Evidence-Based Complementary and Alternative Medical Approaches for Arthritis

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Complementary and Alternative Medicine: An Overview

Health practices that are not part of conventional, mainstream medicine are commonly referred to as complementary and alternative medical (CAM) modalities. Usually, persons use CAM modalities in conjunction with, rather than as alternative to, conventional medicine. However, persons may or may not disclose CAM use to their healthcare providers. In some settings, healthcare providers incorporate both conventional and CAM approaches, which is called integrative medicine. In the U.S., CAM research is mostly funded by the National Center for Complementary and Integrative Health (NCCIH), a center within the National Institutes of Health (NIH). Although "CAM" is the most familiar term (and is used throughout this chapter), NCCIH notes that their preferred term is "complementary health approaches". This term is appropriate because CAM modalities are not strictly medical. Furthermore, the term "approaches" is more appropriate than "medicine" or "therapies" given that many CAM modalities lack research evidence of therapeutic efficacy. For many modalities, physiological effects have been shown through research, but it cannot be assumed that these translate into clinical therapeutic effects.

Because CAM modalities are highly varied, it is helpful to categorize these by types. For many years, NCCIH assigned CAM approaches to five categories: (1) mind-body medicine, (2) biologically based therapies, (3) manipulative and body-based therapies, (4) energy therapies, and (5) alternative medical systems. More recently, however, NCCIH simplified this classification to only three categories: (1) natural products (e.g., herbs, vitamins, and probiotics); (2) mind-body practices (e.g., acupuncture, massage therapy, meditation, movement therapies, relaxation techniques, spinal manipulation, tai chi, and yoga); and (3) other complementary health approaches (e.g., traditional Chinese medicine [TCM], Ayurvedic medicine, and homeopathy) (National Center for Complementary and Integrative Health, 2008). Although this new classification is less descriptive, it removes somewhat forced categorization of therapies that logically belonged to more than one of the former categories. For instance, acupuncture could be considered a body-based therapy, an energy therapy, and part of an alternative medical system (TCM).

The widespread use of CAM approaches in the U.S. use gained attention in 1998, when an important survey by Eisenberg and colleagues

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was published in JAMA (Eisenberg et al., 1998). This survey showed that use of CAM in the U.S. increased from 34 % of adults in 1990 to 42 % in 1997. CAM approaches were most commonly used for chronic conditions. More recently, analysis of the 2007 National Health Interview Survey (NHIS) data showed about the same rate of CAM use as Eisenberg et al., with 38 % of surveyed individuals reporting CAM use in the past 12 months (Barnes, Bloom, & Nahin, 2007). Several surveys have shown a trend of greater CAM use among women than men in the general population (Barnes et al., 2007; Eisenberg et al., 1998) and among persons with arthritis (Callahan et al., 2009; Jawahar, Yang, Eaton, McAlindon, & Lapane, 2012).

Research on CAM use among persons with arthritis shows higher rates of use than the general population. In the 2007 NHIS data, musculoskeletal problems were the top reasons for CAM use, with arthritis being the fourth most common reason overall (Barnes et al., 2007). A survey of 2140 persons with various kinds of arthritis found that 91 % of those recruited from specialty care and 83 % of those recruited from primary care had ever used CAM for their arthritis; current use of at least one CAM modality was 76 % and 70 % in these groups, respectively (Callahan et al., 2009). The authors noted that particularly high rates of CAM use in this study compared to other research may be attributable to classifying prayer as a CAM modality. Another group that examined results from a longitudinal study of persons with knee osteoarthritis (OA) also found that a substantial proportion of the sample was regularly using CAM: 52 % at baseline and 47 % at year 4 (Yang, Dube, Eaton, McAlindon, & Lapane, 2013). The most commonly used CAM modalities among persons with arthritis included topical products, dietary supplements (especially glucosamine and chondroitin), chiropractic care, relaxation techniques, and movement practices (e.g., yoga, tai chi) (Callahan et al., 2009; Quandt et al., 2005; Yang et al., 2013).

Persons with arthritis use CAM approaches for many of the same reasons as conventional therapies: to manage pain, preserve function, and reduce the progression of joint damage. CAM may be appealing because of perceptions that these approaches are "natural" or safe and because they represent to the patient a holistic approach. Given the prevalence of CAM use among persons with arthritis, it is important for healthcare providers to address CAM in patient care. This chapter provides an overview of several of the most commonly used CAM approaches for osteoarthritis (OA) and rheumatoid arthritis (RA) and presents the current state of research evidence on these modalities.

