

# Integrative Medicine Approach to Chronic Pain

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## KEYWORDS

- Chronic pain • Integrative medicine • Dietary modification
- Manual medicine

Chronic pain is a common reason for patients to seek medical care. Its cause is generally complex and multifactorial. Patients try various management options with limited or no improvement. Integrative medicine (IM) can offer a means to develop a more comprehensive treatment approach for patients with chronic pain. This approach elicits a broader picture of the patient's condition and combines conventional medicine with complementary and alternative medicine (CAM).

Immediate and complete relief of chronic pain may be an unrealistic goal, and so it is important to establish appropriate goals of care in the treatment of chronic pain. The following 3 goals are an important starting point when addressing chronic pain:

1. Addressing the patient's pain in the context of the patient's life situation, what Giordano and colleagues<sup>1</sup> refer to as the "patient-specific context"
2. Ameliorating the patient's pain and/or improving quality of life
3. Improving the patient's risk profile by diminishing their need for polypharmacy, invasive interventions, and unproven alternative therapies.

## THE PROCESS

An IM history includes a conventional history and inquires about nutrition, social support, work, exercise, and stress-relieving strategies. A spiritual history is also included, as well as the patient's conception of their clinical situation. In addition,

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CAM use is addressed including dietary supplement intake and the use of CAM practitioners (eg, acupuncturist, chiropractor, Reiki practitioner). In designing the therapeutic plan, the physician determines what CAM methods the patient might be interested in exploring. The plan can include nutritional and dietary supplements, stress-relieving techniques, exercise, or a referral to CAM providers. An assessment of the patient's social support can identify possible resources for the patient. The literature on the effects of social support on chronic pain is complex, suggesting that not all social support results in improved pain burden or less disability.<sup>2</sup> However, perceived support, type of caregiver responses, and patient-coping style all interact over time to have an effect on the patient's suffering. Assessing these factors is important, and could lead to an intervention such as couples' counseling.<sup>3</sup>

## DIETARY MODIFICATIONS

Antiinflammatory diets can favorably influence the biochemical process of inflammation present in pain syndromes.<sup>4</sup> Most of the literature relates to rheumatoid arthritis, but studies suggest a beneficial effect in osteoarthritis as well.<sup>5</sup>

Dietary fatty acids can influence the phospholipid membrane, which in turn provides substrate for the downstream eicosanoids. Omega-6 fatty acid inputs contribute to proinflammatory eicosanoids, in contrast to omega-3 fatty acids (Fig. 1). In addition, omega-3 fatty acids compete with the omega-6 fatty acids for the same enzymes, and so decreased antiinflammation precursors can be achieved by increasing the

