

# Application of Acupuncture to Treat Low Back Pain

A 2-year case study of fascial needle manipulation on a patient whose low back pain was unresponsive to medications.

## Joseph Montalto, MPT

Mantalto Physical Therapy, PC  
Oyster Bay, New York

## Josephine Fan, MS

Owner of Aikakai  
Bay Shore, New York

## Jenny Lam

## Ryan Rojas

## Ryan Whelan, LMT

New York College of Traditional Chinese Medicine  
Mineola, New York

## Bin Xu, MD, PhD

Clinical Supervisor  
New York College of Traditional Chinese Medicine  
Mineola, New York

## Audrey Krapf, RN, MBA

Director  
Health and Wellness Center  
Farmingdale State College  
Farmingdale, New York

## Rosemary McCarthy, RN, BS

Associate Director  
Health and Wellness Center  
Farmingdale State College  
Farmingdale, New York



**W**orking adults (ages 18 to 64) represent 63% of the population and account for 72% of all low back pain (LBP) health care visits.<sup>1</sup> Low back pain has been identified categorically as acute, subacute, or chronic, depending on the onset, duration, and severity.<sup>1,2</sup> Risk factors have included occupational posture, depressive moods, obesity, gender, and age, and risk is most likely affected by a combination of several of these variables.<sup>2</sup> Low back pain is not a disease but rather a group of signs and symptoms that affects all age groups across the lifespan. It has been shown to be more common from age 35 to 55, with a higher prevalence in women.<sup>2,3</sup>

The World Health Organization anticipates that as the world population ages, the incidence of LBP will increase substantially and become 1 of the leading conditions for which the aging population will seek out medical intervention.<sup>2</sup>

Acupuncture may help improve quality of life as well as reduce lost workplace productivity through more effective and sustained pain relief.<sup>4,5</sup> Stimulating nerves located in muscles and other tissues with the application of fine needles may lead to the release of endorphins and other neurohumoral factors.<sup>6</sup> The expected result is a change in pain processing between the brain and spinal cord.

Acupuncture has demonstrated efficacy in reducing inflammation by promoting the release of vascular and immunomodulatory factors and increasing local microcirculation.<sup>6,7,8</sup>

**Table 1. Results of Initial Physical Examination**

Lumbar AROM flexion: 50° with pain both during movement and at end range
Lumbar AROM extension: 10°
Lumbar AROM lateral flexion: 20° bilaterally
Lumbar AROM rotation: 5° to 10° bilaterally
Bilateral lower extremity strength: grossly 4/5
Lower abdominal/back extensor strength: 3+/5
Palpation: left to right lumbar paraspinal, left piriformis, left hamstring: 2+ tenderness (scale 0 to 3+) with increased hypertonicity

AROM, Active range of motion.

In turn, this may support better joint movement and relief of muscle stiffness as well as aid the healing of swelling and bruising.<sup>6,7</sup>

While the evidence for acupuncture remains inconclusive, there are a growing number of studies offering clinical support for the benefits of using acupuncture to address LBP.<sup>6-10</sup> In this case review, the pain relief achieved by fascial manipulation was demonstrated through the release of superficial stagnation in the tendino-muscular channels that are responsible for pain; this process has been correlated to benefits in the deeper muscular layers and related meridians.<sup>11,12</sup> We used Master Tung points in a special 3-needle arrangement called Dao Ma, in conjunction with a method called Dong Qi (movement Qi) in which the needle is manipulated as the patient exercises the affected area.<sup>13</sup>

We found that acupuncture's overall therapeutic effects help in reducing the use of medication for back complaints, providing a more cost-effective treatment over a longer period of time (eg, at least 2 years).<sup>5,6,9</sup>

### Case History

A 28-year-old patient came to the Farmingdale acupuncture clinic in December 2014 with low back pain radiating down his left leg due to disc herniation. It had started 4 months

prior when he sneezed and suddenly felt intense pain in his mid-back in the T11-T12 area. After this episode, he had 18 to 20 sessions of combined physical therapy and chiropractic treatments, as well as 2 epidural injections. The patient reported not only that these treatments were not effective in eliminating his pain but also that physical activity and bending forward while sitting made it worse. At the time of the first treatment at our center, the pain was being controlled by over-the-counter medications, including ibuprofen, naproxen (Aleve), meloxicam, and topiramate, which were taken as needed.

