Nonpharmacologic interventions are important adjuncts to treatment modalities for patients with cancer pain. A variety of modalities can be used to reduce pain and concomitant mood disturbance and increase quality of life. Physicians may feel relatively uninformed about which modalities have been used for patients with cancer and which have scientific support. This article reviews a few of the nonpharmacologic and complementary and alternative modalities commonly used by patients with cancer pain. It focuses on those modalities that have empirical support or promising preliminary evidence, with the goal of familiarizing physicians with treatment modalities that may complement regular oncologic care.

Pain is a multifaceted phenomenon that involves biological, psychological, and social consequences. The prevalence of pain in patients with cancer has been reported to be between 50% and 70% during cancer treatment and 65% for those with advanced disease. Etiologic factors of cancer pain include progression of disease, treatment modalities to arrest cancer (eg, surgery, chemotherapy, or radiotherapy), musculoskeletal pain from inactivity, and cancer-related infections that result in neuropathic pain (eg, herpetic neuralgia). A combination of pharmacologic and nonpharmacologic treatment modalities for cancer pain is the standard of care, as presented in current World Health Organization (WHO) guidelines.

Adjuvant strategies combined with appropriate pharmacologic and interventional modes of treatment include nonpharmacologic and complementary medicine interventions. A complete review of all nonpharmacologic and complementary medicine treatment modalities used for cancer pain is beyond the scope of this article. Therefore, the focus is on nonpharmacologic approaches and complementary medicine care presently used to treat patients with cancer pain.

Biopsychosocial Model

The biopsychosocial model encompasses biological, psychological, and social aspects of care and has been applied to patients with cancer pain. There also exists a spiritual or existential aspect of pain for patients with cancer, especially those with a diagnosis of terminal illness. Pain-related quality of life has been classified into three variables of well-being corresponding to the biopsychosocial model, namely, physical well-being, psychological well-being (ie, cognitions, affect, spiritual factors, coping, communication, and the meaning of pain and cancer); and interpersonal well-being (eg, social support, role functioning).

The prevailing model of pain, the gate control theory, postulates a spinal cord control mechanism in the dorsal horn that receives ascending and descending signals from nerve tracts and weighs integration of these inputs. Pain perception is ultimately determined by the weighing of these inputs. The importance of the gate control theory to a discussion of treatment of patients with cancer pain is that descending cortical inputs that affect pain perception include psychological and psychosocial variables such as beliefs about pain, emotions, reactions to stress, and cognitions. Therefore, interventions that target modification of cognitions, beliefs, emotions, and stress can change pain perception and experience.

Physical Modalities

Specific, nonpharmacologic physical modalities are often used to augment pain treatment plans. For example, rehabilitative treatment such as optimizing range of motion, strength, endurance, and neuromuscular control can reduce instability and pain associated with disuse. Another common physical treatment modality, transcutaneous electrical stimulation (TENS), delivers mild electrical stimulation to painful regions. Research on TENS in nonmalignant pain shows positive results after 1 to 3 months, with approximately 25% reporting relief and continued use after 4 years. Few studies, however, have focused on the efficacy of TENS for patients with cancer pain.

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Another commonly prescribed physical modality is application of heat or cold or a combination of both. The former method is most often used to alleviate postoperative pain and pain from inflammatory processes associated with cancer. Caution must be taken in use of heat for patients with insensate tissue, arterial insufficiency, metastatic tumors, bleeding diathesis, or cognitive deficits; such conditions may prevent patient's understanding of warnings of too much heat.13,16

Finally, therapeutic exercise and massage can be used to improve range of motion and reduce muscle tension, respectively. Physical therapists with a specialty in management of chronic or cancer pain often have skills to encourage patients with cancer to engage in exercise even when they observe minimal progress.

Psychological Interventions

Attention to psychological issues such as affective distress, coping, and beliefs about cancer is an important aspect of pain treatment programs. Cancer pain can be intensified by psychological distress, especially mood disturbance, depression, fear, and anxiety as shown by the large majority in 19 studies reviewed by Zaza and Baine.17 Fear of disease progression and a painful death is common, but the level of psychological distress is variable among patients.18

Psychiatric disorders for which patients need treatment are common in cancer, but appear to be more prevalent in patients with cancer who report significant pain.19 Therefore, early consultation with a mental health professional who can diagnose and treat psychiatric disorders (eg, major affective disorders, adjustment disorders, and anxiety disorders) is important.