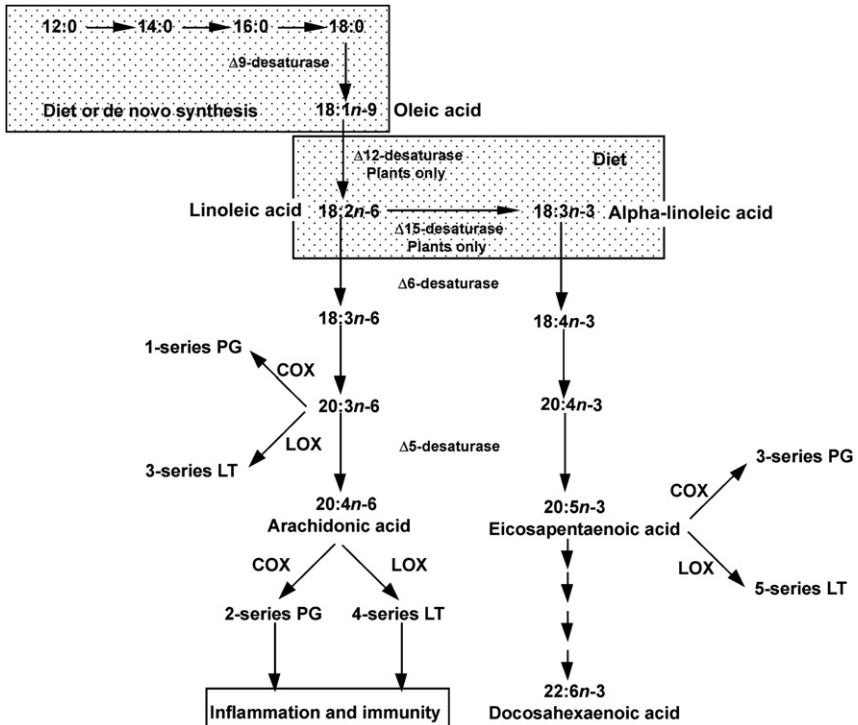


Fig. 1. Outline of the pathway of biosynthesis and metabolism of polyunsaturated fatty acids. (Adapted from Grimble RF, Calder PC. Polyunsaturated fatty acids, inflammation and immunity. *Eur J Clin Nutr* 2002;56(Suppl 3):S14-9; with permission.)

absolute amount of omega-3 fatty acid ingested and by decreasing the ratio of omega-6 to omega-3 in the diet.<sup>6</sup> The ingestion of olive oil, a monounsaturated fatty acid, does not contribute to the omega-6 pool, therefore it can also improve (or at least not worsen) the omega-6/omega-3 ratio.<sup>6</sup> Olive oil also contains olecanthol, which in vitro has been found to block cyclooxygenase, similar to nonsteroidal antiinflammatory medicines.<sup>7</sup> Diets with less meat contribute less to the arachidonic acid pool, and so can diminish proinflammatory compounds.<sup>8</sup> Further, fruits and vegetables contain phytochemicals which in the laboratory can act as antioxidants, combating oxidative stress seen in pain conditions such as osteoarthritis.<sup>9</sup>

Three major omega-3 fatty acids are available in foods:  $\alpha$ -linolenic acid (ALA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA) (see **Fig. 1**). EPA and DHA are found in cold-water fish such as salmon, mackerel, halibut, sardines, and herring. ALA is found in flaxseeds, flaxseed oil, canola (rapeseed) oil, soybeans, soybean oil, pumpkin seeds, pumpkin seed oil, purslane, perilla seed oil, walnuts, and walnut oil.

Clinical studies of omega-3 fatty acid supplements have shown that they can improve pain symptoms, such as joint tenderness and morning stiffness, and decrease the amount of medication required by patients with rheumatoid arthritis.<sup>10</sup> Goldberg and Katz<sup>10</sup> did a meta-analysis of 17 placebo-controlled studies, looking at the effect of omega-3 fatty acids on joint pains. These studies largely used fish oils (combined DHA+EPA) as therapy rather than ALA. The joint pains were in the context of rheumatoid arthritis, dysmenorrhea, or inflammatory bowel disease. The quality of the studies was variable, but overall the conclusion was that fish oils can be helpful in the context of inflammatory joint pain syndromes. Doses more than 2.7 g daily for a period exceeding 3 months seemed to provide the greatest effect. Laboratory and animal studies also suggest that diets rich in omega-3 fatty acids may benefit people with osteoarthritis, but no clinical outcome studies have clearly shown benefit in osteoarthritis.<sup>11</sup> For chronic pain, fish oils at doses nearing 3 g could be beneficial with inflammatory conditions. Further studies are needed to establish their role in less global inflammatory syndromes, such as osteoarthritis.

Questions arise as to the best means of ingesting omega-3 fatty acids: through whole foods or supplements. Regarding whole foods, some fish contain significant amounts of mercury or polychlorinated biphenyls,<sup>12</sup> and estimating the amount of fish oil ingested can be difficult. Fish oil supplements generally have been found by third party testing to be free of toxins.<sup>13</sup>

