



## Accurate Clinic

2401 Veterans Memorial Blvd. Suite 16  
Kenner, LA 70062 - 4799  
Phone: 504.472.6130 Fax: 504.472.6128

[www.AccurateClinic.com](http://www.AccurateClinic.com)

## Accurate Education

# UNDERSTANDING YOUR PERSONALIZED PAIN TREATMENT

## A Patient Guide to the Four-Domain Approach

### INTRODUCTION: WHY THIS APPROACH IS DIFFERENT

If you're reading this, you've likely been living with chronic pain—pain that has lasted for months or even years. You may have tried many treatments with limited success. You may have been told that tests are "normal" even though your pain is very real.

Modern pain science has taught us something important: **chronic pain is not just about damage to tissues in your body—it's also about how your nervous system processes pain signals.** Think of it like a volume knob on a stereo. In chronic pain, that volume knob can get turned up too high, making painful sensations feel more severe and sometimes even making normal sensations feel painful.

This guide explains a new approach to treating your pain. Instead of just treating symptoms, we look at **four different factors** that can turn up your pain "volume knob." By understanding which of these factors are most active in *your* body, we can choose natural supplements (called nutraceuticals) that target your specific needs.

**Your pain is real. Your pain is not "all in your head."  
And there are reasons why you feel the way you do.**

### PART 1: HOW PAIN WORKS

#### Normal Pain vs. Chronic Pain

When you stub your toe or touch a hot stove, pain serves an important purpose—it warns you of danger and protects you from further injury. This is *acute* pain, and it goes away once the injury heals.

*Chronic pain* (lasting more than 3 months) is different. It persists long after the original injury should have healed, or it occurs without any obvious injury at all. This happens because of changes in your nervous system—the network of nerves, spinal cord and brain that processes all sensations.

#### The Pain Alarm System

*Think of your nervous system as a home security alarm:*

- In a healthy system, the alarm only goes off when there's a real threat (like a burglar breaking in)
- In chronic pain, the alarm becomes overly sensitive—it might go off when a leaf blows past the window, or even when nothing is happening at all.

- The alarm may also get "stuck" in the on position, continuing to ring even after the threat is gone.

*This oversensitivity can happen at different levels:*

1. **At the site of pain** (your nerves become extra sensitive)
2. **In your spinal cord** (signals get amplified before reaching your brain)
3. **In your brain** (the brain interprets normal signals as painful)

## The Good News

These changes are **not permanent**. With the right approach, your nervous system can learn to turn down the volume and become less sensitive over time. This is called *neuroplasticity*—your brain's ability to change and adapt.

## PART 2: THE FOUR DOMAINS THAT DRIVE CHRONIC PAIN

Research has identified four key factors that can impact pain processing to keep your pain system turned up too high. We call these the "four domains" (or 4 Demons). Most people with chronic pain have problems in two or three of these areas.

### DOMAIN 1: SYSTEMIC INFLAMMATION

#### What It Is

Inflammation is your body's natural response to injury or infection—it's how your immune system fights threats and heals damage. You've seen inflammation when a cut becomes red, warm, and swollen.

But sometimes inflammation becomes *chronic*—it stays active even when there's no injury to heal. This low-grade, body-wide inflammation can make your nerves more sensitive and contribute to pain.

#### Signs You May Have High Inflammation

- Elevated blood markers (like CRP or ESR) on lab tests
- Excess weight, especially around the belly
- Conditions like diabetes, high blood pressure, or high cholesterol
- Autoimmune conditions (rheumatoid arthritis, lupus, etc.)
- Diet high in processed foods, sugar, and unhealthy fats
- Joint stiffness, especially in the morning

#### How It Affects Pain

Inflammatory chemicals travel through your bloodstream and can make pain nerves throughout your body more sensitive. This is why people with high inflammation often have pain that seems to move around or affect multiple areas.

#### Natural Supplements That May Help

- **Omega-3 fatty acids** (fish oil): Reduce inflammatory chemicals
- **Curcumin** (from turmeric): Blocks inflammation pathways
- **Boswellia**: An herb that reduces specific inflammatory enzymes

## DOMAIN 2: NEUROINFLAMMATION

### What It Is

Your brain and spinal cord have their own distinct immune cells called *glial cells*. When these cells become stimulated and overactive, they trigger inflammation inside the nervous system—this is called neuroinflammation.

Unlike regular inflammation, neuroinflammation directly affects how your brain processes pain signals. It can make your brain more sensitive to pain and can contribute to other symptoms like fatigue, "brain fog," and mood changes.

