



HEALTH
MEANS®

Becoming Pain-Free:
HEALING THE
ROOT CAUSES OF
CHRONIC PAIN

by HEALTHMEANS

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INTRODUCTION

Our body's pain response is an incredible communication tool. The interlaced workings of our nervous, immune, and endocrine systems send complex signals to the brain, letting us know that something is wrong. Pain is vital information for us to remain functional and healthy.

But what happens when pain is prolonged due to an injury or illness? Or when pain goes awry, and there's no apparent reason why it's occurring?

With over 50 million US adults suffering daily from chronic pain, we need solutions that can address the root cause and help people regain their lives. In this eBook, we'll examine the surprisingly common world of chronic pain and explore a wide range of support strategies to work toward living pain-free.

LET'S GET STARTED!



ANATOMY AND PHYSIOLOGY OF PAIN

In order to optimally address the root causes of chronic pain, we need to understand how our pain response works.

“Pain” is what we feel thanks to the brain’s eloquent interpretation of a stimulus. But before we feel pain, our peripheral nervous system has a big job to do. Let’s explore exactly what that means.

Our nervous system consists of two major branches: the central nervous system and the peripheral nervous system. The central nervous system includes the brain and spinal cord. This is the core processing center of our bodies, our very own “super-computer” of nerve cells releasing neurotransmitters, glands secreting hormones, and immune organs and cells delivering cytokines—yes, all three systems intersect in the central nervous system!

Our brain and spinal cord receive information from all parts of our body and manage these signals so that we are able to function. Every single action that occurs in our body, whether we’re conscious of it or not, is due to the receipt, interpretation and reaction of the central nervous system.

The second branch is the peripheral nervous system. This two-part system consists of the autonomic nervous system that is in charge of our automatic activity, such as our heart beating, breathing, and the well-known “fight-or-flight” and “rest-and-digest” responses. The second part of this network is the somatic nervous system—it powers voluntary movements via our skeletal muscles.

So, how does the peripheral nervous system lead to our feelings of pain?