The Mediterranean diet is high in fruits, vegetables, fish, and monounsaturated fats such as olive oil. The diet has a low intake of dairy products and red meat, and with the inclusion of omega-3 fish is an example of an antiinflammatory diet. A recent Cochrane Review by Hagen and colleagues<sup>14</sup> reviewed dietary interventions for rheumatoid arthritis. They found 14 randomized controlled trials, with heterogeneity of interventions and outcomes. Diets that were included in the trials included the Mediterranean diet, vegetarian diets, allergy-elimination diets, elemental diets, and vegan diets. Studies did show some improved pain scores with the Mediterranean and vegetarian diets, but not with the other diet interventions. Studies were small, and had risk of moderate bias, given that it is difficult to blind food interventions. In addition, there are some risks with diet interventions, including unintentional weight loss and missing important nutrients. Drop-out rates were generally higher in the dietary intervention groups than their controls.

Our recommendation is that a trial of the Mediterranean diet can be beneficial for the patient with chronic pain. Although more studies are needed, the Mediterranean diet reflects a generally safe and overall beneficial diet. It is less restrictive than the other dietary regimens, thereby decreasing risk of malnutrition. If patients intend to pursue

more restrictive diets, the authors recommend making dietary changes slowly and consider consulting a dietician. Supplementation with calcium, vitamin D, and vitamin B<sub>12</sub> can be helpful to avoid lack of important nutrients.<sup>8</sup>

## HERBS AND SUPPLEMENTS

### *Ginger and Turmeric*

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Two common culinary herbs have been shown to contain antiinflammatory properties. Ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*) are members of the same plant family, Zingiberaceae. Ginger has long been used in traditional medical practice to reduce inflammation. The strong aroma of ginger is the result of pungent ketones including gingerol, which are standardized and concentrated in extracts used in research studies.<sup>15</sup> Studies for ginger have been mixed, at times showing an effect greater than placebo,<sup>16</sup> at other times not showing a beneficial effect.<sup>17</sup> Some preliminary clinical research suggests that turmeric may improve symptoms of rheumatoid arthritis,<sup>18</sup> but at concentrations found greater than in food. As a result, the data are not suggestive enough to recommend such supplements. Ginger and turmeric are obviously safe when ingested through food, but such amounts are unlikely to have clear effect on chronic pain conditions.

### *Glucosamine Sulfate and Chondroitin*

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Glucosamine sulfate and chondroitin gained importance after 2 long-term clinical trials showed it could slow the progression of anatomic joint structure changes in knee osteoarthritis and control the progression of symptoms.<sup>19,20</sup> It seems that glucosamine stimulates the production of glycosaminoglycans (the key structural components of cartilage) as well as the incorporation of sulfur into cartilage. Sulfur is necessary for making and repairing cartilage.<sup>21</sup> Chondroitin is a glucosaminoglycan that may also be beneficial for cartilage. The literature has been confusing in terms of the level of benefit. On the one hand, a meta-analysis in 2000 of 15 studies suggested that although trial quality was not ideal, there was likely some moderate benefit to glucosamine and chondroitin.<sup>22</sup> On the other hand, the largest study to date, the NIH-sponsored Glucosamine/chondroitin Arthritis Intervention Trial (GAIT) trial, failed to confirm that glucosamine reduced pain significantly after 6 months compared with placebo. The study was of high quality, although there was a high placebo response (60%).<sup>23</sup> An effort to understand this variability in trial outcomes was subsequently undertaken by Vlad and colleagues.<sup>24</sup> An analysis of 15 more recent and more rigorous glucosamine trials was done. Their conclusions were still that the benefit for glucosamine and chondroitin is not proven, although glucosamine hydrochloride preparation alone was not efficacious. They concluded that further trials are needed of sufficient rigor to eliminate bias and clarify benefits.

All the studies agree that glucosamine sulfate and chondroitin are safe. Reported adverse effects from glucosamine and chondroitin have been relatively well studied and are generally uncommon and minor. There is the possible risk of allergy in patients with known shellfish allergy, given glucosamine is often produced from marine exoskeletons. Given the safety profile, and that there maybe some beneficial effect, it is our recommendation that patients with osteoarthritis undergo a trial with a combination product, specifically, 1500 mg/1200 mg of glucosamine sulfate with chondroitin sulfate, respectively.

