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## CME ARTICLE

### Yoga as an Intervention for Low Back Pain

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**Learning Objectives:** *After participating in this CME activity, the physician should be better able to:*

1. Review some of the basic types of yoga.
2. Assess situations in which yoga might be applicable in pain management.
3. Analyze the validity of research in which yoga has been used as pain therapy.

Chronic low back pain (LBP) is the most common cause of disability claims in the United States and the second-most common cause of lost workdays, after the common cold. It is the number 2 reason for visits to primary care physicians, second only to the common cold. This large number of visits to physicians is only a fraction of the story. LBP is the primary cause of disability in people younger than 45. Across all age groups, an estimated 1% of the US population is chronically disabled because of LBP. The result is approximately \$50 billion annually in combined medical costs and lost earnings.

Practitioners prescribe many treatments with varying success in relieving LBP. Although alternative therapies have been slow

to be adopted in the United States, incorporation of yoga has shown some efficacy. By reviewing the literature on yoga and its use by patients with chronic pain, the practitioner can understand when yoga might be applicable in pain management.

#### Low Back Pain

Chronic pain in the lower back has a complex etiology with several treatment options. While most options focus solely on the physical aspects of pain, very few options address the psychologic component of pain. Yoga is a discipline that addresses both physical and mental aspects of pain. Some of the additional benefits include flexibility, improvement in strength, and relaxation of the body as a whole.

Although many acute cases of LBP resolve, up to one-third of patients who seek treatment for initial LBP report persistent pain 1 year later.<sup>1</sup> Chronic LBP has plagued our health care system

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for decades and is the most common cause contributing to a large number of lost workdays and disability claims.<sup>2</sup> Those afflicted with chronic LBP are at risk for increased disability<sup>3</sup> and increased levels of anxiety<sup>4</sup> and depression.<sup>5</sup> LBP in the United States represents the largest category of medical claims (20%–25%)<sup>6</sup> and exceeds, according to some data, \$34 billion in annual direct medical costs.<sup>7</sup> Many interventions have been tried with variable results, indicating that no single course of therapy is universally effective.

**Evidence from several converging lines of research suggests that despite the seemingly widespread acknowledgment of the benefits of a bio-psycho-social model, this approach continues to be underemphasized.**

A Cochrane database review shows exercise is effective in decreasing pain and improving function in patients with chronic LBP.<sup>8</sup> However, there is some controversy over which type of exercise should be prescribed. Some have focused on extension exercises and others on the opposite, as in flexion exercises.

The controversy and lack of consensus are understandable; LBP has many causes, with several aspects that do not fit a simple model. In fact, most cases cannot be linked to specific abnormalities.<sup>9</sup> Therefore, it is feasible that one would obtain significant benefit by incorporating a multidisciplinary intervention

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that included both the physical and mental aspects of pain. Evidence from several converging lines of research suggests that despite the seemingly widespread acknowledgment of the benefits of a bio-psycho-social model, this approach continues to be underemphasized.

## **Yoga**

Yoga is a physical, mental, and spiritual discipline originating in ancient India. The goal is attainment of a state of perfect spiritual insight and tranquility. The word is associated with meditative practices in Hinduism, Buddhism, and Jainism. The Sanskrit word *yoga* has the literal meaning of “yoke,” from a root *yuj* meaning to join, to unite, or to attach. As a term for a system of abstract meditation or mental abstraction, it was introduced by Patanjali in the second century BCE. Someone who practices yoga or follows the yoga philosophy with a high level of commitment is called a *yogi* or *yogini*. The goals of yoga vary and range from improving health to achieving *Moksha*—a lasting inner peace.

## **Yoga's 8 Limbs**

Patanjali's writing also became the basis for a system referred to as Ashtanga yoga (“eight-limbed yoga”). This 8-limbed concept derived from the 29th *sutra* of the second book, and it is a core characteristic of practically every Raja yoga variation taught today. The 8 limbs are as follows:

1. Yama (the 5 “abstentions”): nonviolence, nonlying, noncovetousness, nonsensuality, and nonpossessiveness;
2. Niyama (the 5 “observances”): purity, contentment, austerity, study, and surrender to God;
3. Asana (literally means “seat”): in Patanjali's sutras, refers to the seated position used for meditation;
4. Pranayama (“suspending breath”): *prāna*, breath, “*āyāma*,” to restrain, or stop. Also interpreted as control of the life force;
5. Pratyahara (“abstraction”): withdrawal of the sense organs from external objects;
6. Dharana (“concentration”): fixing the attention on a single object;
7. Dhyana (“meditation”): intense contemplation of the nature of the object of meditation; and
8. Samādhi (“liberation”): merging consciousness with the object of meditation.

In the teachings of this school, the highest attainment does not reveal the experienced diversity of the world to be illusion. The everyday world is real. Furthermore, the highest attainment is the event of one of the many individual selves discovering self; there is no single universal self that is shared by all persons.