Natural Products

Glucosamine and Chondroitin

Glucosamine and chondroitin are dietary supplements used by persons with arthritis both for symptom management and for modification of disease progression. These may be taken alone or in combination. Glucosamine and chondroitin are substances that naturally occur in joint and connective tissues. Research has shown that these substances can stimulate collagen synthesis in articular chondrocytes and reduce the production of pro-inflammatory mediators and proteases that contribute to joint degeneration (Henrotin, Marty, & Mobasheri, 2014). Currently, the American College of Rheumatology (ACR) guidelines for OA management do not recommend use of glucosamine and chondroitin (Hochberg et al., 2012). However, several recent reviews, including one by the lead author of the ACR guidelines, recommend that these substances may have small but significant benefits when taken over time (Gallagher et al., 2014; Henrotin et al., 2014; Hochberg, Chevalier, Henrotin, Hunter, & Uebelhart, 2013; Lee, Woo, Choi, Ji, & Song, 2010).

The majority of research on glucosamine and chondroitin has been conducted in persons with osteoarthritis, usually in the hip or knee. The largest trial to date, the Glucosamine/chondroitin Arthritis Intervention Trial (GAIT), was a randomized controlled trial (RCT) comparing five

treatments (glucosamine, chondroitin, combination glucosamine and chondroitin, celecoxib, or placebo) given for 24 months in persons with knee OA ($N=1583$) (Clegg et al., 2006). A 20 % reduction in the pain subscale of the Western Ontario McMaster Osteoarthritis Index (WOMAC) was considered a significant treatment response. Glucosamine or chondroitin alone did not improve pain based on this response criterion, but the combination of glucosamine and chondroitin did improve pain (Clegg et al., 2006). Joint swelling was reduced in the chondroitin group only. Analyses of the 2-year follow-up showed that none of the treatments produced a significant improvements in WOMAC pain or joint space width, though celecoxib and glucosamine showed trends in WOMAC pain improvement that verged on significance (Sawitzke et al., 2008, 2010).

Two meta-analyses published in 2010 arrived at conflicting conclusions. Wandel et al. (2010) included 10 trials (6 glucosamine, 3 chondroitin, 1 combination), concluding that the evidence did not support the effectiveness of any of these supplements. Findings on pain showed little difference with glucosamine (standardized mean difference [SMD] = −.17), chondroitin (SMD = −.13), or combination (SMD = −.19). Effects on joint space narrowing (JSN) were also small (SMD not reported). Another meta-analysis by Lee et al. reported no effect of 1 year of glucosamine on JSN based on two trials (SMD = .078), but did find a small and significant effect at 3 years (SMD = .43), indicating the importance of treatment duration (Lee et al., 2010). Two years of chondroitin treatment (based on four trials) had a small but significant effect on JSN (SMD = .26). This review did not examine pain. Two recent reviews examined the highest quality research on glucosamine and chondroitin, but neither used meta-analysis (Gallagher et al., 2014; Henrotin et al., 2014). Henrotin et al. (2014) concluded that the evidence supports both supplements as promising treatments for OA, though the evidence presented in the review on glucosamine was particularly mixed. The evidence more consistently supported chondroitin for improving pain and preventing JSN. The authors also noted that glucosamine sulfate has been associated with more favorable outcomes than glucosamine hydrochloride. This is consistent with speculation that the benefits of glucosamine sulfate may be related to the sulfate component (Hoffer, Kaplan, Hamadeh, Grigoriu, & Baron, 2001). The other recent review noted that three of four studies of chondroitin meeting the criteria for inclusion in the review showed significant reduction of JSN versus placebo; however, only one of these studies showed reduction of pain (Gallagher et al., 2014). Of the three studies of glucosamine reviewed, two reported significant reduction of JSN, one reported improvement of the total WOMAC score, and one reported improved WOMAC pain. The one trial showing no effects for glucosamine or chondroitin was the GAIT study (Clegg et al., 2006).

Insufficient evidence on glucosamine for RA is available, and no studies have tested chondroitin. Only one recent trial has tested glucosamine (using glucosamine hydrochloride) in persons with RA ($N=51$) (Nakamura et al., 2007). Compared to placebo, 12 weeks of glucosamine resulted in no improvements in joint counts, pain, C-reactive protein, or erythrocyte sedimentation rate. The only improvement observed was reduced matrix metalloproteinase-3 levels. The only other study in this population was conducted in 1975, comparing glucosamine with indomethacin (Giordano, Capelli, & Chianese, 1975). Glucosamine improved joint tenderness; however, the findings are not particularly relevant due to major changes in RA treatment in the time since this study.