### Musculoskeletal Evaluation

The patient reported pain at 7, using a numeric 1 to 10 pain rating scale. The patient complained of functional limitations, including bending forward, lifting, and sitting for periods longer than 15 to 20 minutes due to increased lower back, left buttocks, and left posterior thigh pain (Table 1).

### Testing and Diagnosis

Magnetic resonance imaging (MRI) scans and myelograms of the lumbar spine and thoracic spine were ordered by an orthopedist. The first MRI of the lumbar spine, taken in October 2014, revealed a posterior disc herniation on the ventral surface of the cord,

disc dehydration, and diminished disc space height. There was a Schmorl's node (protrusion) located posterior to the inferior T11 endplate. In addition, at L4-L5 a posterior annular disc bulge pressed upon the ventral thecal sac with evidence of disc hydration. At L5-S1, there was a posterior right-sided, subligamentous disc herniation impressing the right ventral epidural space and right S1 nerve root as it approached the lateral recess. Also, mid-facet hypertrophic changes were noted at both L4-L5 and L5-S1.

Transitional vertebrae were evidenced at the lumbosacral junction as a large ventral extraradial defect was detected at T11-T12. In the same location, a large herniation with a subligamentous extrusion was evident on a post-myelogram computed tomography (CT) scan. There was compression of the distal cord and the proximal portion of the conus medullaris with the herniation at the midline without a lateralized fragment.

A small herniation also was noted at L4-L5 and L5-S1 with a mild sac effacement contained within the ventral epidural fat situated further to the right. The imaging findings as well as the patient's initial description of his pain led to an orthopedic physician diagnosis of multilevel herniated discs at T11-12, L4-5, L5-S1.

### Assessment Using Traditional Chinese Medicine

In addition to imaging tests, we relied on the 4 pillars of traditional Chinese medicine (TCM) in evaluating the patient's overall constitution and chief complaint. Observation was a powerful tool used for diagnostic purposes (Side bar).<sup>10</sup>

With the information gathered from the diagnostic pillars, a quantitative integration was gathered to get to the root of the problem.



### Side Bar

## Four Pillars of Traditional Chinese Medicine

**Looking** at physical attributes such as the face, eyes, gait, and tongue is the first pillar. We examined the map of the tongue as it laid out the internal viscera and details of the tongue such as shape, color, texture, moisture, coating thickness and color, size of the papillae, and movement, as these features can be very revealing.

**Listening** is a second pillar in the evaluation. The patient's voice might offer evidence of a disturbance or irregular pattern.

**Palpation** is the third pillar. For example, the pulse, like the tongue, presents a blueprint of a patient's condition. The left and right side of the radial pulse is laid out into 3 sections (from proximal to distal): qi, guan, and cun. Each pair of organs can be

recognized within each of these positions. Palpating the pulse is an extremely detailed task requiring complete focus to feel for the quality. The pulse has several attributes that serve as a window between the practitioner and the patient, including the depth, strength, consistency, and even the specific movement in which the blood travels through the vessel.

**Asking** is the final pillar, which revolves around 10 essential questions that directly correlate to the patient's overall being and constitution. These questions journey from the chief complaint and project to other life behaviors and inclinations that may encompass tendencies to be either hot or cold (or neither), sweating, gastrointestinal (ie, digestion, urination, bowel movements), sleep quality and quantity, emotional status, energy levels, and pain quality and consistency.

Source: Four Pillars of Chinese Medicine. Available at: <http://www.china.org.cn/english/health/225768.htm>

A summary of the assessment was as follows:

- On self-report, the patient described a tendency to be warm while having an aversion to cold. He was sweaty but not thirsty.
- His digestion was regular, with normal bowel movements, and he had no gas, distention, or bloating.
- He reported undisturbed sleep, averaging 7 hours a night.
- His sense organs and emotional status were assessed as normal. He reported a steady energy throughout the day.
- His pain was described as stabbing and constant and rated between 6 and 7 in the 10-point numeric pain scale.
- The patient's tongue appeared red with a thin white coating and center crack.
- His pulse was very deep (sinking) in both the chi and cun positions and was slippery.