Yoga has been gaining popularity over the last decade in the Western world as a mind-body exercise intervention to address

the physical and mental aspects of pain. Its growth as a movement in the West has moved away from the religious to a more secular approach to practice. Benefits for those who practice it include improved strength, flexibility, and relaxation. Evidence has shown yoga to be effective in one way or another against several lifestyle-related chronic diseases such as osteoarthritis,<sup>10</sup> rheumatoid arthritis,<sup>11</sup> essential hypertension,<sup>12</sup> bronchial asthma,<sup>13,14</sup> irritable bowel syndrome, diabetes,<sup>15</sup> coronary heart disease,<sup>16</sup> and depression.<sup>17</sup>

## **Yoga Types**

Hatha yoga is a nonreligious type of yoga that is the most common type practiced in the United States. It integrates 3 aspects as given here:

1. Asanas, or physical postures;
2. Pranayama, or breathing exercises; and
3. Meditation, or relaxation.<sup>18</sup>

The poses (Figure 1) are performed in a variety of positions to increase flexibility, strengthen the body, and improve balance. A Hatha yoga class (Figure 2) lasts from 60 to 90 minutes



**Figure 1.** Basic Hatha yoga positions. Adapted from Wikipedia.



**Figure 2.** A yoga class From Wikipedia.

through the asanas and is completed with a session of inward relaxation. Although hundreds of postures and their variations have been developed, each is designed to stretch and strengthen particular areas of the body. Yoga is not only for the slim and flexible, as the use of additional equipment enables people of all ages and physical ability levels to perform the poses and achieve benefit.<sup>19</sup> Dense foam blocks, for example, can compensate for a patient who cannot bend over far enough to reach the floor.

Iyengar yoga was created by B.K.S. Iyengar and is a form of Hatha yoga known for its use of additional equipment, such as belts, blocks, and blankets, as aids in performing asanas (postures). These devices enable students to perform the asanas correctly, minimizing the risk of injury or strain, and making the postures accessible to both young and old. The development of strength, mobility, and stability are emphasized.

## There has been a recent proliferation in the literature addressing yoga as a useful treatment option for back pain.

Anusara yoga is a type of Hatha yoga that emphasizes postural alignment, coordinating movement with breath, and positive mental attitudes. It is one of the most common types of yoga practiced in the United States.

Bikram yoga is a branded system of yoga that Bikram Choudhury synthesized from traditional yoga techniques and popularized beginning in the early 1970s. Bikram yoga classes run exactly 90 minutes and consist of a set series of 26 postures and 2 breathing exercises. Bikram yoga is usually practiced in a room heated to 105°F ( $\approx 40.6^{\circ}\text{C}$ ) with a humidity level of 40%. Because of the heat of the room and the intensity of this type of yoga, its safety for all fitness levels has been subject to debate, but it remains popular among athletes.

## Yoga Literature and Research

There has been a recent proliferation in the literature addressing yoga as a useful treatment option for back pain. In 2004, Jacobs et al<sup>20</sup> conducted a study exploring yoga intervention for chronic LBP. This study included 52 subjects randomly assigned to a yoga group or a group that received an educational booklet about back pain. The yoga protocol had a set of 28 postures from which the teacher would select individual poses and combine them in varying sequences. The yoga participants were also encouraged to practice yoga at home for 30 minutes, 5 days a week. Demographic and clinical baseline data of the 2 groups were similar, with an adherence rate of 64% throughout the 3-month intervention. They concluded that with such a high rate of adherence, a yoga protocol would be beneficial. However, the authors did not include any pain result scores in their study.

## Yoga Compared With Educational Intervention

In 2005, Williams et al<sup>21</sup> evaluated the efficacy of an Iyengar yoga intervention with regard to pain-related outcomes in patients with chronic LBP. The control group received educational intervention rather than yoga. In this study, 43 participants with nonspecific LBP of 3 months' duration or longer were randomized to the 2 groups. The average age was 48.3 years with average duration of LBP of 11.2 years.

Group 1 received the yoga intervention. Group 2 was an educational control group and received newsletters about back care with lectures from physical and occupational therapists. The primary outcome measures were functional disability measured with the Pain Disability Index (PDI).

Measures were assessed at baseline, posttreatment, and at 3 months' follow-up. An analysis of the demographics and medical histories shows no difference between the groups. Posttreatment, the yoga group had significantly lower PDI scores, that is, disability was decreased by 77%, compared with 38% in the control group. Improvements were still present at 3 months' follow-up. Drug usage posttreatment declined 88% in the yoga group and 35% in the control group. Adherence was also assessed; results demonstrated that the yoga group was practicing an average of 52 minutes per week.

It is important to note that this study lacked a control group with any sort of physical activity that could be monitored and thus would have represented a more appropriate control group.