The overall safety profiles of glucosamine and chondroitin are favorable, though there is the potential for drug interactions and certain cautions are advisable. In the large GAIT study, the rate of adverse events did not differ between the supplements and placebo (Clegg et al., 2006). One serious adverse event that occurred after 2 years of treatment was possibly related to the glucosamine/chondroitin combination (myocardial infarction) (Sawitzke et al., 2010), but details are not provided. Persons with seafood allergies may react to glucosamine, which is derived from shellfish. Glucosamine has also been associated

with photosensitivity and drowsiness; it should be used cautiously in persons with a history of topical allergy or depression (Natural Standard, 2014a, 2014b). Both glucosamine and chondroitin may increase risk of bleeding and should be used cautiously in persons taking anticoagulant medications (Natural Standard, 2014a). It has been suggested that glucosamine may alter carbohydrate metabolism, particularly in diabetics, but studies have only shown such effects at doses that grossly exceed regular use (Salazar et al., 2014). Evidence suggests that negative effects on carbohydrate metabolism are unlikely, but caution is still advisable.

In summary, despite a large trial that mostly failed to support the effectiveness of glucosamine and chondroitin for OA pain and joint structure, conclusions on the overall body of literature are difficult to reach. Some evidence shows reduced pain and joint protection (reduced JSN) in hip or knee OA, particularly with chondroitin. Evidence is currently insufficient to recommend glucosamine or chondroitin for RA. Any benefits of these supplements may take 2 or more years of treatment to become apparent (Lee et al., 2010). Benefits may also depend on product quality and dosing. Both supplements have favorable safety profiles. Therefore, glucosamine and chondroitin may be reasonable options for persons with OA, but this should be decided in consultation with a provider and understanding that benefits may be small.

Topical Products

There are a variety of CAM ointments and creams that are used for analgesic and anti-inflammatory effects, but few of these are supported by research. A recent Cochrane review examined topical agents, finding limited evidence supporting the benefits of arnica and comfrey, but not capsicum or stinging nettle (Cameron & Chrubasik, 2013). Arnica is a flower that is processed to produce topical analgesic products (and also as a homeopathic remedy, which is not discussed here). One study compared 21 days of arnica gel to ibuprofen gel in persons with hand OA ($N=175$) (Widrig, Suter, Saller, & Melzer, 2007). Both groups had similar improvements in hand pain and function. The rate of adverse events likely due to treatment was similar between groups ($n=6$ and 5 for ibuprofen and arnica, respectively), and most often involved skin irritation at the administration site. Arnica has not been compared to placebo. Arnica has been shown to inhibit platelet aggregation in vitro, but it is uncertain if this is a potential clinical side effect in humans (Natural Standard, 2014c). Additionally, persons allergic to flowers in the daisy family may also be allergic to arnica (Natural Standard, 2014c).

Comfrey is a plant that has been shown to have anti-inflammatory effects (Natural Standard, 2014d). A study of persons with knee OA ($N=220$) comparing 3 weeks of comfrey ointment to placebo found significant improvements in WOMAC pain, stiffness, and physical function with comfrey (Grube, Grunwald, Krug, & Staiger, 2007). Caution is warranted in the use of comfrey, which has been shown to be hepatotoxic (Natural Standard, 2014d). Absorption from prolonged topical use may cause risk of toxicity, but little is known about the risk. Persons might also experience allergic reactions to comfrey.

Capsicum (also called capsaicin) is derived from cayenne peppers. It reduces pain by depleting local nerve cells of substance P, thereby reducing pain transmission. Given this effect, topical capsicum is expected to cause a burning sensation as substance P is depleted (Cameron & Chrubasik, 2013). Although the Cochrane review concluded that capsaicin is not effective for OA (based on one study), a more recent review of five studies reported moderate effects on OA pain (Laslett & Jones, 2014). The authors reported a moderate effect on pain visual analog scale ratings (SMD = .44). The ACR recommendations for OA management conditionally recommend capsaicin for hand OA but not for knee OA (Hochberg et al., 2012).

In summary, arnica, comfrey, and capsaicin may be useful for OA pain, but research is scant. Topical agents may cause local irritation, and in some cases may cause systemic effects if

absorbed, so monitoring of patient use is advisable. Finally, camphor and menthol, which are constituents of commonly available analgesic balms such as Tiger Balm and Elder Balm, have not been studied in person with arthritis, so there is no evidence available for recommendations.