Cognitive-Behavioral Interventions

Cognitive-behavioral therapy (CBT) can be useful for patients with cancer pain.18 Cognitive interventions generally involve asking patients to track their pain, record thoughts and emotions during prescribed periods of the day, or follow exacerbations of pain. The content of these thoughts and their relation to subsequent emotions is discussed with a therapist. Maladaptive coping, often stemming from dysfunctional automatic thoughts and beliefs, can be identified and modified through therapeutic intervention.

One of the more important maladaptive cognitive coping strategies related to management of pain is catastrophizing.19 This is the tendency to make negative cognitive and emotional evaluations of pain or circumstances (eg, “This pain is horrible and I can’t stand it.” or “This pain means I will die soon.”). Catastrophizing is associated with depression, increased pain intensity, and interference in life activities secondary to pain and anxiety.20,21 Perceptions of control over pain and high self-efficacy that patients with cancer can do something to affect their pain are associated with reduced pain in these patients.20,21

Behavioral Interventions

Behavioral therapy involves analysis of behavior that has been learned or conditioned for evaluation, prevention, and treatment of pain or psychological distress. Psychophysiologic interventions such as biofeedback and relaxation have been categorized as behavioral. Other such interventions include modeling appropriate behavior, assigning tasks in a “graded” or hierarchical manner that promotes success and reinforcement, practicing tasks (eg, often to reduce fear), and managing attention or rewards given by significant others.18

Combination strategies include meditation, hypnosis, music therapy, and systematic desensitization. The latter pairs relaxation with exposure to stimuli that produce anxiety; it can result in controlling anxiety.

Hypnosis is an especially focused state of concentration that can be used to alter painful sensations. It has been shown to be especially effective in the control of postoperative pain and pain following invasive procedures.22

Psychosocial Interventions

Social well-being is also affected by cancer pain. Keefe et al19 point out three broad categories of interventions designed to treat patients with cancer pain, including education about cancer, hypnotic and imagery-based methods, and training in coping skills. Educational interventions are focused on helping patients to understand pain assessment and to overcome barriers to treatment for pain.19 Barriers to pain management are detailed in a National Institutes of Health (NIH) Consensus statement on symptom management in cancer (Figure).23 Videos, role modeling, use of coaches, tutorials, and didactic sessions have been studied.19 Although some of these interventions show good results, others do not; further investigation is necessary to evaluate the efficacy of educational interventions.19

An exciting new direction in teaching patients about pain is education directed toward caregivers. When learning about cancer pain was directed toward caregivers, Ferrell et al24 found that elderly patients with cancer pain described less discomfort with increased psychological and social functioning. Combining coping skills training and education, Keefe et al25 studied a partner-guided pain management training program for the end of life. They found that partners who participated in the cognitive-behavioral program reported improvements in self-efficacy for helping patients control pain and other symptoms; they also observed less caregiver strain. Patients in the study reported no differences in pain, but this finding was likely because they were very ill and near the end of life.

Keefe et al19 point to important future directions in the study of the biopsychosocial aspects of cancer pain. Referral to a psychologist remains more the exception than the norm for patients with disease-related pain. Access to services is also difficult at times. Therefore, Keefe et al19 recommend that future research be directed toward practical strategies for integration, including involving nurses in cognitive-behavioral training that can be accomplished during medical appointments and using telephone or Internet systems to deliver self-management training. These methods have been used in studies of back pain26 and osteoarthritis27 with good results.

Complementary Medicine

Complementary and alternative medicine (CAM) treatment modalities have increased since 1993, when the Eisenberg et al28 first national survey
revealed that one in three respondents had used an unconventional or CAM treatment modality the previous year. However, studies have shown that patients frequently do not report their use of CAM to their physicians, often because of perceptions that their physicians are unreceptive to CAM treatment modalities.29 High-quality empirical data on CAM approaches are emerging from increased research due to the development of a National Center for Complementary and Alternative Medicine (NCCAM) by the National Institutes of Health; however, extensive research on a wide range of approaches is not yet available.30

This section looks at complementary treatment modalities that have some supportive empirical evidence or promising preliminary data in three areas:
- traditional Chinese medicine treatment modalities,
- mind-body medicine, and
- therapeutic massage.

**Traditional Chinese Medicine**

Traditional Chinese medicine dates back more than 4000 years and regards health as a balance between individual and environment.31 According to traditional Chinese medicine, *qi*, or *ch'i* is a life energy force that flows in characteristic patterns (meridians) that correspond to five elements (earth, wood, metal, water, and fire).

Physical and psychological illness is conceptualized as an improper flow or blocking of *qi* along a meridian. Therefore, the goal of traditional Chinese medicine is to achieve a balance in opposite poles of meridians, referred to as *yin* and *yang*.