### *Avocado/Soybean Unsaponifiables*

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A lipid mixture of one-third avocado and two-thirds soybean unsaponifiables (ASUs) has been reviewed in a systematic review for hip and knee osteoarthritis.<sup>11</sup>

Unsaponifiables are the fractions of the lipids that, after hydrolysis, do not produce soap. ASUs have been studied in 4 smaller, placebo-controlled studies, with doses of 300 mg daily showing improvement in symptoms and less use of nonsteroidal anti-inflammatory drugs. Adverse effects were reported to be low. The studies were generally good quality, but overall numbers were low, with approximately 600 patients from the 4 studies. Our recommendation is that this could be a consideration for treatment of chronic pain with an osteoarthritic component, but larger studies are needed to confirm the positive findings.

### ***Methylsulfonylmethane (MSM)***

Methylsulfonylmethane (MSM) and its precursor, dimethyl sulfoxide (DMSO), have been used for osteoarthritis. However, the data are sparse to support its use. A recent meta-analysis found 3 high-quality studies that looked at either of these 2 compounds as isolated therapeutics, and found that the data did not clearly support benefit for osteoarthritis.<sup>25</sup> At this point, the authors do not recommend MSM or DMSO for chronic pain treatment from osteoarthritis.

## **MANUAL MEDICINE**

Manual medicine includes such CAM modalities as chiropraxy, osteopathic manipulation therapy (OMT), and massage. The concept of joint subluxation in chiropraxy proposes a biomechanical model of spinal pain that emphasizes normal function in the active, passive, and neural integration systems of the spine as a prerequisite for stability.<sup>26</sup> The loss of spinal stability occurs when 1 of the components of the active (musculotendinous), passive (ligamentous), and neural integration (proprioceptors, nociceptors) systems become dysfunctional. Compensations of the other systems may trigger movement impairments, such as pain avoidance, or control impairments, such as pain provocation. In addition, chiropraxy and other manual therapy interventions seem to have neurophysiologic effects that can cause pain modulation, similar to acupuncture. These techniques are known to trigger similar populations of proprioceptive afferents (groups I and II) that can gate nociception in the dorsal horn.<sup>27</sup> Osteopathic manipulation therapy views this more broadly, understanding that the doctor's role in combating disease is to restore proper musculoskeletal function to the body.<sup>28</sup> Manual medicine can be used as an adjunct to other modes of pain control. Research for chiropraxy alone has been mixed, generally not showing benefits over standard therapy, but showing similar efficacy to conventional therapies. Meeker and Halderman<sup>29</sup> reviewed 43 randomized controlled trials (RCTs) using chiropraxy for acute, subacute, and chronic low back pain. Thirty of these RCTs favored chiropraxy over the comparison treatment in at least 1 patient subgroup. The remaining 13 reported no significant differences, and none of the RCTs reported that chiropraxy was less effective than the comparison treatment. Eleven of the trials on low back pain included a placebo group and 8 showed an advantage to manipulation. Other systematic reviews have confirmed these results.<sup>30–32</sup> The most recent analysis of 12 systematic reviews including 69 unique trials on efficacy of spinal manipulation concluded that the only nonpharmacologic therapies with evidence of efficacy are superficial heat and spinal manipulation (ie, chiropraxy), with fair evidence for small to moderate benefits.<sup>33</sup>

### ***Osteopathic Manual Therapy***

OMT in theory suggests similar benefits as chiropraxy. However, it has not been studied to the same degree. One small study found that patients in an osteopathic-treatment group (83 patients) required significantly less medication (analgesics,

antiinflammatory agents, and muscle relaxants,  $P < .001$ ) and used less physical therapy (0.2% vs 2.6%,  $P < .05$ ) than the standard medical therapy group (72 patients).<sup>34</sup> OMT as an adjunctive therapy is also successful but at increased cost. It may also contribute to patients' improved psychological status.<sup>35</sup> Further studies are needed to assess OMT's role in chronic pain.