## Yoga Compared With Aerobic Exercise

Sherman et al<sup>22</sup> attempted to address the issue of a lack of control group. They conducted a randomized control trial in 2005 comparing the effects of yoga classes with conventional aerobic exercise classes and a self-care book in patients with LBP.<sup>22</sup> A total of 101 subjects with nonspecific LBP of at least 12 weeks' duration were enrolled in the study. Participants were then randomly assigned to 1 of the 3 groups. Group 1 engaged in a yoga class. Group 2 did a conventional aerobic exercise

class, and group 3 read a self-care book. Exclusion criteria included subjects with sciatica, spinal stenosis, significant discogenic symptoms, or any ongoing legal issues.

Yoga instructors used a core group of 17 postures specifically geared to addressing LBP in patients without any previous yoga experience. For the exercise intervention group, a physical therapist led classes that included aerobic conditioning, strengthening, and stretching for the hips, abdominal muscles, back muscles, and legs. Classes were held twice a week for 12 weeks for 75 minutes. The self-care-book group received an evidence-based book that emphasized self-care strategies for LBP.

Primary outcome measures included improvement in scores on the modified Roland-Morris Disability Questionnaire, used to measure back-related functional status, and an 11-point numerical pain scale. Secondary outcome measures included the 36-item Short Form Health Survey, which measured general health status, degree of restricted activity, and medication usage. All measures were assessed at baseline and at 6, 12, and 26 weeks after intervention.

## Seven days of an intensive residential yoga program improved spinal flexibility in patients with chronic LBP better than a physical exercise regimen.

The 3 groups were well matched and mostly college educated, working, white women between the ages of 40 and 50 years. Two-thirds of patients had back pain for more than 1 year.

Roland-Morris Disability Questionnaire score decreased in all the 3 groups over the course of the study. The yoga group had statistically and clinically important improvements at all follow-up points compared with the book group. Hindrance bothersomeness of pain, via the 11-point pain scale, also decreased in all the 3 groups. However, between weeks 12 and 26, symptoms continued to improve only in the yoga group, whereas the other groups had worsening symptoms.

Medication use, which was similar in all the 3 groups before the study, decreased most sharply in the yoga group. The authors concluded that yoga was more effective than a self-care book in reducing pain in patients with chronic LBP, which persisted several months after intervention. On the contrary, although the yoga group consistently reported superior outcomes compared with the exercise group, none were statistically different. It is important to note the yoga group had lasting benefit between 12 and 26 weeks, which the exercise group did not, and that the yoga group also decreased pain medication use.

### Effect of 7-Day Intensive Program Studied

In 2008, Tekur et al<sup>23</sup> published a study that concluded that 7 days of an intensive residential yoga program improved spinal flexibility in patients with chronic LBP better than a physical exercise regimen.

Eighty patients (43 male and 37 female) with chronic LBP were randomly assigned to the yoga or control group if they satisfied the selection criteria. Forty were placed in the yoga group and 40 into the control group. The groups were well matched with mean age of 49 years, equal distribution of men and woman, and equal distribution of length of time with chronic back pain. The intervention consisted of a residential 1-week intensive yoga program that comprised asanas designed for back pain relief, pranayamas (breathing practices), meditation, and didactic and interactive sessions on philosophic concepts of yoga that lasted from 5 AM to 8:30 PM daily. The control group practiced physical exercises under a trained physiatrist and also had didactic and interactive sessions on lifestyle change.

Primary outcome measures were a measure of total disability measured by the Oswestry Disability Index (ODI) and spinal flexibility, which was assessed using goniometer before and after intervention.

The total disability scores in the yoga group decreased from 35 to 18 with a *P* value of 0.001, indicating a shift from moderate to mild disability. There was a nonsignificant reduction in disability scores in the control group. Subgroup analysis of the ODI showed a significant reduction in pain with *P* values 0.001 and nonsignificant in the control group. Spinal flexion increased in both groups with a higher effect in the yoga group.

### Ten-Week Study at Veterans Administration Center

In 2008, Groessl et al<sup>24</sup> further solidified the effectiveness in treatment of chronic LBP. In this study, patients with chronic LBP were enrolled in a 10-week yoga study at a Veterans Administration (VA) health center. Exclusion criteria included patients with spinal fusion or inserted spinal hardware, an inability to understand and follow verbal instructions, an unrealistic expectation of an immediate cure, morbid obesity, active and severe substance-abuse disorders, or other acute medical or psychologic problems that could compromise safety or be disruptive to others if the participant were to join the yoga program.

The study enrolled 33 patients in a weekly Anusara yoga program, which is designed to serve students of all levels. Patients would go through 32 yoga poses that are specifically chosen for patients with LBP. On average, patients attended 8 sessions. The studies included questionnaires to measure pain, depression, energy/fatigue, and the Health-Related Quality-of-Life (HRQOL) questionnaire.