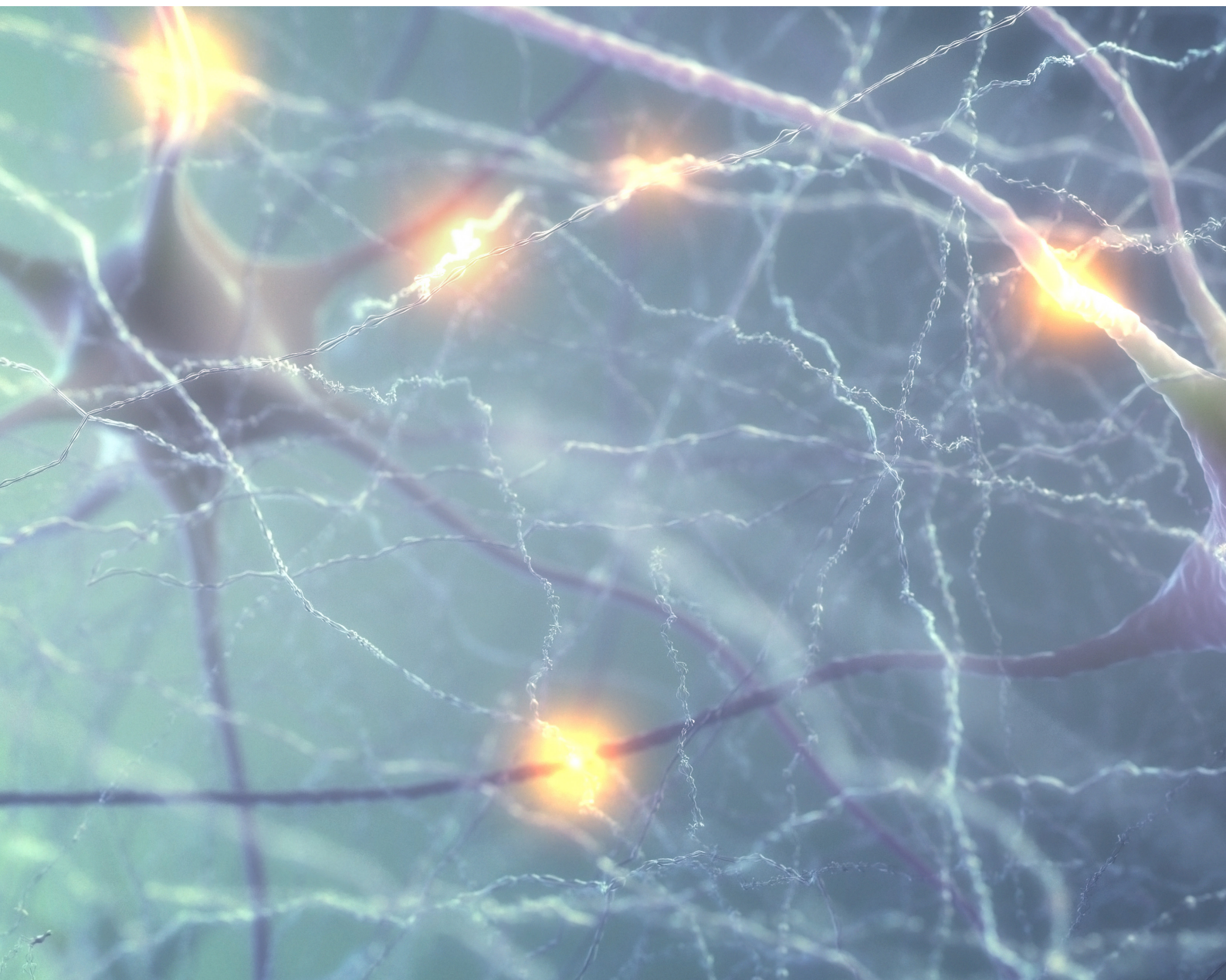
Before a stimulus, such as touching a hot stove, turns into the familiar experience of pain, it must first be detected by the peripheral nervous system. This detection and identification is called nociception, and nociception is carried out by specific nerve endings in the skin, joints, bone, viscera and muscles, aptly named nociceptors. Interestingly, there are no nociceptors in the central nervous system.

If there is a chance that a stimulus may lead to injury, such as even a short moment of contact between our skin and a hot burner on a stove, nociceptors are activated by a variety of compounds, including histamine, globulin and arachidonic acid, released by the affected tissues. This activation allows the

nociceptors to communicate with the brain that something is wrong—the brain then interprets these signals as pain.

Nociceptive signal transduction, sometimes called pain transduction, is the technical term for this communication between the peripheral and central branches of the nervous system. Transduction is an intricate biochemical and bioelectrical process that allows us to perceive and rightfully react to experiences that may cause us harm.

Amazingly, however, pain is not the only sensation we experience due to transduction. This integral function of our neurophysiology also allows us to taste, hear, touch, see and smell. Without transduction, we would lose our five senses [1].



ACUTE PAIN VS. CHRONIC PAIN

The steps outlined above are the most basic physiology of pain perception. However, chronic pain is different from an acute injury that heals and no longer causes discomfort.

One out of 5 adults in the United States suffers from pain that doesn't follow these physiological "rules." Chronic pain is defined as pain that lasts more than three months, be it continuous or cyclical, and it is generally considered a central nervous system disorder.

Those who live with chronic pain sometimes have no signs of physical damage or any external reason for their pain, and yet it exists. Their bodies may release the inflammatory compounds listed above—histamine, globulin and arachidonic acid along with bradykinin, nitric oxide and immune cytokines—sometimes called an "inflammatory soup"—long after any threat has passed.

While the root causes of chronic pain are still poorly understood, we do know that both physical and psychological trauma can contribute to the condition—a particularly traumatic accident, death of a loved one or divorce are common events associated with chronic pain. Additionally, prolonged infection or chronic diseases such as diabetes, chronic fatigue syndrome, endometriosis or autoimmune disorders may also play a role. Genetics, too, can influence our sensitivity to pain. An overlap of multiple triggers and events is found in most patients [2].