We concluded that the patient was Qi and had blood stagnation.

### Treatment Plan

Based on the diagnosis, the treatment plan was to alleviate the patient's pain by removing the stagnation of Qi and blood. The goal of planned sessions was to reduce pain to as close to 0 as possible while increasing range of motion.

The acupuncture points were selected according to point specificity, needling the right when the symptoms were on the left, needling the opposite end of the channel from where the symptoms were located, and arranging points according to somatotopic arrangement.

Between December 2014 and May 2015, treatment points focused on the urinary bladder and gallbladder, largely to tonify Qi, blood, and yin due to their classical clinical indications (Figures 1).

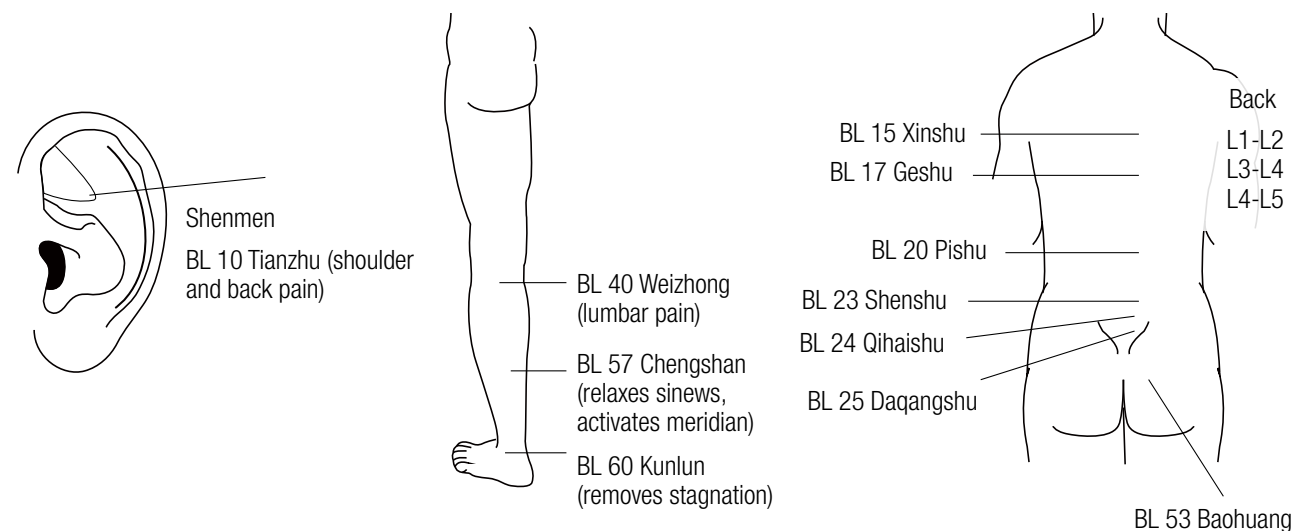
To more efficiently and effectively treat the left posterior thigh symptoms, especially for the bladder (BL) channel,

we were able to reduce the post-treatment symptoms of pain with forward bending and slouching, or slumping and sitting.