**Acupuncture**—Acupuncture, acupressure, and electroacupuncture are forms of traditional Chinese medicine in which physical manifestations of the meridians (eg, joint pain) are assessed, and *qi* is facilitated or rebalanced. Pressure on meridian points can be exerted by insertion of small-gauge needles (eg, acupuncture) or a combination of needles and low-frequency electric current (electroacupuncture), or by manual pressure with a finger (acupressure).30 Auricular acupuncture is acupuncture of the ear, thought in traditional Chinese medicine to contain points connected to internal organs.32

Physicians trained in Western medicine and acupuncture are more likely to take a pragmatic approach and stimulate trigger points, tender points, or a mixture of segmental points appropriate to a disordered segment, though these referral patterns often resemble traditional meridian lines.32 Some evidence indicates that effects of acupuncture are due to release of multiple endogenous substances (eg, oxytocin, steroids, endorphins) that no single drug treatment could mimic.32

Acupuncture has been found to help manage a wide variety of pain conditions. Evidence is particularly strong for acupuncture in acute pain, though limited evidence exists for postprocedure pain in patients with cancer. Filshie and Thompson32 reported that a majority of 250 patients with gynecologic cancer had enhanced analgesia when acupuncture was administered as an adjunct to anesthesia. A randomized controlled trial of auricular acupuncture for patients with cancer found substantial pain reduction in patients receiving acupuncture compared with those receiving placebo.33

Acupuncture for cancer pain caused by primary or metastatic lesions has been studied, but most reports are retrospective and lack control groups.34-36 Two reviews of 339 patients with advanced cancer showed that 52% and 56% of patients, respectively, benefited from increased analgesia following three weekly acupuncture treatment sessions.34,35 In these studies, mobility, cancer treatment–related pain, muscle and bladder spasms, and vascular problems

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**Checklist**

- **Provider Barriers**
  - Lack of awareness of patient’s pain
  - Inadequate cancer pain management training and education
  - Lack of time and resources to address cancer pain
  - Higher priority given to cure rather than treating patients for symptoms
  - Concern about legal and regulatory sanctions for opioid use

- **Patient and Family Barriers**
  - Belief that pain is inevitable in cancer
  - Belief that nothing can be done for cancer pain
  - Fear of addiction and dependence on opioids
  - Fear drugs will lose their effectiveness
  - Fear that reporting pain will exclude patient from clinical trials or cancer treatments
  - Failure to mention pain to providers
  - Lack of adherence to treatment regimens
  - High cost of medications and treatments
  - Cognitive impairment hindering symptom assessment

- **System Barriers**
  - Lack of communication between specialists and primary care providers
  - Lack of coordination of care, particularly during transition from cure to hospice mode
  - A priority on curing cancer over caring for patients with cancer
  - Regulatory barriers to effective pain management
  - Lack of reimbursement for symptom management

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improved. Auricular acupuncture has also shown an analgesic effect in patients with cancer pain.33,37

In addition to alleviating cancer pain, acupuncture has been used to treat patients with radiation-induced xerostomia,38,39 as well as patients with cancer-related conditions such as shortness of breath caused by a primary or secondary malignancy,40 patients with lower extremity edema secondary to intrapelvic lymph node dissection for malignant gynecologic tumors,41 and women with menopausal symptoms on tamoxifen therapy after previous breast cancer.42 Acupuncture has improved upper extremity mobility following axillary lymphadenectomy.43

Side effects of acupuncture, acupuncture pressure, and electroacupuncture are generally limited to minor bruising or irritation at the point of contact.44 Acupuncture is contraindicated in the local area of an unstable spine, in persons with severe clotting disorders or neutropenia, and on limbs with lymphedema.45 Additionally, semi-permanent needles, placed with tape for days at a time are contraindicated for patients with valvular heart disease.46

Qigong—Qigong is an ancient practice of manipulating energy through slow body movements and meditation, with or without imagery and breathing techniques. Like acupuncture and other traditional Chinese medicine modalities, the goal of qigong is to open blocked energy channels and facilitate qi. Although often taught in isolation for the purpose of healing and fitness, qigong is part of a cultivation practice or lifestyle system of Buddhism and Taoism aimed at spiritual enlightenment and longevity.30 In a retrospective review of 344 patients in hospice where qigong was practiced as an adjunct to a traditional approach, Aung47 found reduced pain. Although studies of use of qigong in patients with cancer are rare, a well-designed study of patients with complex regional pain syndrome revealed positive results for short-term pain reduction and long-term anxiety reduction.48