Interestingly, a higher proportion of women than men suffer from chronic pain—multiple biological, psychological and cultural reasons back this statistic. Biologically, the interplay between female sex hormones and the nervous system, such as estrogen and progesterone's effects on nociceptors, is one cause that has been widely studied. A perfect example of this is the increase of systemic pain that has been observed in women during the high-hormone phase leading up to and accompanying the menstrual cycle.

One small study even found that women have approximately twice the density of nerve fibers when compared to men. With the help of high-powered microscopy, a team of scientists in Springfield, Illinois, compared female and male nerve fibers in a patch of skin near the nose. They concluded that while more research is needed, this may explain why women have more intense pain perception than men [3].

The brain and spinal cord of both male and female chronic pain patients are altered when compared to those without a chronic pain diagnosis. Differences even exist at a cellular level—research has revealed that the synapse, the area of a neuron that allows communication with other neurons and cells, is functionally different when chronic pain is at play. These changes create a neurological imbalance that may decrease a person's ability to tolerate and perceive pain [4].

SOLUTIONS FOR CHRONIC PAIN

Remedies for chronic pain range from surgery to meditation. Ultimately, those who deal with this often-debilitating syndrome must find an individualized combination of conventional and holistic therapies that lead to the best quality of life possible.

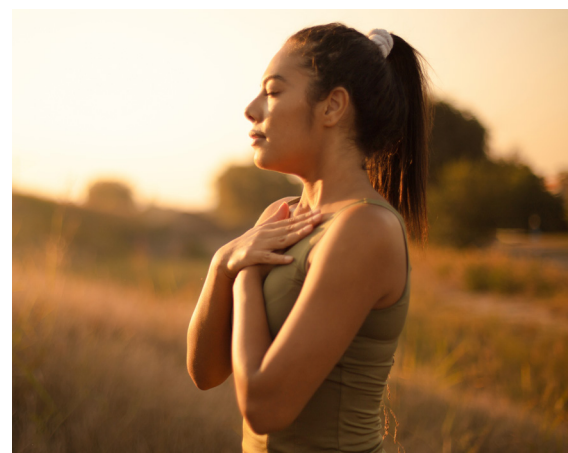
In this section, we'll explore research-based holistic therapies that have a solid track record of alleviating chronic pain. These include psychological-based treatments, traditional medicine, physical manipulation, diet and supplements.

MINDFULNESS-BASED STRESS REDUCTION (MBSR)

One of the most well-known tactics for those with chronic pain is a system of mindfulness and meditation practices called Mindfulness-Based Stress Reduction, or MBSR. Created by Jon Kabat-Zinn, PhD, in 1979, MBSR is an eight-week course that includes a full-body awareness exercise, the body scan, as well as sitting and moving meditations. As simple as it sounds, the goal of each activity is to become non-judgmentally aware of what is happening right now, in the moment, and nothing more.

Hundreds of medical centers across the world employ MBSR as an alternative treatment for patients suffering from depression, anxiety, cancer, diabetes, hypertension and chronic pain. And the research is incredibly promising: MBSR improves the lives of those with chronic illnesses and helps them cope, both psychologically and physically, with otherwise untreatable diagnoses. MBSR has been investigated as a strategy for chronic pain and may be especially effective for those with arthritis, back or neck pain, migraines and fibromyalgia.

But how does MBSR reduce symptoms of chronic pain? Studies have examined a few underlying reasons, including changes in brain function that occur after meditation training. These changes help those with chronic pain evaluate their experiences in a different way by altering emotional and sensory experiences of pain and less anticipation of impending pain. Amazingly, meditation may also decrease pain-associated inflammatory markers. One study found that interleukin-6, an immune chemical released during periods of inflammation, was reduced for up to four months in those practicing meditation [5].



Ideally, the MBSR program is completed in person with a trained instructor. However, UMass Memorial Health's Center for Mindfulness offers an online version of the program in both English and Spanish. UMass Medical Center is the birthplace of MBSR, and since its inception in 1979, over 25,000 people have successfully completed the course. For more information, please visit www.ummhealth.org.

