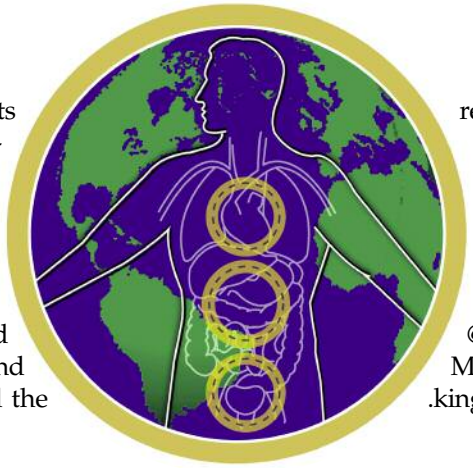
JAOA THE SOMATIC CONNECTION



"The Somatic Connection" highlights and summarizes important contributions to the growing body of literature on the musculoskeletal system's role in health and disease. This section of *JAOA—The Journal of the American Osteopathic Association* strives to chronicle the significant increase in published research on manipulative methods and treatments in the United States and the renewed interest in manual medicine internationally, especially in Europe.

To submit scientific reports for possible inclusion in "The Somatic Connection," readers are encouraged to contact *JAOA* Associate Editor Michael A. Seffinger, DO (mseffinger@westernu.edu), or Editorial Board Member Hollis H. King, DO, PhD (hollis.king@fammedwisc.edu).

"How much lymph can a lymph pump pump if a lymph pump can pump lymph?"

—Norman Gevitz, PhD[1]

Schander A, Downey HF, Hodge LM. Lymphatic pump manipulation mobilizes inflammatory mediators into lymphatic circulation. *Exp Biol Med*. 2012;237(1):58-63.

As a challenge to osteopathic manipulative treatment (OMT) researchers, Norman Gevitz, PhD, has suggested that lymphatic pump techniques (LPTs) are high data-yield applications.[1] In recent clinical trials, LPTs have shown benefits for hospitalized patients with pneumonia.[2] However, the greatest advances in demonstrating the effects of LPT have been made in studies of animal models. The breakthrough study in this field, published by Knott et al[3] in *JAOA—The Journal of the American Osteopathic Association* in 2005, showed that lymph flow in dogs was increased by LPT. Subsequent research in the same laboratories, at the University of North Texas Health Science Center in Fort Worth, has shown that LPT in dogs increases leukocyte count in thoracic duct lymph,[4] and that a primary source of these leukocytes is gut-associated lymphatic tissue.[5]

The study by Schander et al—the most recent publication in this line of research—measured a number of inflammatory mediators in dogs before, during, and after LPT. Twelve unconscious, healthy, mongrel dogs were used in this study. Six of the dogs had catheters inserted into the thoracic lymphatic duct (TLD), and the other 6 dogs had catheters inserted into the mesenteric lymphatic duct (MLD). One hour after cannulation, lymph was collected during a 4-minute pre-LPT period, during a 4-minute LPT period, and during a 10-minute post-LPT period. The dogs were in the right lateral recumbent position during LPT, and the hands of the operator (an osteopathic physician) were placed bilaterally just below the costodiaphragmatic junction. Manual force was directed medially and cranially to compress and then release the abdomen at a rate of about 1 compression per second.

The outcome measures were lymph flow; cytokine/chemokine flux (ie, the rate of flow multiplied by the concentration of the cytokine or chemokine, as a way to describe the distribution of these substances in circulation); and the concentrations of proinflammatory cytokines and chemokines—including interleukin 6 (IL-6), IL-8, IL-10, monocyte chemotactic protein-1 (MCP-1), and keratinocyte chemoattractant (KC)—for both the TLD and MLD collections. In addition, superoxide dismutase and nitrotyrosine were collected for the TLD.

The results showed that, as indicated in previous studies, LPT transiently increased the flow of lymph during the active LPT procedure for both the dogs that had catheters inserted into the TLD and the dogs that had catheters inserted into the MLD. Although there was a general increase in the concentrations of cytokines and chemokines during the LPT procedure, compared with the pre- and post-LPT periods, only the MCP-1 level was increased to a statistically significant amount in the TLD dogs. In the MLD dogs, LPT was associated with a statistically significant increase in IL-8 and MCP-1. However, when cytokine/chemokine flux was measured, IL-6, IL-8, IL-10, MCP-1, and KC were found to be increased to statistically significant levels by LPT in both the TLD and MLD dogs. Furthermore, in the TLD dogs, superoxide dismutase and nitrotyrosine flux were increased to statistically significant levels by LPT.