Pain was measured using the visual analog scale with 5 additional questions on severity and interference. Energy and fatigue were measured using items adapted from the Medical Outcomes Study for use with chronic illness populations by Lorig.<sup>25</sup> Depression was assessed using the Center for Epidemiologic Studies Short Depression Scale (CESD-10).<sup>26</sup> HRQOL was measured using the 12-item Short Form health survey, version 2.<sup>27</sup>

Results from the study showed that 33 patients in the VA health care system, with mean age of 55 years, showed improvements

in pain, energy/fatigue, and depression, all with  $P < 0.001$ . Therefore, the authors concluded that there are sizable reductions in pain and depression with increase in energy levels and improvement in mental health with the use of yoga.

### Longer-Term, Broader Study Follows Up at 6 Months

A broader study was done by Williams et al,<sup>28</sup> who randomized 90 patients to a yoga or control group with the purpose of assessing the effectiveness and efficacy of a 24-week Iyengar yoga intervention in comparison with standard medical care.

Of the 90 participants, 43 were placed in the yoga group and 47 in the control group. Evaluations were done at 12, 24, and 48 weeks after the start of intervention, with a research assistant blinded to the group assignments.

Inclusion criteria included English-language speaking, a body mass index of less than 37, LBP for more than 30 months, VAS score of 308, and ability to get up from the floor and rise to a standing position without assistance. Patients also had to agree not to get chiropractic treatment, massage therapy, or acupuncture, or to participate in any other yoga program or in a Pilates program. Patients were excluded for spinal stenosis, spine tumors, spinal infection, and osteoporosis with vertebral fractures, spondylolisthesis with radiculopathy, and ankylosing spondylitis, or failed back syndrome.

### The yoga intervention was effective and efficacious in treating chronic LBP when compared with standard medical care.

The Iyengar yoga group had 24 weeks of 90-minute yoga classes twice a week. Participants were encouraged to practice 30 minutes a day on nonclass days. The control group was managed with pain medication and the individual's usual medical care. The groups were similarly matched by age and sex, education, income, amount of pain medications and pain medication class type, functional disability score, and VAS pain score.

Outcome measures were functional disability, measured by the ODI<sup>29</sup>; pain, using the VAS<sup>30</sup>; depression, measured using the Beck Depression Inventory, second edition (BDI-II)<sup>31</sup>; and self-reported medication use. Medication use was compared with baseline to determine increase or decrease in usage.

The results showed a greater reduction on the ODI and VAS in the yoga group compared with the control group at 24 weeks. The yoga group also had a higher success rate in decreasing pain medication than did the control group at 12 and 24 weeks, although the reduction was not significant. At 24 weeks, the yoga group showed a 42.9% reduction in ODI, a 56% reduction in VAS, and a 58.9% reduction in BDI-II scores.

Therefore, this study concluded that the yoga intervention was effective and efficacious in treating chronic LBP when compared with standard medical care. Patients randomized to the yoga group showed a significantly greater improvement in

functional disability, pain intensity, and depression. These improvements were maintained at 6-month follow-up as well.

### Inherent Multimodality of Yoga Offers New Model for LBP

With all these apparently positive results, the question that remains unanswered is this: How, exactly, does yoga work?

Yoga is a multimodal practice that increases flexibility, relaxes the mind, and focuses on breathing exercises. It stretches tight muscles and forces patients through full anatomic ranges of motion that otherwise are limited in typical day-to-day activities. Yoga exercises extend the lower back, strengthen the core, and provide a meditative relaxation and escape from the busy world we live in. The result is whole-body relaxation.

Therefore, yoga provides a bio-psycho-social model for treating LBP. It also allows multiple positions that in theory would activate the multifidus muscle, which has been postulated to be atrophied in patients with chronic LBP (Figure 3).

