stress response, and reduce symptoms over time.

How to Restore Healthy Breathing and Get Your Energy Back

If dysfunctional breathing is at the root of your exhaustion, then fixing how you breathe isn't optional — it's necessary. Chronic fatigue isn't always about low oxygen or poor conditioning. Often, the issue is that your body is stuck in a cycle of overbreathing, poor CO_2 handling, and a nervous system that's constantly on edge. But the good news is that you can retrain your breathing. You can fix the physiology.

Here's what I recommend if you suspect your fatigue, dizziness, or brain fog might be linked to how you breathe. Whether you've been diagnosed with ME/CFS, POTS, EDS, or simply feel chronically "off," these steps can help you reset your breath, increase your energy, and reclaim stability.

1. **Test your CO_2 tolerance with a simple breath-hold —** Before you start fixing anything, it helps to get a clear picture of where you stand. I recommend doing the basic breath-hold test mentioned above.

Another good test that can tell you if your symptoms are due to a CO_2 deficiency is to breathe into a paper bag. If your symptoms begin to ease with this approach, it may suggest that breathing too much, and therefore low CO_2 levels, could be playing a role in how you're feeling. For safety reasons, never use a plastic bag, as it can be dangerous. A paper bag is important, ideally around 6 × 15 inches, since bags that are much smaller or larger may not work as intended.

Hold the paper bag lightly over your nose and mouth using your hands, and breathe normally into it for a short period. As you breathe, some of the air you exhale stays in the bag, which gently increases CO_2 levels and may help ease symptoms.

2. **Start CO_2 tolerance training using nasal breathing and light breath holds —** You don't need fancy tools to change how your body responds to CO_2. You just need a consistent, safe routine that tells your nervous system it's okay to breathe less.

   I recommend starting with gentle nasal breathing throughout your day. Try to keep your mouth closed unless you're speaking or exerting yourself. Then, add in light breath holds — short pauses after your exhale — during calm moments. These aren't intense. You're not pushing into discomfort. You're just helping your body get used to slightly higher CO_2 levels.

3. **Stop mouth breathing and focus on slow, silent breaths —** Mouth breathing throws your entire breathing chemistry off. It dries your airways, triggers overbreathing, and drops your CO_2 too quickly. If you're breathing through your mouth during sleep, it's worth addressing.

   Try this during the day: Slow your breath down. Breathe in and out through your nose. Your breath needs to be so quiet you barely feel it. Each breath should be low — diaphragmatic — not high and fast in the chest. Think of this as “invisible breathing.” You’re retraining your brain to stop panicking about every small rise in CO_2.

If you snore or breathe through your mouth at night, consider mouth taping as a temporary support tool (if it feels safe for you). The goal is always to return to calm, nasal breathing — especially during rest.

4. **Track your breathing response to activity and stress —** Start noticing when your breathing goes off. Is it after meals? During conversations? When you stand up too quickly? If you have ME/CFS, your body might be reacting to stressors with subtle hyperventilation, even if you're sitting still.

   This awareness matters. Many people think breathlessness means they're "out of shape." But if your VO_2 max is normal, the problem isn't your fitness — it's your breathing regulation. Watch for patterns: sighing, yawning, rapid shallow breaths, feeling "air hungry," or even breath-holding during stress.

   Once you recognize your triggers, you can intervene. Use a short nasal breathing break. Take a moment to ground yourself. The moment you slow your breath, you're sending a signal to your brain that you're safe. That one choice can change your day.

5. **Use gentle movement paired with breath awareness (like yoga or swimming) —** If you're ready to go further, try pairing gentle exercise with conscious breath control and activities that can help you reprogram your breathing patterns. "Breathing exercises via yoga could help, or gentle physical conditioning where breath control is important, as with swimming," Natelson said.[9]

   The key is to focus on breath mechanics while you move. Are you holding your breath while climbing stairs? Are you gasping after small tasks? These moments are your training ground. Use the movement to teach your breath how to stay calm and steady — low, slow, and nose-based.

   Let your breath act as your guide. If you feel calmer, more energized, or notice less dizziness or air hunger after training, you're on the right path.

Frequently Asked Questions (FAQs) About Breathing Problems in ME/CFS

Q: What does breathing have to do with chronic fatigue?

A: A hidden issue with how you breathe — like chronic hyperventilation or erratic breathing patterns — can lower your carbon dioxide (CO_2) levels. When CO_2 drops, your body struggles to deliver oxygen efficiently to muscles and organs, which makes fatigue worse and slows down your recovery.

Q: How common is abnormal breathing in people with chronic fatigue syndrome?

A: In a study from the Icahn School of Medicine at Mount Sinai, 71% of ME/CFS patients had disordered breathing patterns. That included chronic hyperventilation, dysfunctional breathing, or both — far more than seen in healthy individuals.

Q: What are the symptoms of dysfunctional breathing?

A: If you're dealing with dizziness, lightheadedness, brain fog, chest tightness, frequent yawning or sighing, and exhaustion after mild activity, you might be breathing too fast or inefficiently. These are common signs of low CO_2 levels caused by overbreathing.

Q: How can I tell if my breathing is contributing to my fatigue?

A: You can test your body's CO_2 tolerance with a simple breath-hold test. It gives a snapshot of how well your nervous system is handling stress and whether you're overbreathing. A low tolerance suggests your body is stuck in a chronic stress state.

Q: What steps can I take to fix dysfunctional breathing?

A: Start with gentle retraining: Use nasal breathing throughout the day and during sleep, practice light breath holds after exhaling, sip dextrose water slowly to calm your system, and avoid harsh exercise that spikes your breathing rate. Over time, this helps restore your CO_2 levels and rebuild cellular energy.

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