Mind and Body Practices

Acupuncture

Acupuncture is a provider-based CAM approach. Although acupuncture is based in TCM, it is frequently administered without using the entire TCM system, or with incorporation of only parts of this system. The most characteristic aspect of acupuncture treatment involves insertion of small needles into specific points on the body to promote the flow of *qi* (life energy) along energy pathways called meridians. The flow of qi is considered vital to health, and blockages, excess, or deficits of qi are believed to cause symptoms and disease patterns. Treatments are based on traditional assessments of energy flow and symptom patterns. The patterns treated may or may not align with Western medicine diagnoses, depending on the condition being addressed. Other practices related to acupuncture include acupressure, which is manually applied pressure at acupuncture points, and electro-acupuncture, which is electrical stimulation of either surface acupuncture points or inserted needles. According to the 2007 NHIS data, 5.5 % of persons with arthritis had used acupuncture within the past 12 months (Hawk, Ndetan, & Evans, 2012). The effects of acupuncture on arthritis are suspected to occur through regulation of endogenous opioid mechanisms and modulation of central nervous system sensory processing in the limbic, subcortical, and brainstem structures (Amazaga Urruela & Suarez-almazor, 2012).

There is a fairly large, but highly varied, body of research on acupuncture for OA. There are fewer studies examining acupuncture for RA. In 2010, Manheimer et al. (2010) updated their previous Cochrane review of acupuncture for peripheral joint OA. The 16 RCTs examined, including 3498 participants, mostly addressed knee OA, with few addressing hip OA or both knee and hip OA. The meta-analysis showed significant effects of real acupuncture versus sham acupuncture at post-treatment on WOMAC pain (SMD = −.28) and WOMAC function (SMD = −.28), but the differences did not exceed the pre-determined threshold of clinical significance (SMD = −.39 and −.37 for pain and function, respectively). At a 6-month follow-up, these outcomes verged on significance, but were of smaller and clinically unimportant magnitude (WOMAC pain SMD = −.10, WOMAC function SMD = −.11). A more recent meta-analysis by Manyanga et al. (2014) examined 12 RCTs (1763 participants) of acupuncture for OA. This analysis reported similar findings; compared to sham acupuncture, real acupuncture was associated with significant post-treatment improvements in pain (SMD = −.29), functional mobility (SMD = −.34), and health-related quality of life (SMD = −.38). This analysis also examined the effect of intervention duration on the primary outcome of pain, finding stronger reduction of pain in treatments longer than 4 weeks versus those lasting 4 weeks or less. A novel network meta-analysis recently published by researchers for the Osteoarthritis Research Society International (OARSI) concurrently examined the effects of acupuncture and 21 other physical CAM and conventional approaches for OA (Corbett et al., 2013). This analysis demonstrated that reduction of pain with acupuncture was superior to usual care (SMD = −.89). The investigators also compared the other treatments directly to acupuncture, finding that acupuncture was superior for pain reduction compared to all treatments except inferential therapy, which was represented by only one study. The authors of all three of these meta-analyses noted a high risk of bias in most of the studies, especially due to uncertain or inadequate blinding of verum/sham treatment.

Research in persons with RA is much more limited and heterogeneous in terms of treatment (electro-acupuncture, acupuncture with moxibustion, etc.). A 2008 systematic review of acupuncture for RA found no effects of acupuncture treatments on pain or other outcomes (Lee, Shin, & Ernst, 2008). Another review published in the same year noted some

favorable study outcomes, but also reported conflicting evidence (Wang, de Pablo, Chen, Schmid, & McAlindon, 2008). No major studies have been published since these reviews, though several studies have examined bee venom acupuncture, noting some promising results (Lee et al., 2014). Overall, high-quality research is needed before any confident recommendations can be made on the usefulness of acupuncture for RA.

Due to the nature of using a sham acupuncture comparison, it is possible that actual effects of acupuncture may be underestimated. It appears that sham acupuncture has effects on pain and function. In the OARSI network meta-analysis, sham acupuncture was shown superior to standard care for the outcome of pain (SMD = −.47) (Corbett et al., 2013). Sham acupuncture may involve full insertion of needles at a location that is not an actual acupuncture point, or it may involve retractable needles that are not actually inserted (Streitberger needles). It is suspected that needling non-meridian locations may produce analgesia through a diffuse noxious inhibitory (DNIC) mechanism, by which a local noxious stimulus may produce generalized analgesic effects (Manheimer et al., 2010). It is possible that even surface stimulation through non-inserted needles may produce a physiologic effect. On the other hand, it is also possible that sham acupuncture is an appropriate control for non-specific (placebo) effects that occur due to subjects' expectations of acupuncture. In sum, it remains unknown whether or not sham acupuncture is truly physiologically inert, but the effects do suggest that some of the efficacy of acupuncture is due to non-specific effects.