### Signs You May Have Neuroinflammation

- "Brain fog"—difficulty concentrating, memory problems, mental fatigue
- Sensitivity to light, sound, or smells
- Fatigue that doesn't improve with rest
- Mood changes (anxiety, depression, irritability)
- Pain that seems out of proportion to any injury
- Multiple symptoms affecting different body systems

### How It Affects Pain

When glial cells are activated, they release chemicals that make your brain's pain processing centers more sensitive. This can cause:

- Pain that spreads beyond the original injury site
- Pain from things that shouldn't hurt (like light touch)
- Difficulty "turning off" pain even when you're resting

### Natural Supplements That Help

- **Curcumin**: Crosses into the brain and calms glial cells
- **Sulforaphane** (from broccoli): Activates protective pathways in the brain
- **Melatonin**: Reduces brain inflammation and improves sleep

## DOMAIN 3: OXIDATIVE STRESS

### What It Is

Your cells produce energy through chemical reactions that create byproducts called *free radicals* (also known as reactive oxygen species or ROS). In addition to those ROS that are produced in the body through metabolism, our bodies are also exposed to free radicals in our environment and in foods that we eat processed [meats (bacon, sausage), refined carbohydrates/sugars, reheated cooking oils, trans fats, red meat, and alcohol]. Normally, our body cleans up these with *antioxidants*—protective molecules that neutralize free radicals.

*Oxidative stress* occurs when free radicals overwhelm our antioxidant defenses. This results in damage to cells, especially nerve cells, and can contribute to pain and other symptoms.

Think of rust - when exposed to the right conditions, the iron (Fe) in steel is "oxidized" when it combines with oxygen in water, forming iron oxide, which is rust.

## Signs You May Have High Oxidative Stress

- Current or former smoking
- Diet low in fruits, vegetables, and colorful foods
- Diets high in processed meats (bacon, sausage), refined carbohydrates/sugars, reheated cooking oils and alcohol]
- Overweight or obese
- Chronic inflammatory medical conditions
- Exposure to environmental toxins
- High stress levels
- Poor sleep

## How It Affects Pain

Oxidative stress damages the protective coating around nerves (called myelin), making them more sensitive and prone to sending pain signals. It also triggers inflammation, creating a vicious cycle.

## Natural Supplements That Help

- **Alpha-Lipoic Acid (ALA)**: A powerful antioxidant that protects nerves
- **N-Acetyl Cysteine (NAC)**: Helps your body make glutathione, the "master antioxidant"
- **Sulforaphane**: Activates your body's own antioxidant defenses
- **Taurine**: Protects cells from oxidative damage

## DOMAIN 4: MITOCHONDRIAL DYSFUNCTION

### What It Is

*Mitochondria* are tiny structures inside every cell that produce energy (called ATP). They're often called the "powerhouses" of our cells. When mitochondria don't work properly, our cells—especially nerve cells—don't have enough energy to function normally, leading to oxidative stress.

## Signs You May Have Mitochondrial Problems

- Severe, persistent fatigue
- Fatigue that worsens after physical, mental, or emotional exertion (called "post-exertional malaise")
- Muscle weakness or pain
- Exercise intolerance—feeling exhausted after minimal activity
- Slow recovery from activity
- "Crashing" after doing too much

## How It Affects Pain

Nerve cells require enormous amounts of energy to function properly. When mitochondria are impaired:

- Nerves become more sensitive and prone to sending pain signals
- Your brain has less energy to suppress pain
- Muscles fatigue easily and become painful
- Recovery from any activity takes longer

## Natural Supplements That Help

- **CoQ10 (Coenzyme Q10)**: Essential for mitochondrial energy production
- **Nicotinamide Riboside (NR)**: Boosts NAD+, a molecule critical for energy
- **Acetyl-L-Carnitine (ALC)**: Helps transport fuel into mitochondria
- **Alpha-Lipoic Acid (ALA)**: Supports mitochondrial function

# CONSEQUENCES OF THE FOUR DOMAINS' IMPACT ON PAIN PROCESSING

## 1. PERIPHERAL SENSITIZATION

### What It Is

*Peripheral sensitization* means the nerves outside your brain and spinal cord (in your skin, muscles, and organs) have become overly sensitive. These nerves are called *peripheral nerves* because they're in the "periphery" of your nervous system.

*When peripheral nerves become sensitized, they:*

- Get triggered (Fire) more easily (at a lower threshold for stimulation)
- Send stronger signals than normal
- May fire spontaneously, even without any stimulus

### Signs You May Have Peripheral Sensitization

- Burning, tingling, or "electric" pain
- Numbness or unusual sensations
- Pain that follows a nerve pathway (like down your leg or arm)
- Increased sensitivity in the painful area
- Pain from light touch in the affected area
- Conditions like diabetic neuropathy, sciatica, or carpal tunnel syndrome

### How It Affects Pain

Sensitized peripheral nerves send exaggerated pain signals to your spinal cord and brain. Even normal sensations—like wearing socks or feeling sheets touch your legs—can become painful.