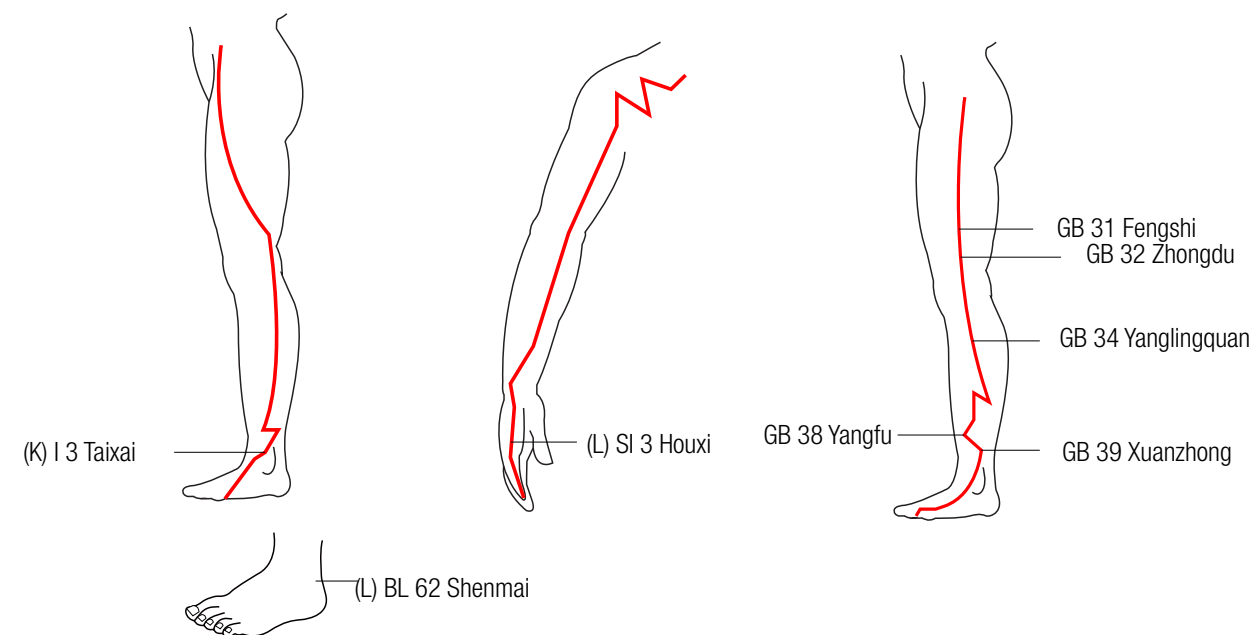
From September 2015 to September 2016, a new set of points were used largely to tonify Qi, blood, and yin due to their classical clinical indications. Also, these points were selected because of their anatomical placement, doubling as local points along the affected channel in the bladder and gallbladder<sup>14</sup> (Figure 2).

### Needling Technique

Qi puncture and fascial manipulation needle techniques were applied, using traditional Qi puncture or triple puncture with a 2-needle technique where 1 needle is placed in the center and 2 needles are placed on the sides. This technique has been used most often to treat areas of deep muscle tenderness. In contrast, fascial manipulation is presented by using a 3-cun needle inserted



**Figure 1.** illustration of bladder (BL) acupuncture points used in phase 1 treatment. The prescription was formulated because of their anatomical placement, in the bladder (BL) and spleen, doubling as local points along the affected channel to tonify the kidney Qi and Yin.



**Figure 2.** Illustration of gallbladder (GB), small intestine, and kidney meridians (K) acupuncture points used in phase 1 treatment.

**Table 2. Phase 1 Treatment--Points selected to tonify Qi, blood and yin due to clinical indications for back pain--bladder (BL) and gallbladder (GB). (See Figure 1 for body locations)**

BL 10 Tianzhu	(Activates the meridian, relieves pain)
BL 15 Xinshu	BL 57 Chengshan
BL 20 Pishu	BL 60 Kunlun
BL 23 Shenshu	GB 31 Fengshi
BL 24 Qihaihu	GB 32 Zhongdu
BL 25 Daqiangshu	GB Yangfu
BL 40 Weizhong	GB Xuanzhong
BL 53 Baohuang	
Classical pair of points used to open up the Taiyang zone of the body where pain is [small intestine (SI)]: Left SI 3 Houxi and BL 62 Shenmai	
The following point is used to tonify the kidney (KD): 3 Taizi Auricular points, located in the ear—Homunculi theory--correspond to body pain: [EAR]	
Hua Tuo Jiaji points are used to activate the sympathetic nervous system, to promote better circulation: L1-2 L3-4 L4-5	
Extra points are located anatomically in the affected areas: Yao yan Ashi (lower back and left buttocks)	
The 4 Gates, remove stagnation and improves Qi Right LR 3; LI 4	
Master Tung points: 33.08 Shu Wu Jin 33.09 Shou Qian Jim A.04 Sanchansan	

into the superficial fascia overlying a taut or tender band of muscle tissue at a depth of ¼-inch to ½-inch. The needle was then gently bowed and the handle twirled until a mild sensation—warmth or vibration—was achieved and radiated distally away from the point of insertion.