In regard to safety, acupuncture appears to be generally safe. Serious adverse events have been noted to occur with acupuncture, but these are rare. The most common serious adverse effects were pneumothorax and infections. The meta-analyses by Manheimer et al. (2010) and Manyanga et al. (2014) both reported no serious adverse events in any study, but they did note the occurrence of transient adverse events, including bleeding/bruising/swelling at the needle insertion sites, pain, sleepiness, faintness, and nausea.

In summary, the evidence suggests that acupuncture may be of some benefit for pain and function in persons with OA, but the effects appear small. The benefits of this treatment should be weighed against the cost of provider visits. For persons with RA, there is very limited evidence of benefit, but there is currently insufficient evidence to support recommendation of this treatment. Although it is generally safe, acupuncture does involve some risk of minor side effects and rare, but serious, side effects of which patients should be aware.

Massage Therapy

Massage therapy is a treatment that involves manual manipulation of soft tissues. There are a number of different styles of massage that vary in bodywork techniques and depth of tissue manipulation. In the U.S., Swedish massage is the most widely available style. The effects of massage that may benefit persons with arthritis include increased tissue circulation and reduced muscle tension (Field, 2014; Perlman et al., 2012). Some evidence also suggests that massage may produce the relaxation response through stimulation of the parasympathetic nervous system (Field, 2014; Perlman et al., 2012).

Only a few studies have examined massage for arthritis. In particular, Perlman and colleagues conducted two modestly sized, but well-designed trials of Swedish massage for knee OA (Perlman et al., 2012; Perlman, Sabina, Williams, Njike, & Katz, 2006). In the first RCT ($N = 68$), 8 weeks of massage versus a wait-list control produced significant improvement in WOMAC global, pain, stiffness, and physical function; pain ratings; and 50-ft timed walk (Perlman et al., 2006). The subsequent RCT ($N = 125$) not only compared massage to usual care, but also compared four doses of 8-week massage (30 min once or twice per week, 60 min once or twice per week) (Perlman et al., 2012). All massage groups showed improvement on WOMAC, pain, and functional outcomes, but results in the 60-min groups were more consistently significant than the 30-min groups. The researchers found that benefits pla-

teaued at 60 min once per week. Effects in these studies persisted at follow-up assessments on week 16 (Perlman et al., 2006, 2012) and week 24 (Perlman et al., 2012). Field and colleagues conducted two studies of massage (style not noted) for hand OA (Field, Diego, Hernandez-Reif, & Shea, 2007; Field, Diego, & Solien-Wolfe, 2014). The initial study ($N=22$), which compared 4 weeks of massage to standard care, reported significantly improved pain, anxiety, and depression at post-treatment (Field et al., 2007). The follow-up study ($N=20$) compared 4 weeks of massage alone versus massage plus a menthol-based topical analgesic (Field et al., 2014). Both groups improved significantly on grip strength, pain, depression, and sleep disturbance, and the improvements were greater in the group receiving the topical analgesic. Finally, the same research group conducted a study of light versus medium pressure massage for 4 weeks in persons with RA (Field, Diego, Delgado, Garcia, & Funk, 2013). Compared to the light massage group, the medium massage group had significant improvements in pain, anxiety, depression, grip strength, and range of motion, but not sleep.

Overall, two well-designed trials with relevant clinical outcomes suggest that massage may be of benefit for persons with knee OA (Perlman et al., 2006, 2012). Research on the appropriate dose currently supports 60-min sessions once per week (Perlman et al., 2012). Although findings for hand OA and RA have shown some benefit, these studies were small and lacked standardized clinical outcome measures for these conditions (Field et al., 2007, 2013, 2014). Only one adverse event was reported in these studies (increased discomfort) (Perlman et al., 2006). A review of case reports of adverse events from massage found that, although adverse events may occur due to excessive pressure on nerves, circulatory tissues, and internal organs (e.g., hematoma, neuropathy), adverse events were rare, given the popularity of massage (Ernst, 2003). Furthermore, adverse events were rare when treatment was delivered by a trained professional therapist, especially using Swedish massage rather than a style using deeper pressure (e.g., rolfing).