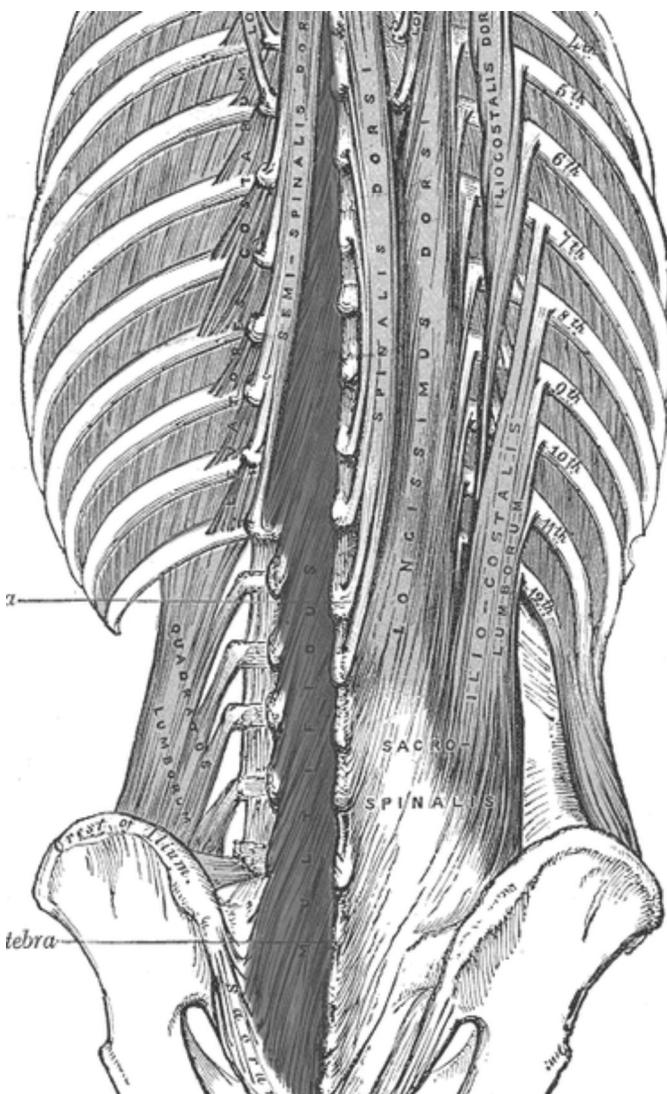
Future research on this issue may shed further light on modes of action. After all, although yoga has been practiced in the East for more than 2 millennia, it is still a relatively new therapy in the United States. Reimbursement is usually through workers' compensation or automobile-insurance providers. On the basis of a physician's prescription, a licensed yoga practitioner or the pain specialist working with the client or case manager may administer 6 to 8 courses, billed as "private yoga sessions" rather than "yoga therapy."<sup>32</sup>

**Practitioners should be aware of yoga—if not to actively recommend it to patients, at least to answer questions that patients may raise about this form of exercise.**

### Conclusion

The integration of ancient and traditional Asian therapies to Western techniques has been viewed by some as unnecessary and even dangerous, due in part to lack of understanding of the remedies prescribed. Recent studies published in journals in the United States indicate that addition of yoga practices to other modalities used in the treatment of back pain may be beneficial without complications. The outlined studies support the use of yoga as a treatment for patients with chronic LBP. The benefits include pain reduction, reduction in depression, and reduction of disability.

A wide variety of yoga techniques within the Hatha yoga group were used in these studies, and so future studies may benefit from adopting a yoga protocol to assess efficacy more specifically for each type of yoga practice compared with a control group or to each other. Future study could also explore how yoga therapy might be effective, not just to learn more about yoga, but also to gain further insight into how other therapies and approaches can incorporate whatever it is about yoga that leads to improvement in these patients.



**Figure 3.** Multifidus muscle of the back. Adapted from *Gray's Anatomy* via Wikimedia Commons.

In the meantime, however, practitioners should be aware of yoga—if not to actively recommend it to patients, at least to answer questions that patients may raise about this form of exercise. Although yoga is relatively new to the West, its popularity is growing, as is the body of evidence that yoga is effective. And at the very least, the evidence also indicates that there do not seem to be any complications from its incorporation into a multidisciplinary approach to the treatment of the vexing problem of chronic LBP. ■

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## Institute of Medicine Issues Recommendations in a Blueprint For Transforming Pain Prevention, Treatment, and Research In the United States

Pain care experts and advocates hailed a report by the Institute of Medicine (IOM)<sup>1</sup> as a landmark assessment and blueprint for action on pain care, research, and education when the report was released in June of 2011 by the National Academies.

The report, “*Relieving Pain in America: A Blueprint for Transforming Prevention, Treatment, and Research*,” includes recommendations that collectively call for what the IOM committee has called a cultural transformation.

What remains now is to see how advocates for improved care, more research, and increased professional, academic, and public education on pain can leverage the report into such a transformation through the many specific actions the institute is recommending.

The report was commissioned by Congress through Section 4305 of the 2010 Patient Protection and Affordable Care Act. That legislation required the secretary of the Department of Health and Human Services (HHS) to work with the IOM “to increase the recognition of pain as a significant public health problem in the United States.” From there, the HHS, through the National Institutes of Health (NIH), requested that the IOM of the National Academies to conduct a study to assess current pain care and to make recommendations to advance the field of pain care and research.

The IOM Committee on Advancing Pain Research, Care, and Education is part of the Board on Health Sciences Policy, and was chaired by Philip Pizzo, MD, dean of the Stanford University School of Medicine, and the Carl and Elizabeth Naumann Professor of Pediatrics and professor of microbiology and immunology.

“Given the large number of people who experience pain and the enormous cost in terms of both dollars and the suffering experienced by individuals and their families, it is clear that pain is a major public health problem in America,” Pizzo said in a press release when the report was first issued. “All too often, prevention and treatment of pain are delayed, inaccessible, or inadequate. Patients, health care providers, and our society need to overcome misperceptions and biases about pain.”

In response to interview questions from *Topics in Pain Management* (TPM), Pizzo responded, “We hope all medical professionals, health care policy experts, state and federal legislators and leaders—as well as state and federal funding and regulatory agencies—will read this report. We also hope that the American public, especially those suffering from chronic pain, will be aware of this report and its conclusions.”