### Natural Supplements That Help

- **Alpha-lipoic acid:** Protects and repairs peripheral nerves
- **Acetyl-L-carnitine:** Supports nerve regeneration
- **Vitamin D:** Essential for nerve health
- **PEA (palmitoylethanolamide):** Calms overactive nerve cells
- **B vitamins:** especially vitamin B-12

## 2. CENTRAL SENSITIZATION

### What It Is

*Central sensitization* means the spinal cord and brain have become overly sensitive to pain signals. The "central" nervous system (brain and spinal cord) has turned up the volume on pain processing. This is perhaps the most important concept in understanding chronic pain.

*Central sensitization explains why:*

- Pain can spread beyond the original injury site
- Pain can persist long after an injury has healed
- Tests may be "normal" even though pain is severe
- Multiple body systems can be affected

## Signs You May Have Central Sensitization

- Widespread pain affecting multiple body areas
- Pain on both sides of the body, above and below the waist
- Pain from light touch (allodynia)—even gentle pressure hurts
- Exaggerated pain response (hyperalgesia)—things hurt more than they should
- Pain that seems out of proportion to any injury or damage
- Multiple other symptoms: fatigue, sleep problems, brain fog, mood changes
- Sensitivity to light, sound, smells, or temperature (like cold weather)
- Conditions like fibromyalgia, chronic fatigue syndrome, or irritable bowel syndrome

## How It Affects Pain

In central sensitization, the brain and spinal cord have essentially "learned" to be in pain. The pain alarm system is stuck in the "on" position. This creates a self-perpetuating cycle where pain causes more sensitivity, which causes more pain.

## Natural Supplements That Help

- **Magnesium:** Suppresses overactive nerve signaling in the brain
- **PEA:** Reduces central nervous system sensitivity
- **Melatonin:** Helps reset pain processing and improves sleep
- **Taurine:** Has calming effects on the central nervous system

## PART 3: HOW THE FOUR DOMAINS CONNECT

These four domains don't exist in isolation—they interact with and reinforce each other. Understanding these connections helps explain why chronic pain can be so complex.

### The Vicious Cycles

- **Inflammation → Oxidative Stress → More Inflammation:**  
Inflammatory chemicals create free radicals, which cause oxidative stress, which triggers more inflammation
- **Oxidative Stress → Mitochondrial Dysfunction → More Oxidative Stress:**  
Free radicals damage mitochondria, which then produce more free radicals
- **Peripheral Sensitization → Central Sensitization:**  
Constant pain signals from sensitized peripheral nerves eventually sensitize the central nervous system
- **Neuroinflammation → Central Sensitization:**  
Activated glial cells in the brain amplify pain processing
- **Poor Sleep → All Domains:**  
Sleep deprivation worsens inflammation, oxidative stress, and pain sensitivity

### Breaking the Cycles

The good news is that improving one domain often helps others.

*For example:*

- Reducing inflammation can decrease oxidative stress
- Supporting mitochondria can reduce oxidative stress
- Calming peripheral nerves can help reverse central sensitization
- Improving sleep helps nearly everything

This is why we target multiple domains at once—to break these vicious cycles from several angles.

## PART 4: YOUR PERSONALIZED ASSESSMENT

### How We Determine Your Profile

*We will assess each of the four domains using:*

- **Your symptoms and medical history**
- **Physical examination findings**
- **Questionnaires** (like the Central Sensitization Inventory)
- **Blood tests** (like CRP for inflammation, vitamin D levels, etc.)
- **Your lifestyle factors** (diet, exercise, sleep, stress)

*Each domain is scored from 0 to 3:*

- 0 = Minimal/None:** This domain is not a significant factor for you
- 1 = Mild:** Some features present
- 2 = Moderate:** Clear evidence this domain is contributing to your pain
- 3 = Severe:** This domain is a major driver of your pain

### Your Top Domains

Most people have 2-3 domains that score highest. These are the "primary drivers"—the factors most responsible for keeping your pain alarm system turned up.

Your treatment plan will focus on these primary drivers while also addressing any nutritional deficiencies (like low vitamin D or magnesium).

## PART 5: YOUR NUTRACEUTICAL PROTOCOL

### What Are Nutraceuticals?

Nutraceuticals are natural compounds—vitamins, minerals, amino acids, and plant extracts—that have health benefits beyond basic nutrition. Unlike prescription medications, they work with your body's natural processes to restore balance.