The patient received this treatment (phase 1) at a frequency of 1 to 2 times every week from December 4, 2014, to May 5, 2015, followed by phase 2 treatment consisting of once weekly visits for nearly 1 year after resuming in September 2015.

**Treatment Results**

During phase 1 treatment, pain in the patient’s lower back, left buttocks, and posterior thigh, on average, decreased from 7 to 2 on a 10-point numerical pain scale.

The patient reported that the treatment both with and without electrostimulation was more effective than the previous physical therapy and spinal injections that he had received. The patient stopped treatment in May 2015 and resumed acupuncture in September 2015, continuing for 1 year.

Upon initiating phase 2 acupuncture (Table 3), the patient reported continued pain in his left lower back and upper buttocks with left lateral upper thigh pain, especially when bending forward. The pain was 5 out of 10 on the numerical pain scale. Acupuncture treatment in this phase emphasized fascial manipulation and the use of Master Tung points to address the pain in the left buttocks and hamstring muscles.<sup>12,13</sup> This treatment reduced the patient’s pain to approximately 0 to 2 on the 10-point numeric pain scale between treatment periods, during which Bob admitted sitting in a slouched position both with and without his feet elevated.

**Discussion**

This case illustrated an effective use of facial needle manipulation and Master Tung acupuncture to treat low back pain/lumbar radiculopathy caused by local Qi and blood stagnation in the Taiyang channel. Stagnation or blockage was relieved through the use of different acupuncture needling techniques to enhance the circulation of

Qi and blood throughout the myofascial system.

Given the efficacy achieved in this patient, we repeated this modality of treatment in other patients who complained of similar pain; they also reported relief (unpublished data).

The treatment approach addressed pain stemming from the sciatic nerve and how its distribution was anatomically a source of pain from the L4 to S3 segments of the sacral plexus. The sciatic nerve has 2 branches: the tibial nerve, which travels down the posterior compartment of the leg into the foot, and the common peroneal nerve (also called the common fibular nerve), which travels down the anterior and lateral compartments of the leg into the foot.

Research in Western medicine has begun to correlate the fascial anatomy planes throughout the body with the 12 main acupuncture meridians in TCM, in particular of the tendinomuscular channels. Thomas Myers described 7 myofascial meridians that coincide with the 12 regular channels/tendinomuscular channels in TCM theory.<sup>15</sup>

In Myers’s theory, tracks, or lines of pull through the fascia, are made from myofascial or connective tissue units and show a continuity of fascial fibers.<sup>15</sup> These tracks must be delivered in a straight line or change direction only in a gradual manner.

In this patient, the superficial back line (SBL) in Myers’s system coincided with the Taiyang tendinomuscular channel in TCM. Therefore, fascial needle manipulation was performed on the midline of the hamstrings (a main component of the SBL and Taiyang channel) in the region of BL 36 and BL 37.

In the Anatomy Trains concept—a map of the whole-body fascial and myofascial linkages—muscle attachments, or stations, were placed where underlying fibers of the muscle’s epimysium or tendon were enmeshed or were continuous with the periosteum of the accompanying bone.<sup>15</sup> The more superficial fibers of the myofascial unit may, however, run on and communicate with the next piece of myofascial track. The SBL, like the Taiyang channel, connects and protects the entire posterior surface of the body from the

bottom of the foot to the top of the head in 2 pieces: toes to knees and knees to brow. With the knees extended, as in standing, the SBL functions as one continuous line of integrated myofascia.

In comparison, the Luigi Stecco approach recommends that the fasciae of the limbs and trunk are divided into the superficial fascia, deep fascia, and epimysial fascia.<sup>13</sup> To be effective, the fascial needle manipulation occurs at the superficial fascial layer, including the membranous layer of the hypodermis and the deeper loose connective tissue layer. This needle technique also involves the deep fascial layer, more specifically the 2 most superficial layers of the deep fascia, known as the undulated collagen fibers and the aponeurotic collagen fibers.