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**For many patients, the first problem is the difficulty patients have in accessing the treatments that are available now.**

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Although new research and treatments are needed, Pizzo noted that for many patients, the first problem is the difficulty patients have in accessing the treatments that are available now.

“We have effective tools and services to tackle the many factors that influence pain and we need to apply them expeditiously through an integrated approach tailored to each patient,” Pizzo said.

The committee that authored the report and recommendations included one member of the *TPM* Editorial Advisory Board: Lonnie Zeltzer, MD, director of the Pediatric Pain Program at Mattel Children's Hospital and professor of pediatrics, anesthesiology, psychiatry, and biobehavioral sciences at the David Geffen School of Medicine at UCLA.

Starting out, she said, the committee easily reached consensus that pain is a major health problem with major costs to families.



Lonnie Zeltzer, MD

"One of the most controversial issues initially was both defining 'chronic pain' and calling it a 'disease.' Discussions under the good leadership of Drs. Pizzo and Clark [vice chair Noreen Clark, PhD, of University of Michigan] led to consensus with all the pros and cons and definitions discussed and debated," Zeltzer said.

## Challenges in Education

One of the biggest challenges the report acknowledges is in education—both of health care professionals and the public. The report calls for federal agencies and other stakeholders to redesign education programs.

"They should aim to foster an understanding among patients, the public, and healthcare providers that there are complex biological and psychological aspects to pain, and they should

develop materials about the nature of pain; ways to use self-help strategies...; and available treatments for pain," according to the report brief.

The report also calls for putting standardized information into graduate and undergraduate training programs for health care providers, including experience in caring for pain in an interprofessional setting.

## The report calls for federal agencies and other stakeholders to redesign education programs.

"Improving education is especially important for primary care providers, given their key role in pain management," the report states. "In addition, all care providers should keep their knowledge current by engaging in continuing education programs; and licensure, certification, and recertification examinations should include assessments of providers' pain education."

Here is what the report does *not* do:

- It does not provide an exhaustive literature review;
- It does not address in detail the science of pain and the diagnosis and treatment; and
- It does not provide a clinical algorithm for diagnosis and treatment.

## Challenges in Research

The report acknowledges advancements in understanding pain, especially in genomic, cellular, and behavioral fields,

## Recommendations by the IOM Have Impact

Pain specialists and others who already are involved in chronic pain treatment, education, and advocacy have praised the report for making a strong statement about the need to take action to improve pain care. The report makes clear not only the need for additional research and discovery, but better dissemination of existing knowledge and best practices that are not reaching all health care professionals in the country.

Although it is still too early to gauge the impact of the pain care report, reports by the IOM on other issues over the last several years have led to legislation, research dollars, and public awareness.

For example, according to the IOM website:

- "The passage of the Patient Protection and Affordable Care Act (ACA) of 2010 marked a profound shift away from reactive care and toward a system focused on prevention, including a new provision that ensures preventive health services will be covered with no out-of-pocket costs. On August 1, 2011, less than two weeks after the release of Clinical Preventive Services for Women: Closing the Gaps, HHS adopted the IOM's recommendations outlining which services for women should be included."
- "An FDA regulation announced June 22, 2011, requires that new warnings on cigarette packages and advertisements better communicate the health risks of smoking by using graphic images and bold health warnings. The FDA cites the IOM report, *Ending the Tobacco Problem: A Blueprint for the Nation*, which found current text warnings inadequate and ineffective."
- "Walmart announced on January 20, 2011, that it would work to provide healthier food choices and make those foods more affordable to consumers. Walmart will reformulate many packaged foods to reduce sodium and added sugars, and eliminate trans fats by 2015. The company references the IOM in its rationale for sodium and trans fat reduction."

## Broad Support for IOM Report Among Pain Medicine and Nursing Societies and Patient Advocates

The IOM report could provide just enough heft and momentum to maximize the efforts already underway by the pain patient population, clinicians, researchers, and educators involved in pain medicine and basic science. Just after the report was released, for example, a broad coalition of consumer, health professional, and advocacy organizations released a statement praising the report.

As organizations representing millions of Americans who suffer from chronic pain, of health professionals who care for these Americans, and of researchers and educators working to improve the care and treatment options available to these Americans, we are united in our enthusiasm for the IOM's attention to this issue and by the release of this landmark report that identifies pain as a major public health problem.

"While we are still carefully reviewing its findings and recommendations, we hope that this landmark report sounds the siren call for greater attention to pain issues by both public and private sector policymakers and by the nation as a whole. We hope the recommendations of the report lay a clear path toward much needed improvements in pain research, care, education, and treatment."