### **Massage**

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Massage therapy is defined as soft-tissue manipulation by trained therapists for therapeutic purposes.<sup>36</sup> Massage is typically used as an adjunctive therapy that prepares the patient for exercise or other interventions rather than as the main treatment.<sup>37</sup> It can help relieve muscle tension, reduce stress, and evoke feelings of calmness. Massage induces a variety of positive physiologic effects that may contribute to tissue repair, pain modulation, relaxation, and improved mood.<sup>38</sup> The main theories regarding the analgesic effects of massage include gate theory, the serotonin hypothesis, and the restorative sleep hypothesis.<sup>39</sup> Animal models suggest a role of oxytocin acting in the periaqueductal gray area of the midbrain, influencing descending antinociceptive systems in this area.<sup>40</sup>

In their comprehensive review, the Cochrane Collaboration recently reported that massage alone was superior to relaxation, acupuncture, and self-care education for lower back pain. It was found equal in efficacy to corsets and exercises, but found inferior to spinal manipulation therapy.<sup>27,41–44</sup> The investigators of the Cochrane Review concluded that massage therapy may benefit patients with subacute and chronic nonspecific lower back pain, particularly when combined with exercise and education. Direct plus indirect costs for the massage group were about 40% lower than for acupuncture or self-care groups (although not statistically significant), suggesting that initial costs of massage may be offset by reduced health care utilization. On the other hand, in a randomized controlled trial of 579 patients with chronic or recurrent low back pain, exercise, and 6 lessons in the Alexander technique were compared with massage alone. Massage was found to have moderate effectiveness at 3 months, but that did not persist to 1 year. In contrast, the Alexander technique lessons and exercise did show benefits in the Roland Disability Score at 3 months and 1 year.<sup>45</sup>

### **Manual Medicine Summary**

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Adverse effects from manual medicine therapy have generally focused on risks from spinal manipulation. These adverse clinical events are rare, making them difficult to evaluate. None of the previously mentioned RCTs or any case series have reported a serious complication, such as worsening lumbar disc herniation or cauda equina syndrome. The risk of a serious adverse event, including data from observational studies, has been estimated at less than 1 per million patient visits.<sup>46,47</sup> In a Danish series, inclusive of 99% of chiropractors for a 10-year period, 5 cases of cerebrovascular accident and 1 death were identified.<sup>48</sup> One of the most comprehensive assessments of the complications of spinal manipulation was conducted in 1996.<sup>49</sup> Relevant case reports, surveys, and review articles were identified using a search of online databases. Estimates of the incidence of cauda equina syndrome following lumbar manipulation range from 1 case in 1 million to 1 in 100 million.<sup>50</sup>

Considering the evidence supporting the efficacy of chiropraxy in low back pain and the extreme rarity of serious complications from lumbar spinal manipulation, it would be prudent to recommend a trial of chiropraxy for low back pain, especially in the subset of patients who are interested in such an approach, intolerant of nonsteroidal antiinflammatory drugs, or looking for adjuvant treatments to conventional therapies. Massage

therapy is best prescribed in combination with exercise and education and there is evidence supporting its use for short-term relief of low back pain. Although OMT shares theoretic underpinnings with chiropraxy, it is less well established through studies.

## ACUPUNCTURE

Acupuncture is part of a larger system of healing within traditional Chinese medicine (TCM). According to TCM, acupuncture attempts to influence the life force, or energy, known as qi (pronounced chee) that flows through energy pathways (meridians) in the body. Each meridian corresponds to 1 organ, or group of organs, that governs particular bodily functions. Achieving the proper flow of this energy is believed to create health and wellness, which can be achieved by stimulating the acupuncture points.<sup>51,52</sup> Modern research has confirmed the physiologic effects created by this needling process, with studies showing that acupuncture may alter brain chemistry by changing the release of neurotransmitters and neurohormones. These biochemical modulators can then affect the central nervous system, further influencing immune reactions and processes that regulate a person's blood pressure, blood flow, and body temperature.<sup>53</sup> In addition, research using functional magnetic resonance imaging (fMRI) has demonstrated the neuromodulatory effect of acupuncture stimulation. Results of unilateral acupuncture needling showed bilateral neural modulation of cortical and subcortical structures in fMRI, causing a signal decrease in the limbic region and other subcortical areas. This was in contrast to fMRI findings with simple tactile stimulation.<sup>54</sup>