The functional application of Stecco's Fascial Manipulation system is important to note because it correlates the fascial centers of coordination and fusion with the individual acupuncture points on each channel.<sup>13</sup> The center of coordination refers to a single point of reference from which muscle fibers synchronize to collectively move a joint in 1 direction. The center of perception extends over a moving joint and correlates to a specific center of coordination. For example, Stecco said, "When the fascia overlying a center of coordination becomes fibrotic, uncoordinated movement results, leading to irritation of the articular nociceptors, thereby creating pain in a joint (ie, the center of perception)."<sup>13</sup>

In addition, Master Tung theory relies on many points not found in the dominant systems of TCM.<sup>14</sup> Distribution of the points includes the entire body, but the points are arranged topographically by an anatomical zonal concept where each zone functions as a microsystem and has points that affect the entire body.<sup>14</sup>

In the case study, the affected area was not needled. The Master Tung system

of effective point selection is based on 3 types of correspondence: (1) image correspondence (diseased body area); (2) channel correspondence (diseased channel); and (3) tissue correspondence (diseased tissue).<sup>14</sup>

In comparison to these parallels made between the Western fascial system and TCM theory, the Master Tung system and theory was also applies.<sup>14</sup> The most effective application observed was the use of the large Taiji arm-leg correspondence where the right shoulder was used to treat the left lower back and left buttocks/posterior hip symptoms. Specifically, the point Jian Zhong (R 44.06), at the midpoint of the middle deltoid on the right shoulder, was needled and manipulated during seated active range of movement (AROM) of left knee extension/flexion, which routinely reduced pain from 1 to 2 to a post-treatment rating of 0 out of 10. This is the clearest example of the efficacy of the use of the Master Tung system.

### Conclusion

The reduction in pain reported by the patient, achieved with a combination of Master Tung points, myofascial needle manipulation, and Qi puncture-style acupuncture, demonstrates the efficacy of managing the symptoms that had previously adversely affected the patient's quality of life.<sup>13-15</sup> Thus, it is an option worth offering to patients with chronic low back who have not found relief with other therapeutic methods.

At end of treatment, the patient reported pain of 0 to 2 out of 10 on the 10-point numeric pain rating scale. He will continue to receive acupuncture treatment to manage any future low back pain. The patient's prognosis is good and considered improving based on the reduction of pain symptoms. ■

**Authors' Bios** Joseph Montalto, MPT, is sole proprietor of Montalto Physical Therapy, PC, in Oyster Bay, New York.

*Prior experience includes being manager/director at Physiologic Physical Therapy, PC, in Syosset, New York, and manager of a satellite office for Orthopedic Physical Therapy Associates, PC, in Great Neck, New York. He holds a master's degree in physical therapy from Touro College, Dix Hills, New York, and Bachelor of Science degree in biology from Molloy College, in Rockville Centre, New York. He is board certified in orthopedics.*

*Josephine Fan, MS, is owner of Long Island Aikikai in Bay Shore, New York, one of the oldest martial arts schools in the country. Until 2012, she was president of BC Fan & MC Peng Memorial Nature and Humanity Foundation, a family-owned nonprofit organization dedicated to serving the environment and its inhabitants. Before that, she was an account manager for Dynamic Decisions, Inc, a government-contracted IT company. She passed the National Certification Commission on Acupuncture and Oriental Medicine exams and is awaiting approval of her application for certification. She graduated from the New York College of Traditional Chinese Medicine (NYCTCM) with a master's degree in health science/acupuncture and a bachelor's degree in business management (management and operations) from Stony Brook University.*

*Jenny Lam is in the process of taking the National Certification Commission on Acupuncture and Oriental Medicine exams. She completed the program in acupuncture from NYCTCM and holds an MBA in finance from the Stern School of Business as well as a Bachelor of Science degree in neural sciences from Brown University.*

*Ryan Rojas has been a massage therapist since 2011, providing a wide variety of services, including Swedish massage, Asian massage, deep tissue massage, reflexology, medical massage, chair massage, cupping, Reiki, body scrub, and hot stone massage. He earned a certificate in acupuncture from NYCTCM, and a*