### Why Nutraceuticals for Pain?

- They target the underlying causes of pain, not just symptoms
- They have fewer side effects than most medications
- They can be used alongside other treatments
- They support overall health, not just pain relief
- Many have been studied in clinical trials

### How Your Protocol Is Chosen

*Based on your domain scores, your provider will select 3-5 nutraceuticals that:*

1. **Target your highest-scoring domains**
2. **Work well together** (some combinations are more effective than either alone)
3. **Address any deficiencies** (like low vitamin D or magnesium)
4. **Are safe with your other medications**

## Starting Your Protocol

*To minimize side effects and identify what works best, supplements are introduced gradually:*

- **Weeks 1-2:** Start with foundational supplements (correcting any deficiencies)
- **Weeks 3-4:** Add the primary supplement targeting your top domain
- **Weeks 5-6:** Add complementary supplements
- **Week 8:** First check-in to assess how you're responding
- **Week 12:** Full reassessment

## What to Expect

- **Nutraceuticals work gradually**—most take 4-12 weeks to show full effects
- **Some people notice improvement quickly**, others take longer
- **You may need adjustments**—doses or specific supplements may be changed based on your response
- **This is not a quick fix**—it's a long-term strategy to help your nervous system heal

## PART 6: THE 16 NUTRACEUTICALS

*Here is a brief overview of the nutraceuticals that may be recommended based on your domain profile:*

### For Inflammation

- **Omega-3 Fatty Acids (Fish Oil):** Reduce inflammatory chemicals; support brain and nerve health
- **Curcumin:** Powerful anti-inflammatory from turmeric; also helps brain inflammation
- **Boswellia:** Herbal extract that blocks inflammatory enzymes
- **Quercetin:** Plant compound with anti-inflammatory and antioxidant effects

### For Oxidative Stress

- **Alpha-Lipoic Acid (ALA):** Antioxidant that protects nerves; helps with diabetic neuropathy
- **N-Acetyl Cysteine (NAC):** Boosts your body's master antioxidant (glutathione)
- **Sulforaphane:** From broccoli; activates your body's own antioxidant defenses
- **Resveratrol:** From grapes; antioxidant and anti-inflammatory

### For Mitochondrial Support

- **CoQ10:** Essential for energy production; especially important if you take statins
- **Nicotinamide Riboside (NR):** Boosts NAD+, critical for cellular energy
- **Acetyl-L-Carnitine (ALC):** Helps transport fuel into mitochondria; supports nerve health

### For Nerve Health

- **Vitamin D3:** Essential for nerve function; many people are deficient
- **Magnesium:** Calms overactive nerves; helps sleep and muscle relaxation
- **Taurine:** Amino acid that protects nerves and has calming effects

### For Pain Modulation

- **PEA (Palmitoylethanolamide):** Natural compound that calms pain signaling
- **Melatonin:** Sleep hormone that also reduces inflammation and pain sensitivity

## PART 7: LIFESTYLE FACTORS

*Nutraceuticals work best when combined with lifestyle changes that support healing. These are not optional "extras"—they are essential parts of your treatment.*

### Diet

What you eat directly affects inflammation, oxidative stress, and pain:

#### Eat more:

Colorful vegetables and fruits, fatty fish, olive oil, nuts, whole grains

#### Eat less:

Processed foods, sugar, refined carbohydrates, fried foods

#### Consider:

A Mediterranean-style, Anti-Inflammatory Diet (AID) diet, which has been shown to reduce pain

### Sleep

*Poor sleep worsens every aspect of chronic pain:*

- Aim for 7-9 hours per night
- Keep a consistent sleep schedule
- Create a dark, cool, quiet sleep environment
- Avoid screens for 1-2 hours before bed
- Discuss sleep problems with your provider—they may need specific treatment

### Movement

*Gentle, regular movement impacts pain processing and helps reduce pain sensitivity:*

- Start slowly and increase gradually
- Walking, swimming, and gentle yoga are good options
- Avoid "boom and bust" patterns (doing too much on good days)
- Movement should not significantly worsen your pain

### Stress Management

*Stress activates pain pathways:*

- Practice relaxation techniques (deep breathing, meditation)
- Consider mindfulness-based stress reduction
- Maintain social connections
- Seek help for anxiety or depression if needed

### Using the Mind

*The Mind can directly suppress pain pathways:*

- Focused Mind techniques to block pain signaling
- Meditative thought processes to isolate pain consciousness
- Deep engagement of music experience