RETRAINING THE BRAIN

Behavior-based techniques such as Dynamic Neural Retraining System (DNRS), stimulatory therapies such as transcranial magnetic stimulation, and less well-known solutions such as exercise, educational video games and even caloric restriction and intermittent fasting may improve symptoms in those with chronic pain.

But... how? These interventions all rely on the brain's ability to change itself, otherwise known as neuroplasticity. Neurons, or nervous system cells, hold the ability to change their patterns of communication, development and structure based on our experiences and exposures. While we once thought the brain was only adaptive in childhood, we now know that this ability lasts throughout our lifetime.

This malleability is excellent news for some people with chronic pain syndromes. These patients' brains can become "stuck" in a pattern of misunderstood or enhanced pain perception. Reworking neural patterns can reduce pain and bring profound relief.

RETRAINING THE BRAIN: DNRS

Dynamic Neural Retraining System is a comprehensive program developed by Annie Hopper, primarily inspired by the work of psychiatrist Norman Doidge, author of *The Brain That Changes Itself*. DNRS leads patients through a deeper understanding of neuroplasticity, brain function and awareness of unconscious trauma that may be contributing to their chronic pain. Participants complete visualization techniques, speech pattern adjustments and small movements to rework pain-causing brain patterns.

The DNRS website, www.retrainingthebrain.com, offers a self-assessment survey that helps potential users assess if this method of brain retraining will help their particular symptoms. When considering DNRS, it's essential to understand the time commitment—while some patients experience relief in as little as two weeks, others must maintain a commitment to an hour or more of daily practice for six months, and sometimes longer.

RETRAINING THE BRAIN: EXERCISE

Those with chronic pain might understandably avoid physical movement because they do not want to worsen their condition. However, appropriate movement is well researched as an effective therapy for pain, sleep and cognitive function. Activities such as tai chi, warm-water pool exercise classes, supervised strength training and yoga are examples of low-intensity aerobic exercise that may be as effective as NSAIDs for reducing pain.

But how does physical movement reduce chronic pain? One mechanism might be its ability to change the brain. Artfully worded, exercise enhances synaptic plasticity and stimulates neurogenesis—it leads to positive changes in neuron synapses and the creation of new neurons from neural stem cells. For many, this equates to enhanced brain function, decreases in cognitive decline and, ultimately, less pain [6].

RETRAINING THE BRAIN: CALORIC RESTRICTION AND INTERMITTENT FASTING

Most of the information on caloric restriction and intermittent fasting's effects on neurological health is based on animal research. But the data is still incredibly worthwhile for those looking to alter the brain to address chronic pain. Simply reducing the number of calories eaten in a day below what is habitual, with an emphasis on obtaining essential macro- and micronutrients for vital health, can have potent, positive impacts on neuroplasticity. A reduction in calories creates greater synaptic resilience and leads to more synapses with improved function. It also stimulates the expression of genes that are associated with synaptic plasticity—all changes that help us teach the brain a new way of dealing with stimuli that might be interpreted as pain.

Practically, both caloric restriction and intermittent fasting can be less regimented than you might imagine. During mealtimes, try eating 3/4 of your usual serving size, with a focus on nutrient-dense, whole foods. Additionally, do your best to fast for 12 hours during the night, from 7 p.m. to 7 a.m., for instance.

An important caveat to this solution is populations of people who might experience more harm than help from reducing calories. Children, pregnant women, or people over 50, who are at greater risk of muscle wasting and the subsequent sharp rise in the function loss and mortality that accompany it, should focus on the other chronic pain tips in this eBook. Caloric restriction is most suitable for those who are 18 to 50 years of age with generally stable health. As with any dietary change, be sure to consult with your physician or licensed clinician to get the guidance that's right for you [7].