Tai Chi

Tai chi was originally developed as a martial art in China, but today it is usually practiced as a gentle exercise and meditative practice. Tai chi involves sequences of fluid movements performed with mental awareness and deep breathing (National Center for Complementary and Integrative Medicine, 2006). The movement practice of tai chi is intended foremost to promote a state of tranquility or serenity. The foundation of tai chi lies in the traditional Chinese philosophy of energies within the body—yin and yang (opposing energies that should be in balance) and qi (one's overall life force). Tai chi is believed to aid the flow of qi by promoting the balance of yin and yang (National Center for Complementary and Integrative Health, 2006). There are five styles of tai chi that have variations in pose performance and sequencing, but the overall intent of tai chi practice is consistent across styles. Tai chi may benefit persons with arthritis through physical and psychological effects. The exercise involves standing and shifting balance between the feet. Thus, tai chi may improve quadriceps strength and bone mineral density, though evidence is mixed (Lee, Pittler, Shin, & Ernst, 2008). The performance of fluid motions in the upper and lower body may also improve joint mobility. However, tai chi may not be strenuous enough to improve aerobic capacity (Lee, Lee, & Ernst, 2009). The meditative component of tai chi may be helpful for reducing mood disturbances such as depression and anxiety. Finally, attending a class-based exercise may provide benefits through social contact.

Several small-to-moderate-sized studies have examined tai chi for OA, but the majority of these studies included persons with hip or knee OA only. Two recent meta-analyses concluded that evidence supports the benefits of tai chi for persons with OA. The meta-analysis by Lauche, Langhorst, Dobos, and Cramer (2013) included five studies of persons with knee OA only (with a total of 252 participants). Compared to attention control or usual care, 8–20 weeks of tai chi resulted in significant improvements in pain

(SMD = −.72), physical function (SMD = −.72), stiffness (SMD = −.59), and the physical component of quality of life (SMD = −.88). No serious adverse events were related to tai chi, and the only minor adverse event was transient muscle pain (Yan et al., 2013). Another recent meta-analysis found similar results, including seven studies of both hip and knee OA (348 participants) (Yan et al., 2013). Compared to controls, tai chi significantly improved pain (SMD = −.45), physical function (SMD = −.61), and stiffness (SMD = −.31).

Although numerous research studies have examined tai chi for RA, most of these studies have included only small samples, and findings were varied. A 2004 Cochrane review of tai chi for RA examined 4 studies (206 participants) (Han et al., 2004). The authors reported no effects on clinically important outcomes, but tai chi did not exacerbate RA, and in one study, it was viewed as more enjoyable than conventional exercise. A more recent systematic review including five trials found no effects of tai chi on pain or fatigue, but found some evidence suggesting improved quality of life, disability ratings, and mood (Lee, Pittler, & Ernst, 2007). Studies published since these reviews suggest benefit, but have continued to include very small study samples. In a 2008 pilot study ($N = 20$), Wang and colleagues reported that a significantly greater proportion persons with RA completing 12 weeks of tai chi versus usual care met ACR responder criteria post-treatment (Wang, 2008). Most recently, Lee and colleagues tested 12 weeks of tai chi (with and without auricular acupressure) in 21 persons with RA. They found pre-post improvement across physical and symptom outcomes including balance, grip strength, pinch strength, 50 ft timed walk, joint pain, and swollen and tender joint counts (Lee, Hale, Hemingway, & Woolridge, 2012). A one-group study of 15 persons with RA showed significant improvements on some physical outcomes (swollen joint count, timed stand, pain during shoulder movement), but not on several other outcomes (disability ratings, fatigue, pain, quality of life, self-efficacy) (Uhlig, Fongen, Steen, Christie, & Odegard, 2010). In sum, evidence suggests that tai chi may be of benefit in RA, but larger, controlled studies are needed to determine whether or not this should be a recommended treatment.

In summary, evidence currently supports the usefulness and safety of tai chi for knee, and possibly hip, OA. Evidence is suggestive of benefit in RA, but the research literature is of inadequate quality to recommend tai chi for this group. Evidence supports the overall safety of tai chi. Transient muscle soreness is common (Wayne, Berkowitz, Litrownik, Buring, & Yeh, 2014), but this is not unexpected in persons with arthritis who may have muscle deconditioning.

Yoga

Yoga, like tai chi, is a movement-based mind-body practice. Traditional yoga, which originated in India around 200 BCE or earlier, involves eight "limbs" that provide physical, spiritual, and general lifestyle guidance (Sharma, 2014). Yoga in the U.S. generally involves only a few of these components, namely physical postures, breathing practices, and meditative mental focus. The purpose of the physical practice of yoga is ultimately to promote mental calm and awareness. Yoga may provide benefits by promoting muscle strength, flexibility, and balance (Roland, Jakobi, & Jones, 2011). The meditative component may help with mood, coping, and self-efficacy (Bartlett, Moonaz, Mill, Bernatsky, & Bingham, 2013).