## PART 8: WHAT SUCCESS LOOKS LIKE

### Realistic Expectations

- **This is not a cure**—it's a strategy to reduce pain and improve function
- **Improvement is gradual**—expect weeks to months, not days
- **Perfect pain relief is unlikely**—a 30-50% reduction is a meaningful success
- **Function matters as much as pain**—being able to do more is a key goal

## Signs of Progress

- Pain intensity decreases (even by 2-3 points on a 0-10 scale)
- Pain bothers you less, even if intensity is similar
- You can do more activities
- Sleep improves
- Energy improves
- Mood improves
- You need less pain medication

## Tracking Your Progress

*Keep a simple daily log of:*

- Pain level (0-10)
- Sleep quality
- Energy level
- Activities you were able to do
- Any side effects from supplements

This helps you and your provider see patterns and make adjustments.

## PART 9: FREQUENTLY ASKED QUESTIONS

### **Q: Are nutraceuticals safe?**

**A:** The nutraceuticals in this protocol have been studied in clinical trials and are generally safe for most people. However, they can interact with some medications, so always tell your provider about everything you take.

### **Q: How long do I need to take these supplements?**

**A:** Most people take them for at least 3-6 months to see full benefits. Some may be continued long-term; others may be reduced or stopped once improvement is achieved, but monitor for loss of benefits.

### **Q: Can I take these with my other medications?**

**A:** Most nutraceuticals can be safely combined with medications, but some interactions exist. Your provider will review your medications before recommending supplements.

### **Q: Why do I need so many supplements?**

**A:** Chronic pain usually involves multiple mechanisms. Targeting several at once is more effective than addressing just one. However, we start with the most important ones and add others gradually.

### **Q: What if I don't improve?**

**A:** If you don't respond to the initial protocol, we will reassess your domain scores, consider different supplements, and ensure we haven't missed anything. Some people need adjustments before finding what works for them.

### **Q: Is this instead of other treatments?**

**A:** No—nutraceuticals are meant to complement, not replace, other treatments. They work best as part of a comprehensive approach that may include medications, physical therapy, and other interventions.

## PART 10: YOUR COMMITMENT

*For this approach to work, you need to:*

1. **Take supplements consistently** as directed
2. **Be patient**—give each supplement adequate time to work
3. **Track your symptoms** so we can assess progress
4. **Attend follow-up appointments**
5. **Make lifestyle changes** (diet, sleep, movement, stress)
6. **Communicate** with your provider about what's working and what isn't

**Remember:** You are not just a passive recipient of treatment. You are an active partner in your healing. The choices you make every day—what you eat, how you sleep, how you move, how you manage stress—all affect your pain.

## SUMMARY: THE FOUR-DOMAIN APPROACH

Your chronic pain is driven by real, measurable factors in your body and nervous system. By identifying which of the four domains are most active in *your* case, we can choose natural supplements that target your specific needs.

### **The Four Domains:**

1. **Systemic Inflammation** — Body-wide inflammation that sensitizes nerves
2. **Neuroinflammation** — Inflammation in the brain and spinal cord
3. **Oxidative Stress** — Cellular damage from free radicals
4. **Mitochondrial Dysfunction** — Impaired cellular energy production

### ***Consequences of the four domains impact on pain processing:***

1. **Peripheral Sensitization** — Oversensitive nerves in the body
2. **Central Sensitization** — Oversensitive pain processing in the brain/spinal cord

### **Your treatment targets your unique profile across these domains.**

This approach takes time, but it addresses the root causes of your pain rather than just masking symptoms. With patience, consistency, and partnership with your healthcare team, meaningful improvement is possible.

**Your pain is real. There are reasons for it.  
And there are things you can do about it.**



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## Accurate Education

This guide translates the complex neuroscience of chronic pain into accessible language while maintaining scientific accuracy. The document draws on the "explaining pain" principles recommended by the American Academy of Family Physicians, which emphasize that patient education about central sensitization helps validate patients' experiences and facilitates acceptance of evidence-based treatments.<sup>[1]</sup>

The *Lancet* series on chronic pain supports this biopsychosocial approach, noting that "nociplastic changes are at least partially reversible" and that patients benefit from understanding the physiological basis of their symptoms.<sup>[2][3]</sup>

The guide addresses a critical point emphasized in the literature: patients with chronic pain often feel dismissed when told their tests are "normal." By explaining how the nervous system can become sensitized independently of tissue damage, the document validates patients' experiences while providing a framework for understanding their treatment.<sup>[1]</sup>

Research on pain neuroscience education shows that this approach improves pain beliefs, reduces catastrophizing, and enhances treatment adherence.<sup>[4]</sup>

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