HYPNOSIS

Multiple components make up the practice of hypnosis, a trance-like state of intense concentration and focused attention that allows us to become more receptive to suggestion. Hypnosis is a legitimate form of psychological therapy that uses relaxation, imagery, interpersonal processing and suggestion. And it has been used to treat pain in many cultures for hundreds of years. When used to address pain, it is sometimes known as hypnotic analgesia, and in the past 15 years, research for its application in chronic pain has increased, with exciting, though mixed, results.

The results of hypnosis' neurological effects have been measured via positron emission tomography (PET scan) and fMRI to view areas of the brain and electroencephalography to better understand brain states. Based on these studies, we know that hypnotic suggestion can influence specific parts of the brain to reduce feelings of unpleasantness and pain intensity while decreasing brain activity that may lead to increased pain.

However, some people are more easily hypnotized than others. Hypnotizability is the ability of a person to respond positively to hypnotic induction, and this property may explain why hypnotic analgesia is highly effective for some people with chronic pain while barely affecting the pain of others. Amazingly, however, most chronic pain sufferers report high levels of satisfaction whether or not they experience pain relief. Participants enrolled in hypnosis-based clinical trials state that although they didn't have reductions in average pain intensity, they did have temporary pain relief, improved relaxation and increased energy thanks to hypnosis techniques [8].



To find a certified clinical hypnotherapist, you can visit www.natboard.com, the website for the National Board for Certified Clinical Hypnotherapists. Board-certified therapists are conveniently listed by state, and some insurance plans cover the therapy as a mental health treatment.

MUSIC THERAPY

There's a reason why your dentist offers you headphones playing your favorite music while filling a cavity—music therapy can reduce pain and associated anxiety and depression, especially when you get to choose the tunes. Thankfully, these effects also apply to chronic pain.



But how does music actually reduce pain? The most popular hypothesis is based on pain perception and the descending pain modulatory system (DPMS), a group of brain structures that interacts with nociceptors and influences how we feel pain. Interestingly, the DPMS is often altered in adults with chronic pain conditions. But it can be impacted by our expectations of pain, emotions, mood, neurotransmitter pathways, genetics and... music. While theoretical, it is highly likely that music-induced analgesia is the result of these interconnected parts of the brain [9].

For chronic pain relief, the type of music matters. The critical element for effective music therapy is based on your musical taste. Studies that examine music therapy list factors such as “high familiarity” and “self-chosen” when studying music’s effects. And these factors are connected to feelings of pleasure and a sense of control that may tap into the DPMS and dampen our experience of pain. So, whether you love Earth, Wind & Fire, Mozart, or you’re a hip-hop fan, listen to the music that you love to best address chronic pain.

ACUPUNCTURE

Traditional Chinese medicine (TCM) practices, including diet, herbal therapies, physical exercises, massage, and most notably, acupuncture, have been successfully utilized for thousands of years, including as treatments for chronic pain. Acupuncture is currently the most researched branch of TCM, with widely positive effects on pain conditions. However, the mechanism of action, or the underlying reason why acupuncture is effective for chronic pain, is still a mystery. Non-biological ideas and terms such as “meridians” and “qi” fall outside the conventional paradigm and are challenging to define and study. No one is quite sure how inserting needles into specific points on the body can decrease pain. But the evidence is reasonably straightforward: Acupuncture reduces chronic pain and may even sustain this decrease over time.

Many studies have explored acupuncture’s use in chronic pain, and these experiments have been combined into summaries showing acupuncture’s general effectiveness. But one such meta-study stands out. The Cochrane Institute is a research organization that is well-known for its highly rigorous and conservative research summaries that provide clarification of outcomes, particularly for alternative therapies. Their stance on acupuncture for pain? It’s safe and effective [10].

The National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM), takes the stress out of choosing an acupuncturist. Their board certification and subsequent practitioner directory help patients find a well-educated acupuncturist in their area. For more information, visit <https://www.nccaom.org/find-a-practitioner-directory/>.