Research on yoga for arthritis has been increasing in the past few years, but the field remains dominated by small, often uncontrolled or poorly controlled studies. Given the lack of RCTs, no meta-analyses on yoga for arthritis are available. Studies of persons with OA show mixed results on pain, stiffness, and function. Most of these studies were in persons with knee lower extremity OA (Ebnezar, Nagarathna, Yogitha, & Nagendra, 2012; Kolasinski et al., 2005; Taibi & Vitiello, 2011), though one study did not specify site (Park, McCaffrey, Dunn, & Goodman, 2011) and another examined yoga for hand OA (Garfinkel, Schumacher, Husain, Levy, & Reshetar, 1994). Three small uncontrolled

studies ($N=11–25$) examined 8 weeks of yoga; two of these reported improvements in pain and function (Garfinkel et al., 1994; Kolasinski et al., 2005), whereas the other reported improvement in sleep but not pain or disability (Taibi & Vitiello, 2011). A small quasi-experimental study compared 8 weeks of chair yoga with Reiki or education ($N=21$) (Park et al., 2011). Pain and function improved in the yoga group, but did not significantly differ from the other groups. The largest trial of yoga for OA compared 3 months of yoga versus conventional physical therapy exercises in 250 persons with knee OA (Ebnezar et al., 2012). The yoga group had significantly greater improvements than the control group in walking pain, WOMAC disability, knee range of motion, and walking time. Despite the positive findings, this study (conducted in India) delivered an unusually intense treatment with daily yoga sessions. Finally, a recent RCT compared 8 weeks of yoga with wait-list control in women with knee OA ($N=35$). Results showed significantly greater improvements in WOMAC pain, WOMAC stiffness, and function (repeated chair stands) in the yoga group (Cheung, Wyman, Resnick, & Savik, 2014). In summary, the most recent and rigorous studies of yoga have provided results suggesting improved pain and function in persons with knee OA. However, no large trials have tested yoga in the manner in which it is typically used in the U.S., which is class attendance once or twice a week, perhaps including some home practice.

Several studies have tested yoga for persons with RA. A very small ($N=5$) uncontrolled trial of 6 weeks of yoga produced improved pain, depression, and self-efficacy in participants with RA (Evans et al., 2010). A later RCT by this research group ($N=26$) compared 6 weeks of yoga with usual care (Evans et al., 2013). Group comparisons showed improvement in pain disability, the Health Assessment Questionnaire (HAQ) general health subscale, and two SF-36 subscales (general health and vitality), but no differences in disease activity (DAS28), SF-36 mental or pain scales, or HAQ Disability. Another RCT of 7 weeks of yoga versus an unspecified control group ($N=80$) reported significant improvements in pain, morning stiffness, joint counts, and several physical measures, including C-reactive protein in the yoga group (Singh, Bhandari, & Rana, 2011). Finally, an uncontrolled study of 64 persons with RA tested 1 week of twice-daily yoga, finding improvement in HAQ Disability and rheumatoid factor, but not overall HAQ or C-reactive protein (Telles, Naveen, Gaur, & Balkrishna, 2011). Overall, research findings on yoga for RA are varied and result from studies lacking rigorous designs. As with OA, larger studies are needed testing yoga interventions that reflect the manner in which yoga is commonly used in the community.

Overall, yoga appears to be safe if practiced appropriately. No serious adverse events or overall disease exacerbations were reported in these studies (Bartlett et al., 2013), but some studies have reported exacerbation of pain with yoga (Park et al., 2011; Taibi & Vitiello, 2011). This may be related to deconditioning, but could also be related to inappropriateness of particular poses and practices for an individual's condition. Yoga instructors should be attentive to individual needs, and class sizes should be sufficiently small that persons with arthritis can receive individual instruction when needed. Another safety concern is the style of yoga. Some styles are inappropriate for persons with arthritis. Styles that are not recommended include Ashtanga (sometimes called "power yoga"), which is strenuous, and Bikram or "hot yoga", which is performed in a room heated to 100° or more (Bartlett et al., 2013). Vinyasa yoga moves quickly from one pose to the next, with little time to attend to joint alignment. This style should be used cautiously in persons with arthritis. Recommended styles that tend to be gentle include Anusara, Integral, Iyengar, Sivanda, and Viniyoga (Bartlett et al., 2013). Helpful information is available from researchers in the Johns Hopkins Arthritis Center (http://www.hopkinsarthritis.org/patient-corner/disease-management/yoga-for-arthritis/).

In summary, yoga may be beneficial for persons with arthritis, but there is currently insufficient evidence of good quality to recommend

yoga as an effective treatment. Rigorous RCTs reflecting realistic interventions are needed. Yoga appears safe when practiced appropriately, but a gentle style and experienced instructor should be selected.