Conventional studies support its efficacy in providing some clinical improvement in lower back pain. One meta-analysis not only supported the analgesic effect of acupuncture for lower back pain but also suggested that acupuncture can improve functionality and lead to decreased use of analgesic medications in this population.<sup>55</sup> Patients who received acupuncture for an 8-week period had a greater reduction in low back pain than those on a waiting list control.<sup>56</sup> In a prospective, randomized, controlled trial of 174 patients and a follow-up of 3 months, Molsberger and colleagues<sup>57</sup> demonstrated that 12 treatments of acupuncture coupled with conventional orthopedic treatment (COT) was much more effective ( $P \leq .02$ ) than COT alone or sham acupuncture with COT in relieving chronic low back pain.

Literature evaluating acupuncture's safety shows that major adverse events are exceedingly rare and are usually associated with poorly trained and unlicensed acupuncturists.<sup>58–61</sup> Acupuncture is effective when used alone and as an adjunct therapy, and can contribute to mitigating lower back pain. Acupuncture is likely to be most beneficial in patients who have high expectations of benefit,<sup>62</sup> an effect that could point to some placebo effect.

Research on acupuncture has had some limitations (incomplete understanding of the physiologic effect, use of standardized treatment regimens rather than the individualized approach that characterizes most acupuncture practice, blinding of participants), yet based on published evidence, acupuncture is safe and has been shown to be an effective therapeutic strategy for analgesia, likely to benefit patients with low back pain. It should be discussed with patients amenable to this approach and patients should be referred to competent acupuncturists in their area.

## YOGA

Yoga is generally regarded as a CAM approach to health that not only increases flexibility, strength, and stamina but also fosters self-awareness, emotional stability, and peace of mind.<sup>63</sup> Increasing numbers of physicians and patients today are recognizing



yoga as a complementary therapy and incorporating it in treatment of diseases and disorders.<sup>33,64</sup>

Recent studies of rheumatic diseases have shown that the use of yoga asanas (postures) positively affected the well-being of study participants.<sup>65,66</sup> Additional studies have shown that yoga can be added as a complementary therapy to the traditional management of arthritis.<sup>67–70</sup>

One higher-quality trial (101 patients) found that 6 weeks of Viniyoga (a therapeutically oriented style) to be slightly superior to conventional exercise (mean difference in Roland disability [RD] scores,  $-1.8$ ; confidence interval [CI]  $-3.5$  to  $-0.1$ ) and moderately superior to a self-care education book (mean difference in RD questionnaire scores,  $-3.4$ ; CI  $-5.1$  to  $-1.6$ ) in terms of RD scores at 12 weeks.<sup>71</sup> Yoga was also associated with decreased medication use at week 26 (21% of patients) compared with exercise (50%) and the self-care book (59%), although the rate of provider visits for back pain did not differ.

Preliminary evidence has suggested that Viniyoga is an effective treatment of chronic low back pain and physicians should feel comfortable recommending experienced instructors to interested patients. Other yoga styles (Bikram, Vinyasa, and Iyengar) may be too vigorous or need modification for patients who are unfamiliar with yoga. Future research evaluating yoga for chronic back pain should investigate the effectiveness and safety of other therapeutically oriented styles of yoga and help delineate the therapeutic mechanism of action.