CRANIOSACRAL THERAPY

Craniosacral therapy is a subtle hands-on technique developed by John Upledger, DO, a clinical researcher and professor of biomechanics at Michigan State University. Practitioners gently touch the body in specific areas to bring balance to the flow of cerebral spinal fluid and related fascia. The roots of craniosacral therapy lie in traditional osteopathic manipulation, and, along with myofascial structures, craniosacral therapy normalizes sympathetic nerve activity that is often dysregulated in chronic pain patients. Feelings of deep release, tissue relaxation and well-being are often reported by those receiving treatment.

Amazingly, the body continually circulates almost 2 cups of cerebral spinal fluid, and craniosacral practitioners use about 5 grams of pressure, or the weight of a nickel, to ease restrictions and facilitate the optimal flow of fluid through the nervous system. Studies on craniosacral therapy have revealed positive effects for those with chronic pain, specifically for people with low back and neck pain, headache and migraine, fibromyalgia, tennis elbow and pelvic girdle pain [11].

While there is no board certification for craniosacral therapists, the Upledger Institute International and the Milne Institute both offer classes. Many physical therapists, massage therapists and acupuncturists offer the therapy as an adjunct to their primary services. Remember that craniosacral therapy involves incredibly light touch, so it's particularly useful for those suffering from intense pain who still want hands-on therapy.



CHIROPRACTIC CARE

Chiropractic care for chronic pain is a well-studied option for those who need more intense manipulation. Chiropractors are highly trained doctors who offer an array of manual therapies and biomechanical education, many of which have been proven to reduce pain. One statistic is particularly startling: A 2019 study of chiropractic use and opioids found that patients receiving chiropractic care had 64% lower odds of being prescribed an opioid drug when compared to those who didn't receive chiropractic care [12].

Chiropractic manipulations are most well known for their application in back pain, but they're also indicated for headaches, neck pain, carpal tunnel syndrome and fibromyalgia. However, as previously stated, chiropractic work is generally more extreme than the other therapies discussed in this eBook. So, be sure to seek out chiropractic care only if it's the right choice for you.



TAI CHI

Tai chi is an extremely low-intensity exercise therapy that is one of multiple traditional Chinese medicine practices. This technique has been extensively researched for its effectiveness in chronic pain conditions. It seems to be particularly effective for those with osteoarthritis, low back pain, osteoporosis, shingles-associated pain, chronic stroke, rheumatoid arthritis and fibromyalgia.

Tai chi is known as moving meditation, with 108 different positions based on deep core-centered action. The slow, fluid motions and weight shifting actions of the exercises support physical and mental health, including improved mood, immune and nervous system function. And it's possible to safely practice at home with little to no outside support. Many YouTube channels are dedicated to teaching beginning tai chi. Most studies recommend six weeks of dedicated practice in order to see results for chronic pain [13].



YOGA

Another meditative, movement-based therapy is yoga. Traditional forms of yoga included breathwork, known as pranayama, and mindfulness, along with the now popular postures, or asanas, that we most frequently practice today. The Bhagavad Gita, a holy book of Hindu scripture, describes yoga as “the discipline which severs the connection with that which causes suffering.”

Medical yoga therapy is the use of yoga for the prevention and treatment of disease. And along with blood sugar regulation and cardiovascular benefits, multiple studies have shown its positive use in musculoskeletal issues and chronic pain. Hyperarousal of the nervous system, muscle tension and altered breathing patterns that contribute to the symptoms of chronic pain conditions are all addressed by the methodical movements of yoga. Medical yoga uses traditional breath exercises and movements while giving special attention to its effects: nervous system modulation, improved visceral organ function, deeper sleep and diminished fatigue. Together, these outcomes lead to less pain.

Many yoga studios teach slow movement or “yin” classes, as well as online classes. Remember that your body is your greatest teacher—there is no need to push beyond what feels safe or appropriate for you. While joining the community of a yoga studio can be a wonderful experience, practicing yoga at home can reduce any feelings of pressure that might emerge in a class setting [14].