Table 3. Acupuncture Points Used in Phase 2 Treatment	
Bladder (BL) acupuncture points (also used in Phase 1 treatment, Figure 1)	
BL 10 Tianzhu:	Clinically indicated for shoulder and back pain.
BL 40 Weizhong:	The lumbar command point and therefore indicated for lumbar issues such as pain, sprains, and strains.
BL 57 Chengshan:	Relaxes the sinews and activates the meridian; clinically indicated for lumbar issues.
BL 60 Kunlun:	Removes stagnation from the meridian; clinically indicated for lower back pain.
These gallbladder (GB) points smooth the flow of Qi and benefit the meridian	
GB 20 Fengchi:	Meeting point of the gallbladder, Sanjiao, and Yang Wei meridians; activates the channel and relieves pain down the back. Also clinically used to dispel wind.
GB 25 Jingmen:	Clinically indicated for pain in the lumbar or lateral costal region, especially when there is an underlying kidney Qi deficiency.
GB 26 Daimai:	The meeting point of the gallbladder and Dai Mai channel; activates the meridian and relieves pain in the lumbar region.
GB 31 Fengshi:	Clinically indicated to activate the meridian to relieve lower back pain and leg muscle pain.
GB 34 Yanglingquan:	Classically indicated as the influential point of the tendons, therefore benefitting sinews, muscles, and joints.
The following pair of points is the classical extraordinary pair used to open up the Taiyang zone of the body, where the pain is located:	
(L) SI 3 Houxi:	Confluent point of the Du channel. Activates the channel, relieves pain in the back.
(L) BL 62 Shenmai:	Master point of the Yang Qiao (Yang Motility) channel; clinically indicated to relax the sinews.
Master Tung points are arranged topographically by an anatomical zonal concept where each zone functions as a microsystem and has points that affect the entire body:	
(R) 44.06 Jian Zhong:	Indicated for pain and issues in the lower back and posterior hip.
The following points were stimulated using the fascial needle technique to activate the fascia of the posterior thigh and leg:	
BL 32 Ciliao:	The meeting of the bladder and gallbladder channel. Clinically indicated for the lumbar region and the legs, relieving pain, numbness, and stiffness of those affected areas.
BL 36 Chengfu:	Activates the channel and relieves pain. Clinically indicated for pain in the lower back and gluteal region.
BL 37 Yinmen:	Benefits the lumbar area and is indicated for lumbar pain, as well as pain, numbness, and weakness of the lower extremities.
Auricular points are located on the ear, which correspond anatomically (Homunculi theory) to parts of the body.	
Shenmen:	Translated as the Neurogate, or the point used for general pain relief and energy, indicated to bring balance to the body.
Auricular:	Indicated for issues of the back

*certificate in massage therapy from the New York College of Health Professions, Syosset, New York. He holds a Bachelor of Science degree in computer science from Nassau Community College in Garden City, New York.*

*Ryan Whelan, LMT, is a licensed massage therapist motivated by the promotion*

*of holistic health, medicine, and practice. He has extensive experience, enabling him to bring a full range of skills using modalities of both Eastern and Western medicine to capably attend patients' specific needs. He holds a master's degree in health science (acupuncture) and a bachelor's degree in professional studies from NYCTCM.*

*Bin Xu, MD, PhD, who is board certified in acupuncture, has been a clinical supervisor at NYCTCM since 1999. Prior to that, he was a medical acupuncturist at the University Hospital Medical Center/SUNY at Stony Brook where he was part of a multidisciplinary team caring for children, women, and*

families with HIV/AIDS. He was a cancer research scientist at the International Bioimmune System laboratory in Great Neck, New York. He received a master's degree in medicine from Harbin Medical University, China, and earned a diploma of acupuncture and traditional Chinese medicine from the University of Heilongjiang, China. He earned a PhD in medicine and microbiology from Kanazawa Medical University, Japan. He completed a postdoctoral fellowship in the Department of Physiology & Biophysics at SUNY, where he conducted research on the effect of natural herbal inhibitors on oncogenic tyrosine kinases. Dr. Xu is the recipient of the Japan International Education Award.