## MIND-BODY THERAPY

The connection between the mind and the body is particularly significant in the realm of treating chronic pain. Mind-body therapies include cognitive behavioral therapy, hypnosis, biofeedback, and mindfulness meditation. For many patients, the addition of a mind-body approach to treating chronic pain leads to a significant improvement in quality of life. Lower back pain can persist even in the absence of active local tissue damage,<sup>71</sup> suggesting a centrally mediated pain process.<sup>72</sup> Centrally maintained pain has been correlated with cortical plasticity, which refers to the theory that the brain can undergo neurologic changes with time, in correlation with sensations of chronic pain.<sup>73,74</sup> For instance, several changes in the somatosensory cortex have been correlated in patients with chronic pain, including an enlarged area of activation in the part of the body map that represents the painful region; fragmentation of the map, where noncontiguous body parts become adjacent in representation; and a shift in the relative amount of neural activity to a constant stimulus.<sup>72</sup> These abnormalities have also been correlated with pain intensity, and when pain intensity subsides, the somatosensory map becomes more like that of healthy controls.<sup>75</sup> Several components have been described that may affect this cortical plasticity:

1. Repeated sensory input that can create pain memories
2. Attentional modulation, where pain pulls attention to the painful area
3. Behavioral expectations of future pain
4. Higher levels of stress hormones, which can block plasticity (ie, healthy adaptation).<sup>72</sup>

Many of the mind-body therapies used in the treatment of chronic pain aim to correct these imbalances.

### ***Cognitive Behavioral Therapy***

The most commonly used behavioral treatment approach for chronic pain is cognitive behavioral therapy.<sup>76</sup> Cognitive behavioral therapy alone or within the context of an



interdisciplinary pain rehabilitation program has the greatest empiric evidence of all the psychological therapies, including psychodynamic and behavioral therapies, for success in the treatment of chronic pain.<sup>77</sup> A Cochrane Review from April 2009 showed that cognitive behavioral therapy had some small positive effects on pain, disability, and mood, whereas other behavioral therapies showed no evidence of benefit. This review was based on 40 studies assessing the success of cognitive behavioral therapy versus usual care in the treatment of pain conditions, excluding headache and pain associated with malignant disease.<sup>78</sup>

### ***Hypnosis***

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There are several hypnotic approaches commonly used in the treatment of chronic pain, including direct suggestion of anesthesia, glove anesthesia, pain displacement, and physical dissociation. Multiple studies comparing hypnosis to a no-treatment intervention have shown that hypnosis interventions consistently produce significant decreases in pain associated with a variety of chronic pain problems, including low back injuries and arthritis.<sup>79</sup> A review of 13 studies evaluating hypnosis in the treatment of chronic pain, excluding headache, found that hypnosis is generally more effective for pain reduction than nonhypnotic interventions such as attention, physical therapy, and education in the treatment of chronic pain. However, these studies suffered from a lack of standardization of the hypnotic techniques used, low enrollment, and a lack of long-term follow-up.<sup>80</sup> Instruction in self-hypnosis is also an important component in the treatment of chronic pain, with studies showing that self-hypnosis gives patients a greater sense of self-control over their pain. Patients who are more actively involved in self-hypnosis practice benefit more and may have more long-lasting benefits.<sup>80</sup> Patients are often given recordings of sessions allowing them to listen and practice outside the treatment session.

### ***Biofeedback***

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The goal of biofeedback is to help patients learn to control physiologic processes through monitoring and feedback of physiologic variables, such as heart rate or skin temperature. Some suggest pain can be maintained or exacerbated by autonomic nervous system dysregulation and that through training with biofeedback, people can repair the autonomic nervous system.<sup>77</sup> An example is the electromyographic feedback in patients with tension headaches, which teaches patients to manipulate the tension in their frontalis muscle. A meta-analysis of 94 studies evaluating the benefit of biofeedback in the treatment of adult migraine and tension headache found a significant decrease in the frequency of headaches, improved perceived self-efficacy, decreased symptoms of anxiety and depression, and decreased medication consumption.<sup>81</sup> Studies using fMRI have shown that with training individuals can gain voluntary control over activation in the rostral anterior cingulate cortex, a region putatively involved in pain perception and regulation.<sup>82</sup> This leads to control over pain perception, and these effects were powerful enough to affect severe, chronic clinical pain.<sup>83</sup> Given the established benefit of biofeedback in the treatment of headaches and the intriguing results of deCharm's studies, further studies of biofeedback in the treatment of chronic pain, such as low back pain, are warranted.