ART THERAPY

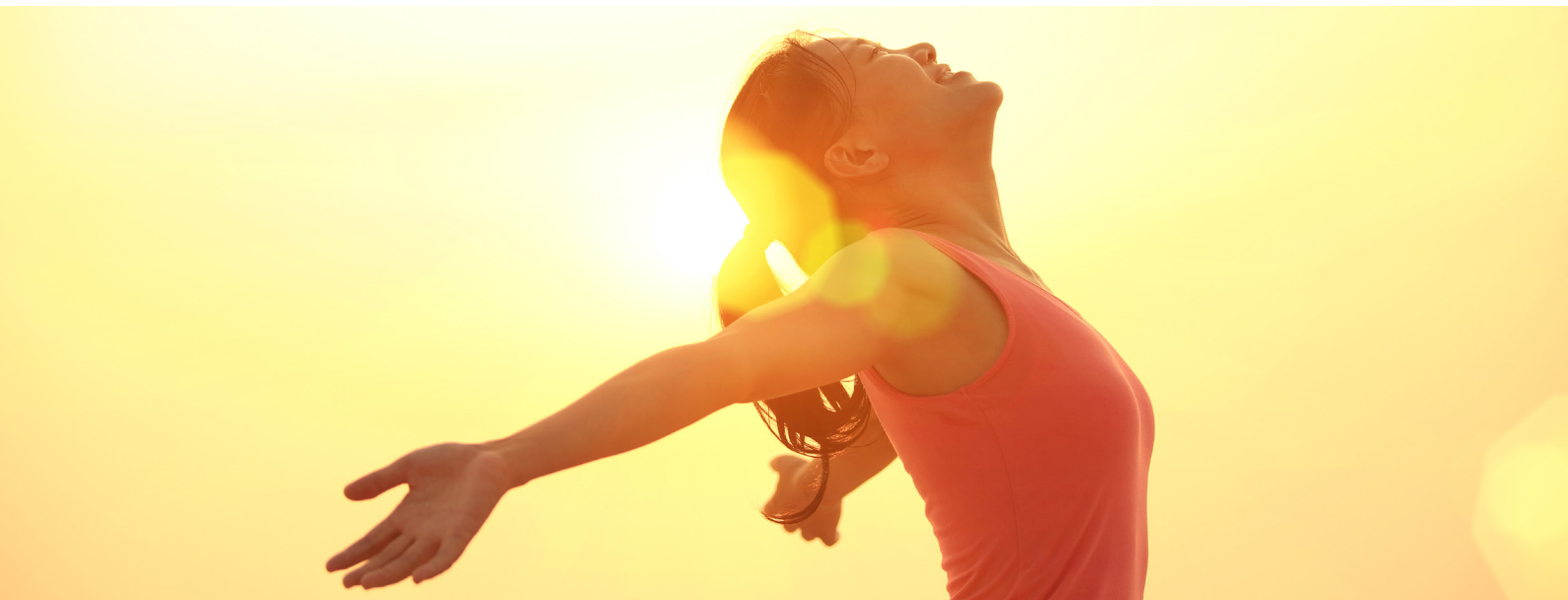
The term “art therapy” was coined by American psychologist and artist Margaret Naumburg in the mid-1900s. Visual arts, dance, and, as previously discussed, music can be used as forms of psychotherapy to stimulate the healing process. These activities are thought to alter the consciousness of chronic pain patients.

The concept of pain as a subjective experience that can be influenced by relaxation and other positive emotional experiences, social communication and interaction, and art-based storytelling of one’s internal struggles underlie the effectiveness of art therapy in chronic pain. In fact, a 2018 study of 200 people hospitalized for medical issues or surgery found that art therapy significantly improved their moods and lowered pain and anxiety [15].

The American Art Therapy Association is a non-profit membership organization for trained art therapists. Their art therapist locator (<https://arttherapy.org/art-therapist-locator/>) allows patients to find a therapist in their area. While it’s highly recommended to work with a licensed therapist, it is perfectly valid to explore chronic pain through art on your own. Painting, woodworking and ceramics are some of the many mediums that may positively influence chronic pain.