As a "treatment provider" in earlier studies conducted at the University of North Texas Health Science Center,[4,5] I perceived dogs' responses to LPT to be very much like those of humans, lending credibility to the generalizability of the animal data to the human condition. Immune system functions in dogs and humans are similar enough to expect that, in response to LPT, levels of cytokines and chemo-

kines in humans would respond similarly to the canine levels of cytokines and chemokines reported by Schander et al. However, advances in technology, such as lymphatic flow imagery, are needed to measure these types of responses to LPT in humans.

The authors state, "LPT may enhance protection against infection by increasing mesenteric-derived inflammatory mediators in circulation, enabling the re-distribution of these mediators to other tissues." The single caveat is that the LPT used in the Schander et al study was performed on healthy dogs, and the impact of LPT on dogs or humans with identifiable disorders remains to be determined.

For researchers who work according to the osteopathic tenet that the body is self-regulatory and self-healing, this study, as well as the general line of research it represents, is an excellent example of how OMT supports this tenet. In my own clinical practice, I have often described this line of research when treating a patient who had an infection or who was in need of immune system enhancement, as a way of encouraging the patient's bodily response and receptivity to OMT, including LPT.—H.H.K.

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Myofascial Release Therapy's Effect on Immune System in Breast Cancer Survivors Modulated by Positive Attitude

Fernández-Lao C, Cantarero-Villanueva I, Díaz-Rodríguez L, Fernández-de-las-Peñas C, Sánchez-Salado C, Arroyo-Morales M. The influence of patient attitude toward massage on pressure pain sensitivity and immune system after application of myofascial release in breast cancer survivors: a randomized, controlled crossover study. *J Manipulative Physiol Ther*. 2012;35(2):94-100.

Osteopathic manipulation has been shown to significantly decrease pain in several patient populations,[1] enhance the immune system in animals,[2] and increase salivary immunoglobulin A (IgA) levels in humans.[3] Myofascial release (MFR) is a type of osteopathic manipulative treatment or therapy technique used to manage somatic dysfunction in which the osteopathic physician or osteopath engages the patient's myofascial tissues with his or her hands using a sustained force. This force is adjusted on the basis of continual palpatory feedback to achieve release of tension in the myofascial tissues. Robert C. Ward, DO, and others introduced the term "myofascial release" in educational settings in the early 1980s, although the technique was based on methods pioneered by the founder of osteopathic medicine, Andrew Taylor Still, MD, DO.[4] For the past 30 years, John F. Barnes, PT, and others have popularized MFR among physical therapists and other manual therapists.[5] In this study, researchers from Spain considered not only the efficacy of MFR as taught by Barnes and performed by a manual therapist, but also the influence of the patient attitude toward massage on pressure pain sensitivity and immune effects in breast cancer survivors.

Inclusion criteria were as follows: a diagnosis of breast cancer (stage I to stage IIIA), age of 25 to 65 years, completion of coadjuvant oncology treatment, and moderate to high fatigue during the preceding week. Patients were excluded if they received chemotherapy or radiotherapy at the time of the study. A sample size of at least 16 participants was determined on the basis of "detecting between-sessions clinical differences of 20% on PPT [pressure pain sensitivity] (with an α level of .05), a desired power of 80%, and an estimated interindividual coefficient of variation of 20%."

The researchers recruited 20 female breast cancer survivors (mean [standard deviation] age, 49 [8] years) who were at least 1 year out of coadjuvant treatment with a combination of radiation or chemotherapy or radiotherapy after either lumpectomy (70%) or mastectomy (30%). In addition, 16 women (80%) were taking estrogen receptor antagonist or aromatase inhibitor drugs; 2 (10%) were taking monoclonal antibody HER2; and 3 (15%) were taking analgesics (ibuprofen or acetaminophen).

For the treatment group, an experienced therapist administered an MFR protocol that included "longitudinal strokes, J stroke, sustained suboccipital pressure, frontalis bone spread, and ear pull technique." The 40-minute treatment was confined to the neck and shoulder areas, with the duration adjusted at the therapist's discretion, using the participant's tissue response. The control group received a 40-minute educational session on healthy lifestyles, emphasizing nutrition, relaxation techniques, or physical exercise. Three weeks after receiving an intervention, each participant crossed over to receive the other intervention.