### ***Meditation***

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Meditation has been identified as a widely used mind-body therapy for chronic pain relief.<sup>83</sup> Mindful meditation is the meditative technique that is most commonly researched and used for the treatment of chronic pain.<sup>84</sup> Mindfulness meditation is a detached awareness, in which one allows all thoughts to enter consciousness,

and then lets them go without emotional attachment. Kabat-Zinn<sup>85</sup> describes the process of pain reduction with mindfulness meditation as an “uncoupling” of the physical sensation from the emotional and cognitive experience of pain.

Mindful meditation can be an effective strategy for helping patients with chronic pain cope more effectively with their conditions. In a 4-year follow-up report, the majority (60%–72%) of 225 patients with chronic pain who had completed an 8-week mindful meditation program reported “moderate to great improvement” in pain status.<sup>86</sup> These same patients who completed the program also showed changes in cortical plasticity, with significant increases in left-sided anterior activation, a pattern associated with positive effect.<sup>87</sup> These findings suggest that meditation programs, especially mindful meditation, may alleviate the short- and long-term effects of chronic pain; however, more research needs to be performed to establish meditation as an effective intervention in the treatment of chronic pain in diverse populations.

### **Healing Touch Therapy**

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Healing touch therapies are defined as those that involve tactile contact or the active guiding of somatic attention. Some examples include light touch, brushing, tapping, near touch, or self-directed somatosensory attention.<sup>72</sup> Many touch healing therapies are practiced in the US health care system, including therapeutic touch, healing touch, reiki, polarity therapy, and qigong.<sup>72</sup> Therapeutic touch and reiki follow a similar structure. The session begins with the practitioner eliciting a calm centered attitude in the patient. The practitioner then sweeps their hands at a distance of 2.5 to 5 cm (1 to 2 inches) from the body and tells the patient they are receiving a powerful energetic touch. Reiki practitioners may lay hands on a patient, for instance, on their head or shoulders. Patients frequently describe a “flowing feeling” near where they envision the practitioner’s hands.<sup>72</sup>

Touch therapies can also have beneficial effects on pain, as reported in a Cochrane Review.<sup>88</sup> This review sums up well the evidence on touch therapies:

*Although the lack of sufficient data means that the results are inconclusive, the evidence that does exist supports the use of touch therapies in pain relief. Studies involving more experienced practitioners tend to yield greater effects in pain reduction. The studies showing the greatest effects on pain reduction were those involving highly experienced Reiki practitioners.*

### **Mind-Body Therapy Summary**

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There is evidence that mind-body therapies can be beneficial for chronic pain, from various causes. Although the evidence has shortcomings, given the safety of the therapies, the authors recommend exploring these modalities with the patient who has chronic pain.

## **SUMMARY**

An IM approach to pain therapeutics uses the notion that multiple strategies can together contribute to an improved clinical state, and can often allow better understanding of the patient-specific context. For instance, a Mediterranean diet can lower proinflammatory compounds, and adding fruits, vegetables, and legumes to the diet could potentially improve pain profile in the long-term. Fish oil supplement at 3 g daily may be helpful. A trial of glucosamine sulfate with chondroitin at 1500 mg/1200 mg total daily dose may also be beneficial in osteoarthritis. Exercise, especially yoga and low-impact high-aerobic exercise such as swimming is important for good

back health and may possibly diminish anxiety about further injury. A mind-body therapy such as cognitive behavioral therapy or biofeedback and acupuncture could be helpful.

Our recommendation is not to throw multiple modalities at once for chronic pain, but instead to offer 2 to 3 therapies as appropriate each visit. The strength of the IM approach is that it allows us to focus more explicitly on the patient's context, in terms of pain inputs as well as following goals in mitigating the pain. Certainly, the level of evidence for the therapies is often not very strong and more research may be needed. However, given our precept to "do no harm," and as the modalities have good safety profiles, the overall net effect to the patient could be positive with regard to chronic pain.

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