Audrey Krapf, RN, MBA, has been director of the Health and Wellness Center at Farmingdale State College, Farmingdale, New York, since 1989. Prior to that, she was a nurse at the SUNY College of Technology, Farmingdale,

New York, and a registered nurse at Syosset Hospital, and South Nassau Communities Hospital, Oceanside, New York. She received a MBA from Dowling College, Oakdale, New York, and a Bachelor of Science degree in community human services from Empire State College in Old Westbury, New York. In addition, she is a pharmacy technician and is certified as a body movement and holistic health specialist. She is a labor relations specialist, with training from the Cornell University Institute of Labor Relations. Ms. Krapf received the NYSCHA Susan Shearer Award for leadership, commitment, and enthusiasm in college health in 2003.

Rosemary McCarthy, RN, BS, has more than 20 years of progressive supervisory experience in a wide array of health care settings, including medical, surgical, telemetry, and rehabilitation in both hospital and college health settings. She is currently associate director of the Health

and Wellness Center at Farmingdale State College (SUNY) in Farmingdale, New York. Prior experience includes being a registered nurse at North Shore Glen Cove Hospital in Glen Cove, New York, and at Mercy Medical Center in Rockville Centre, New York. She holds a bachelor's degree in health and human services from Empire State College in Farmington, New York.

These authors have no conflicts of interest.

**Acknowledgments:** We thank all of the NYCTCM interns who participated in the treatment of the patient's low back pain at the Farmingdale Health & Wellness Center. Each intern has provided an equal contribution to the writing of this paper. NYCTCM and the students interning at the Health & Wellness Center would like to thank the nursing and medical staff that supported us in completing this case study.

## References

- Ehrlich GE. Low back pain. *Bull World Health Organ*. 2003;81(9):671-676.
- Zhang J, Shang H, Gao X, Ernst E. Acupuncture-related adverse events: a systemic review of the Chinese literature. *Bull World Health Organ*. Available at: <http://www.who.int/bulletin/volumes/88/12/10-076737/en/>. Accessed October 10, 2016.
- Meucci RD, Fassa AG, Fariol NMX. Prevalence of chronic low back pain: systematic review. *Rev Saude Publica*. 2015;49:1-10.
- Steffens D, Ferreira ML, Latimer J, et al. What triggers an episode of acute low back pain? A case-crossover study. *Arthritis Care Res (Hoboken)*. 2015;67(3):403-410.
- Sawazaki K, Mukaino Y, Kinoshita F, et al. Acupuncture can reduce perceived pain, mood disturbances and medical expenses related to low back pain among factory employees. *Ind Health*. 2008;46(4):336-340.
- Sherman KJ, Coeytaux RR. Acupuncture for the treatment of common pain conditions: chronic back pain, osteoarthritis, and headache. *J Clin Outcomes Manag*. 2009;16(5):224-230.
- Sherman KJ, Cherkin DC, Ichikawa L, et al. Characteristics of patients with chronic back pain who benefit from acupuncture. *BMC Musculoskelet Disord*. 2009;10(1):114.
- Zhao Z. Neural mechanism underlying acupuncture analgesia. *Prog Neurobiol*. 2008;85(4):355-375.
- Yuan J, Purepong N, Kerr DP, et al. Effectiveness of acupuncture for low back pain: a systematic review. *Spine*. 2008;33(23):E887-900.
- Four pillars of Chinese Medicine. Available at: <http://www.china.org.cn/english/health/225768.htm>. Accessed October 5, 2016.
- Lewis K, Abdi S. Acupuncture for lower back pain: A review. *Clin J Pain*. 2010;26(1):60-69.
- Stux G, Hammerschlag R, eds. *Clinical Acupuncture: Scientific Basis*. New York: Springer Berlin Heidelberg; 2009.
- Stecco L, Stecco C. *Fascial Manipulation: Practical Part*. Padova, Italy: Piccin Nuova Libray; 2009.
- McCann H, Ross HG. *Practical Atlas of Tung's Acupuncture*. 4th ed. Munich, Germany: Verlag Muller & Steinicke; 2015.
- Myers, TW. *Anatomy Trains: Myofascial Meridians for Manual and Movement Therapists*. 3rd ed. Philadelphia, PA: Churchill Livingstone Elsevier; 2014.