The statement is signed by several organizations, including the following: American Academy of Neurology; American Academy of Pain Management; American Academy of Pain Medicine; American Association of Nurse Anesthetists; American Chronic Pain Association; American Headache Society; American Pharmacists Association; American Pain Foundation; American Pain Society; American Society for Pain Management Nursing; Center for Practical Bioethics; Hospice and Palliative Nurses Association; National Fibromyalgia and Chronic Pain Association; National Hospice and Palliative Care Organization; and National Research Center for Women & Families.

but notes that gaps continue to exist, such as the development of "more effective and less risky pain relievers."

Another challenge is in translating the research advances to practice. The report recommends that an existing institute within the NIH be designated as the lead institute for pain and that "the NIH Pain Consortium take a stronger leadership role in effecting the necessary transformation in how pain research is conducted, by fostering coordination across institutes and centers, by improving study section decision making on pain proposals, and by exploring a range of potential public-private initiatives."

But the report does not place all the responsibility on the NIH. Other national agencies called out in the report include the following:

- The Centers for Disease Control and Prevention, to take the lead on epidemiologic data and public education strategies;
- The Agency for Healthcare Research and Quality, for quality improvement in pain care and research;
- The Health Resources and Services Administration for professional education and service delivery for vulnerable populations; and
- The Centers for Medicare and Medicaid Services for reimbursement-related research and demonstration programs.

### Sheer Numbers Emphasize the Need for Action

The summary of the report lists the problem of pain in terms of sheer numbers of people affected—116 million in the

United States—and cost in treatment and lost productivity—between \$560 and \$635 billion annually. But it also addresses the more nuanced situation of limited access to gold-standard pain management, depending on whether a patient can get a referral to a good pain center or whether he or she lives in a more rural area that does not have specialty pain care available or where clinicians are not trained in pain management.

Stated in the summary: "In the committee's view, addressing the nation's enormous burden of pain will require a cultural transformation in the way pain is understood, assessed, and treated. This report provides recommendations intended to help achieve this transformation." ■

### Reference

1. Institute of Medicine report. *Relieving Pain in America: A Blueprint for Transforming Prevention, Treatment, and Research*. www.iom.edu/relievingpain. Available for free download for noncommercial use at www.iom.edu/relievingpain, and can be purchased for a fee as a book.

### Coming Soon:

- Intrathecal Drug Therapy: Conflict of Interest vs. the Scientific Evidence
- Commentary and Context from Institute of Medicine Pain Report Authors

## Topics in Pain Management CME Quiz

To earn CME credit, you must read the CME article and complete the quiz and evaluation assessment survey on the enclosed form, answering at least 70% of the quiz questions correctly. Select the best answer and use a blue or black pen to completely fill in the corresponding box on the enclosed answer form. Please indicate any name and address changes directly on the answer form. If your name and address do not appear on the answer form, please print that information in the blank space at the top left of the page. Make a photocopy of the completed answer form for your own files and mail the original answer form in the enclosed postage-paid business reply envelope. Your answer form must be received by Lippincott CME Institute by November 30, 2012. Only two entries will be considered for credit.

**Online quiz instructions:** To take the quiz online, log on to your account at <http://www.topicsinpainmanagement.com>, and click on the "CME" tab at the top of the page. Then click on "Access the CME activity for this newsletter," which will take you to the log-in page for [CME.lwwnewsletters.com](http://CME.lwwnewsletters.com). Enter your **username and password for this screen as follows:** Your **CME username** will be the letters LWW (case sensitive) followed by the 12-digit account number above your name on the paper answer form mailed with your issue. Your **CME password** will be 1234; this password **may not** be changed. Follow the instructions on the site. You may print your official certificate **immediately**. Please note: Lippincott CME Institute, Inc., **will not** mail certificates to online participants. **Online quizzes** expire at 11:59 pm Pacific Standard Time on the due date.

- 1. Among patients who seek treatment for initial LBP, what amount report persistent pain 1 year later?**
  - A. One-third
  - B. Almost all
  - C. Varies according to location of pain
  - D. One-half
- 2. Bikram yoga is a set of 26 postures done in a room with 40% humidity and at a temperature of**
  - A. 90°F
  - B. 100°F
  - C. 105°F
  - D. 110°F
- 3. According to the study by Groessl et al, after an average of 8 sessions of yoga, patients with chronic LBP reported improvements in all of the following, except**
  - A. depression
  - B. fatigue
  - C. pain
  - D. anxiety
- 4. According to Williams et al, (2005 study), the benefits of yoga with regard to the PDI were still present at**
  - A. 1 month
  - B. 6 weeks only
  - C. 3 months
  - D. nothing happened
- 5. According to Williams et al, (2005 study), drug usage declined by what percentage in the yoga group?**
  - A. 0
  - B. 50
  - C. 100
  - D. 88
- 6. Including lost wages, chronic LBP results in annual health care expenditures of**
  - A. \$10 billion
  - B. \$40 billion
  - C. \$50 billion
  - D. more than \$100 billion
- 7. The cause of LBP is usually**
  - A. herniated discs
  - B. facet
  - C. spinal stenosis
  - D. unknown
- 8. Hatha yoga is an integration of all the of the following except**
  - A. physical postures
  - B. herbal supplements
  - C. breathing exercises
  - D. meditation
- 9. A Hatha yoga class typically ends with a session of**
  - A. breathing
  - B. inward relaxation
  - C. stretching
  - D. singing
- 10. Yoga is for**
  - A. the young
  - B. the flexible
  - C. people of all ages and abilities
  - D. active people