VITAMIN D

Many studies have found a connection between vitamin D deficiency and chronic pain. Studies that examine disease activity in a group of people, formally known as epidemiology, have taught us that many chronic pain patients happen to have low vitamin D status. These links don't necessarily mean that vitamin D is a treatment for ongoing pain disorders. Rather, this prohormone is a critical nutrient to investigate in those with autoimmune-related pain, fibromyalgia, migraines and musculoskeletal pain [16].



One of the most impressive findings relating vitamin D to chronic pain is investigations of pain according to geographical latitude and time of year. People in climates with less sun exposure are more susceptible to headaches, abdominal pain, and knee and back pain.

But how might vitamin D affect chronic pain? One incredible mechanism is the inhibition of inflammatory cytokines, components of the “inflammatory soup” described earlier in the eBook. It may also be that vitamin D plays beneficial roles in pain signaling pathways present in the nervous system.

Vitamin D supplementation isn't straightforward, however. Too much can cause toxicity, so it's imperative to work with a licensed healthcare professional who can perform a blood test to determine your current level. You can, however, eat foods that are rich in vitamin D with no ill effects. Trout, egg yolks, pastured lard, fish eggs and organ meats are fantastic sources of vitamin D. Additionally, exposure to sunlight allows us to make vitamin D through the light's biochemical interaction with our skin. Be aware of your time spent in the sun: just 5 to 10 minutes per day of sunlight can influence your vitamin D levels. An app such as D Minder will help you determine your ability to create vitamin D from the sun depending on the time of year and your latitude.

ANTI-INFLAMMATORY FOODS

There exists a strong connection between chronic pain and inflammation. While short-term inflammation is an essential part of our ability to respond to possibly harmful antigens such as bacteria or viruses, ongoing inflammation can create internal damage and prolonged pain.

Our food choices play significant roles in our ability to appropriately inflame and eventually resolve inflammation. Ingredients such as processed seed and “vegetable” oils like canola oil, cottonseed oil and soybean oil contribute to inflammatory imbalance. Processed sugars and meats, fried foods, sugary soft drinks, overconsumption of protein, carbohydrates or fats, overeating, under-eating, and for some groups of people, the consumption of nightshades (peppers, eggplant, potatoes and tomatoes) can exacerbate inflammation and result in chronic pain.

Unfortunately, there’s no straightforward list of what foods to avoid and what foods to include. As stated above, some people notice pain symptoms increase when eating nightshades, while others can eat them without detriment. Some patients report symptoms from grains and legumes, while others find that the inclusion of red meat in the diet leads to more severe inflammation and pain. Due to this variance, it’s critical to be aware of the signs and symptoms communicated by your unique body.

The good news is that some well-researched foods create positive anti-inflammatory effects in most people. Small, cold-water fish and fish oil, along with flax, chia and hemp seeds, contain high amounts of pain-reducing omega-3 fatty acids. A mix of multi-colored fruits and vegetables contains high amounts of vitamins, minerals, fiber and unique plant compounds called phytonutrients that support healthy immune function and a robust microbiome. Organic, extra-virgin olive oil has been proven over and over again to be a potent anti-inflammatory, while berries of all kinds top the charts thanks to their high levels of anthocyanins [17].

And don’t forget the spices! Culinary amounts of turmeric, ginger, red pepper flakes, rosemary, cinnamon, garlic and cloves are all potent anti-inflammatory pain-fighters to include in your meals.

Finally, the way we cook can influence chronic pain symptoms. Amazingly, meat cooked at low temperatures for long periods, called “low and slow” cooking, is less inflammatory than braised or grilled meat. Think pot roast, soups and stews versus fried chicken or grilled steaks. Additionally, a combination of both raw and cooked vegetables and fruits provides us with a broader array of nutrients and pain-relieving action than one form of preparation. So, for example, prepare baked apples and steamed carrots for some meals and grated apple and carrot salad for others.

WHAT WORKS BEST FOR YOU

While this eBook outlines the most impactful holistic therapies, it's critical to note that many people with chronic pain need a combination of alternative and conventional treatments to feel their best. Work with a physician you trust to find the best solutions for you and your unique situation and body. For chronic pain patients, a balanced approach can be life changing.



**HERE'S
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