Discussing CAM with Patients

Research shows that up to about 70 % of patients may not disclose CAM use to their healthcare providers (Chao, Wade, & Kronenberg, 2008). Patients are more likely to disclose the use of CAM providers (e.g., chiropractic, acupuncture) than self-care practices (e.g., megavitamins, yoga or tai chi, relaxation) (Chao et al., 2008). In many cases, patients fear a negative response from their providers (Chang, Chang, & Siren, 2013; Robinson & McGrail, 2004). In other cases, patients feel that it is not important to disclose CAM use because they believe the approaches are natural and safe, or that their self-management is not pertinent to treatment by their providers. Finally, with the availability of information, patients may not feel the need to engage their providers for information about CAM modalities (Chang et al., 2013).

It is important for providers to broach the conversation about CAM use with their patients. NCCIH has provided helpful resources at the "Time to Talk" webpage (https://nccih.nih.gov/health/tips). This webpage includes tips for speaking with patients on this topic, as well as educational materials encouraging discussion of CAM use.

With the varieties of CAM modalities, it is a significant challenge for providers to maintain current knowledge of these modalities. It is helpful to know the effects and side effects of the most common approaches used by certain patient populations, such as those discussed in this chapter, and have resources ready for learning about other modalities. Table 14.1 lists some useful resources. In particular, NCCIH and the Longwood Herbal Task Force provide patient education materials available as well as summaries for providers. When assessing use of CAM modalities among persons with arthritis, it is important to note that persons with arthritis commonly use CAM for other conditions as well (Quandt et al., 2005).

Some recommendations for addressing CAM with patients are as follows:

- *Be approachable*. Many patients fear negatively impacting their relationship with their providers by disclosing CAM use. Even if a modality is not advisable for a patient, approach the matter in a sensitive, educational manner.
- *Find out where patients are getting their information.* Patients may or may not be using reputable sources of information. It may be helpful to have some sources ready to recommend, such as those listed in Table 14.1.
- *Emphasize that patients should not stop taking conventional treatments without discussion with their provider.* Most patients use CAM in conjunction with their conventional treatments. However, in some cases, patients may be hoping for an alternative with fewer side effects; in these cases, they also risk reduced efficacy. For patients with conditions such as RA, foregoing prescribed treatments may lead to irreversible disease progression. It is advisable to discuss the patient's reasons for using CAM and discuss adherence to conventional treatments.
- *Provide education and/or resources on potential side effects and interactions.* Patients may assume that CAM approaches are safe because they are perceived as "natural". It is important to discuss potential adverse effects, especially potential interactions between supplements and conventional medications.
- *Collaborate with the patient to meet care goals.* Patients have varied reasons for using CAM approaches. It is helpful to explore the patient's own goals to collaborate for effective care and symptom management.

In conclusion, certain CAM approaches hold promise as adjunct treatments for reducing arthritis progression and controlling symptoms. However, none of these modalities is currently supported by strong research evidence.

Table 14.1 Websites with evidence-based resources on CAM

Title	URL	Description
National Center for Complementary and Integrative Health (NCCIH)	https://nccih.nih.gov/	NCCIH is the center within the National Institutes of Health that funds CAM research. The website includes resources to disseminate research findings and to educate patients and providers on the current state of evidence on CAM modalities
Time to Talk	https://nccih.nih.gov/health/tips	The Time to Talk topics within the NCCIH website include resources to promote dialog on CAM between providers and patients
	https://nccih.nih.gov/health/tips/osteoarthritis-supplements	Within the Time to Talk webpages, there is a page specifically devoted to dietary supplements for OA
Longwood Herbal Task Force (LHTF)	http://www.longwoodherbal.org/	The LHTF is a collaborative project of Boston Children's Hospital, the Massachusetts College of Pharmacy and Health Sciences and the Dana Farber Cancer Institute. This project produces and disseminates evidence-based information on herbs and supplements, including brief provider summaries, patient information sheets, and in-depth monographs
Natural Standard	https://naturalmedicines.therapeuticresearch.com/	Natural standard is an independent collaboration that produces evidence-based monographs on a wide variety of CAM topics

Glucosamine, chondroitin, acupuncture, and tai chi have moderate evidence of benefit, but effects are also small. Limited research suggests that certain topical agents, massage therapy, and yoga may be helpful, but more research is needed. It is important for patients to discuss CAM use with providers for collaborative examination of cost and benefit, as well as safety, side effects, and potential interactions with conventional treatments. Given the widespread use of CAM approaches, this is clearly an important area in which collaboration with patients and consideration of their own care goals are important.

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