Participants were seen at the same time of the day on 2 occasions separated by 3 weeks. At each session, they received either the MFR protocol or control intervention. Salivary flow rate, cortisol and IgA concentrations, and α-amylase activity from saliva samples were obtained before and immediately after interventions. Pressure pain thresholds over the cervical spine and temporalis muscles were assessed bilaterally. The attitude toward massage scale was collected before the first session.

Analysis of covariance revealed that the only statistically significant change from the MFR protocol was an increase in the salivary flow rate (P=.010). The other parameters were not changed significantly by either intervention. However, when the attitude toward massage scale was included in the analysis, participants with a positive attitude toward massage had statistically significant increases in saliva IgA levels (P=.001), but the other parameters were not significantly affected.

The novel aspect of this study is the inclusion of the patient's attitude toward manual therapy (eg, massage), with a positive attitude correlated to increased immune activity. However, there are several limitations for osteopathic physicians and osteopaths to consider. Confining the protocol to specific body regions (ie, head and neck) precluded a total structural examination of the musculoskeletal system for other areas of somatic dysfunction and selection of treatments appropriate to manage those dysfunctions. Thus, the MFR protocol may not have included the techniques needed to treat patients' unidentified somatic dysfunctions that may have been related to their pain pressure sensitivity and fatigue. Osteopathic physicians and osteopaths often combine manual procedures when managing pain or immune system dysfunctions. For a patient population similar to this study's, osteopathic physicians and osteopaths might have used MFR combined with techniques such as counterstrain, muscle energy, balanced ligamentous and membranous tension, facilitated positional release, and lymphatic drainage techniques.

Thus, the manual therapy protocol used in this study bears the same name as an osteopathic manipulative treatment technique but shares little else. The restricted use of MFR by this study's therapist, patterned after the Barnes approach, could not significantly decrease pain or stress hormone levels, nor increase IgA immune activity. Since it cannot be recognized as the same procedure used by osteopathic physicians or osteopaths, it should not be considered as the definitive study on the issue of whether MFR techniques in general benefit this patient population. It is imperative that we as osteopathic physicians and osteopaths conduct our own investigations into the efficacy of manual procedures because we cannot rely on other health professionals who reinterpret our procedures. Myofascial release as used by various practitioners is not the same procedure in spite of the same name, and determining the true benefit of this or any of our other manual procedures will require further studies.—M.A.S.

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Myofascial Trigger Point Massage Reduces Pain of Chronic Tension-Type Headache

Berggreen S, Wiik E, Lund H. Treatment of myofascial trigger points in female patients with chronic tension-type headache—a randomized controlled trial. *Adv Physiother*. 2012;14:10-17.

Danish physiotherapy researchers conducted a randomized controlled trial in which the intervention was trigger point massage. Patients were recruited from the public and examined by a general practitioner, who determined if the individual met the criteria for chronic tension-type headache (CTTH) established by the International Headache Society (ie, headaches occurring at least 15 days per month).

Exclusion criteria were pregnancy, monthly migraine of more than 24 hours, head pain associated with dental and jaw disorders, use of morphine or large amounts of analgesics, chronic sinusitis, headaches beginning at the same time as another disease or accident, serious psychological disorder, very high blood pressure, and other physiotherapy. The authors state, "The prevalence of CTTH is higher among women, which together with the possibility of a gender difference was the reason for including only female participants."

Trigger point assessment followed *Travell & Simons' Myofascial Pain and Dysfunction—The Trigger Point Manual, Volume 1, Upper Half of Body* (Baltimore, MD: Williams & Wilkins; 1999). For each patient in the treatment group, trigger point locations were determined, and only active trigger points were documented and manipulated. The same physiotherapist performed all assessments and treatments. Because the number of trigger points varied among patients, the time-to-treat varied depending on the individual. Each patient was scheduled to receive 10 treat-

ments. An intent-to-treat analysis was performed because a few patients did not complete all 10 treatments.

There were 20 patients in the treatment group and 19 in the control (ie, no treatment) group. Individuals in the control group were offered the treatment at the completion of the study. The outcome measures were pain as rated on a 100-mm visual analog scale (VAS), number of trigger points, medicine consumption, and results on the McGill Pain Questionnaire and the Short Form (SF-36) Questionnaire.

Treatment consisted of ischemic compression (held 30 to 60 seconds at a time for each tender point for a period of 2 to 5 minutes), followed by muscle stretching. Each patient was treated approximately once a week for 10 weeks.