## NEWS IN BRIEF

### New Method of Targeting Olfactory Epithelium Increases Transport of Opioids to Central Nervous System

Results of a study evaluating a new method of delivering opioids through the nasal cavity for analgesia were published in the September issue of *Anesthesia & Analgesia*.<sup>1</sup> The pressurized olfactory delivery device targets the olfactory epithelium instead of the nasal respiratory epithelium and was designed to optimize the amount of opioid that reaches the central nervous system (CNS), bypassing the blood-brain barrier and reducing the time of onset of analgesic relief.

With this device, a liquid opioid is mixed with pressurized nitrogen to create optimal penetration into the nasal cavity. Designed by Rodney Ho, PhD, the Milo Gibaldi endowed professor of pharmaceutics at the University of Washington, and John Hoekman, PhD, a former student at the University of Washington, the device is now marketed by the biomedical company Impel Neuropharma, of which Hoekman is chief scientific officer.

Ho and Hoekman wrote that despite the potential advantages of this method of delivery compared with other methods, "direct nose-to-CNS" delivery remains underused because most devices do not reach the olfactory epithelium.

On the basis of the results of their study, the pressurized olfactory device shows promise for this traditionally little-used method of opioid delivery.

The study aimed to determine whether targeting the olfactory epithelium in rats would result in a greater amount of opioid reaching the CNS. Compared with 2 other methods—nose drops and intraperitoneal injection—the percentage of morphine reaching the brain was consistently higher for the pressurized olfactory device than with other methods.

The total analgesic effect over 2 hours, as measured by the tail-flick latency response, was also consistently higher for the pressurized olfactory device than with nose drops or intraperitoneal injection. The researchers also tested the delivery of fentanyl using this method. The plasma concentrations were significantly higher with the pressurized olfactory device than with nose drops or intraperitoneal injection, although the difference was only statistically significant at 1 concentration of the drug tested.

At this concentration, the total analgesic effect was also significantly higher than with the other methods, and time to onset was very rapid in comparison. The authors stated that fentanyl, being a lipophilic compound, delivered to the nasal cavity "would likely be rapidly absorbed into the bloodstream leaving little drug to distribute directly to the CNS."

These results indicate the potential for the pressurized olfactory device to be an effective device for delivering opioids.

Further clinical studies need to determine what effect this method of delivery has on systemic adverse effects of opioids, including respiratory depression and constipation. ■

#### Reference

1. Hoekman JD, Ho RJ. Enhanced analgesic responses after preferential delivery of morphine and fentanyl to the olfactory epithelium in rats. *Anesth Analg*. 2011;113:641-651.

### Kentucky Study Finds Smoking a Risk Factor for Chronic Pain in Women

A cross-sectional analysis of a statewide survey results, published in the *Journal of Pain*,<sup>1</sup> reveals that cigarette smoking is a risk factor for reporting chronic pain in women.

David Mannino, MD, professor in the Division of Pulmonary, Critical Care, and Sleep Medicine at the University of Kentucky in Lexington, and colleagues<sup>1</sup> analyzed the results from more than 6000 women who responded to the Kentucky Women's Health Registry, a health survey designed to help in identifying diseases and understanding possible risk factors among women in the state. The researchers studied musculoskeletal types of pain, including joint pain; sciatica; fibromyalgia; nerve pain and head, neck, and back pain.

In previous studies, smoking has been linked with chronic pain, particularly low back pain. In this survey analysis, approximately 40% of the respondents who never smoked reported having some form of chronic pain, compared with nearly 60% of daily smokers reporting some form of chronic pain.

Furthermore, the authors reported a "dose-response relationship" between the number of cigarettes smoked per day and the frequency of smoking and reporting pain. Women who smoked at least 1 pack a day were more likely to report pain.

The authors concluded that the relationship between smoking and chronic pain needs further elucidation, and that, in this study, it is not clear whether increased chronic pain leads to smoking or vice versa.

The authors suggest several reasons for the association between smoking and chronic pain, including the effect of nicotine on pain receptors and the effect of tobacco on chronic pain and sleep quality.

The authors wrote that the results of the study "suggest that smoking cessation may be an important adjunct treatment of chronic pain syndromes. Similarly, it is possible that appropriate treatment of a chronic pain syndrome may increase the possibility that a woman will be able to successfully stop smoking." ■

#### Reference

1. Mitchell MD, Mannino DM, Steinke DT, et al. Association of smoking and chronic pain syndromes in Kentucky women. *J Pain*. 2011;12(8):892-899.