Neuroemotional Technique—Neuroemotional technique (NET) is an intervention grounded in traditional Chinese medicine and involves testing and manually holding the associated meridian pulse points, thereby facilitating cognitive and emotional processing and resolution of a past traumatic or anxiety-producing event.49 A preliminary outcome study of NET in female cancer survivors with cancer-related traumatic stress symptoms compared preintervention with postintervention responses to recalling a cancer-related event. Decreases in physiologic reactivity and subjective ratings of event-related distress were found, in addition to decreased levels of proinflammatory cytokines in response to recalling the event.30

Mind-Body Techniques

The term mind-body is somewhat ambiguous and refers to a group of treatment modalities that involves acknowledging bidirectional effects of the mind and body. Some of these modalities are generally classified as more conventional modes of treatment, such as progressive-muscle relaxation. Hypnosis and meditation programs are generally considered CAM approaches and are reviewed here.

Hypnosis—Hypnosis is a complex process of attentive, receptive concentration characterized by a modified sensorium, altered psychological state, and minimal motor functioning.30 An NIH Technology Assessment Panel49 found strong evidence for use of hypnosis in reducing pain, including that associated with cancer. Pain reduction is thought to occur through cognitive distraction, muscle relaxation, and alteration of perceptions.50 Hypnosis has been used to successfully relieve nausea and vomiting associated with chemotherapy.51 This application of hypnosis focuses on reducing anxiety and physical responses associated with conditioned responses to hospital cues.

Meditation and Mindfulness-Based Stress Reduction—Meditation is a practice extracted from more comprehensive traditional Eastern systems. For example, yoga is an ancient Eastern Indian system that prescribes an approach to living that includes proper diet, behavior, physical exercise, and sleep hygiene. In the United States, yogic meditation practice alone is more common, as are variations of yogic meditative practices.

Mindfulness-based stress reduction (MBSR) is one such practice that has shown therapeutic benefits for patients with a wide range of medical illnesses, including cancer.52,55 Mindfulness-based stress reduction facilitates moment-to-moment awareness through regular meditative practice. Participants learn to respond to their awareness, including negative emotional thoughts and states in a nonjudgmental, accepting, and relaxed fashion.

The practice of MBSR has been found to improve patients’ coping with prostate cancer55 and to decrease stress and mood disturbances in a group of patients with mixed types of cancer.56 Shifts in immune system markers (reduction in T1 proinflammatory lymphocyte to T2 anti-inflammatory lymphocyte ratio) have also been found in patients with breast cancer and patients with prostate cancer following an 8-week MBSR program.57

Mindfulness-based art therapy (MBAT) is a newly developed program for patients with cancer that integrates MBSR within a supportive-expressive group format. A randomized controlled trial of MBAT showed significant reductions in psychological distress and improvements in quality of life of women with mixed cancer diagnoses compared with control subjects on a wait list.58 MBAT is different from MBSR in that it is specifically designed for patients with cancer, provides a nonverbal creative-expressive component via art therapy and is designed for smaller groups (e.g., 7 to 10 participants compared with 30 or more MBSR participants per group).59

Therapeutic Massage

Therapeutic massage dates back thousands of years in ancient cultures of China, Japan, and India. It is defined as the systematic manual or mechanical manipulations of soft tissues of the body by movements such as rubbing, kneading, pressing, rolling, or slapping or a combination of movements for therapeutic purposes such as the relief of pain, relaxation of muscles, promotion of circulation, and other physical and mental benefits.60 Massage increases relaxation, improves sleep, and results in decreased pain.61 A recent review found a correlation between massage therapy and
decreased levels of cortisol and anxiety. Two studies reported decreased pain and relaxation in male patients with cancer following a massage intervention.62,63

Comment
Pharmacologic and interventional strategies are the first-line modes of treatment for cancer pain, but may be inadequate or limited or both secondary to adverse effects. Adjunct treatment modalities include physical, psychological, and social interventions and complementary medicine techniques. Although many of these modalities have adequate empirical evidence when applied to other pain conditions (eg, nonmalignant pain), well-designed studies specifically addressing cancer pain are needed. Additionally, creative scholarship that addresses how to make practitioners more aware of these interventions and how to make the care more accessible to patients is critical.

Many of these interventions can increase patients’ sense of control over their pain and their lives, increase their quality of life, and employ little risk. Further, the physician-patient relationship would likely benefit from discussion and incorporation of these strategies into cancer care. Perhaps there is no better example than a serious cancer illness for the need to employ a comprehensive biopsychosocial treatment approach that includes the broadest possible range of therapeutic modalities, particularly when pain is involved.

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