The results showed that patients in the treatment group had statistically significant lower VAS ratings in the early morning, as well as a statistically significant reduced number of trigger points. None of the other measures were significantly different between the treatment and control groups. The early morning VAS is considered the most reliable measure for pain, because it occurs after a night of sleep and presents a consistent measure.

The Berggreen et al study was selected for review because of the high prevalence of tension headaches in the practices of osteopathic physicians, as in my clinical experience. Furthermore, the technique of ischemic compression and muscle stretching is commonly taught in osteopathic manipulative medicine courses. As an osteopathic physician, I have used the techniques described in this study. It is encouraging to see that there is an evidence base for these techniques that can be communicated to patients. However, suboptimal components of the ischemic compression technique are that it is time consuming and that it requires very strong fingers—requirements that can compromise the use of other applications of osteopathic manipulative treatment throughout a busy day of osteopathic medical practice.—H.H.K.

Massage Shown to Benefit Patients With Chronic Low Back Pain

Cherkin DC, Sherman KJ, Kahn J, et al. A comparison of the effects of 2 types of massage and usual care on chronic low back pain: a randomized, controlled trial. *Ann Intern Med*. 2011;155(1):1-9.

Researchers in Seattle, Washington, with access to a large patient population in the Group Health Cooperative screened 1161 respondents (recruited through advertisements in the cooperative's magazine) who had chronic low back pain documented in their medical records. Chronic low back pain was defined as low back pain lasting at least 3 months without 2 or more pain-free weeks, as well as a pain bothersomeness rating of at least 3 on a scale of 0 to 10. Exclusion criteria were the following: (1) specific causes of back pain, such as cancer or fractures; (2) complicated back conditions, such as sciatica, or medicolegal issues; (3) conditions making treatment difficult, such as paralysis or psychosis; (4) conditions that might confound interpretation, such as fibromyalgia; (5) inability to speak English; (6) massage within the past year; or (7) plans to visit a provider for back pain. A total of 401 patients were included in the study.

Patients were randomly assigned to receive 1 of 2 types of massage (ie, relaxation or structural massage) or usual care. Relaxation massage was intended to induce a state of relaxation and comprised effleurage, pétrissage, circular friction, vibration, rocking and jostling, and holding. Patients receiving relaxation massage could also receive a take-home compact disc about a relaxation exercise to be performed at home. Structural massage was intended to identify and alleviate musculoskeletal contributors to back pain and comprised myofascial, neuromuscular, and other soft-tissue techniques. Patients receiving structural massage could also be recommended a home exercise consisting of psoas stretch. Patients in the usual care group received no special care, but they were paid $50 for participation. Medical records of patients in the usual care group were reviewed to determine the actual care that they received during the study period. Patients in the relaxation and structural massage groups received 10 weekly sessions of massage at no financial cost. The same 27 licensed massage therapists delivered both the relaxation and structural massages in a randomly determined manner.

Primary outcome measures were results of the modified Roland Disability Questionnaire and scores on the symptom bothersomeness scale at baseline and at 10 weeks. Secondary outcomes were these measures at 26 and 52 weeks. The relaxation massage group started with 136 patients and had 130 patients at 10 weeks. The structured massage group started with 132 patients and had 127 patients at 10 weeks. The usual care group started with 133 patients and had 123 patients at 10 weeks. Demographically, the 3 groups were similar. More than 60% of participants were women, and the mean age of participants, in years, was the mid-40s.

Results showed that patients in all groups had improved function and decreased symptoms at 10 weeks. However, the improvements were greater for patients who received either type of massage, compared with patients who received usual care. There was no statistically significant difference between results achieved with either massage. Beneficial effects decreased after 10 weeks, and by 26 to 52 weeks, benefits from massage were not statistically significant.

This study was selected for review to inform readers of *JAOA—The Journal of the American Osteopathic Association* about progress made in other areas of manual medicine and manual therapy. Furthermore, the study was published in a relatively high-impact journal (*Annals of Internal Medicine*). The editors of the journal commented that massage appeared to produce benefits for patients with chronic low back pain in the short term and somewhat longer term (ie, 26 weeks, but not 52 weeks).

Of note is the previously mentioned description of structural massage provided in the article by Cherkin et al. That description makes the structural massage technique appear to be similar to certain manipulative techniques, such as myofascial release and progressive neuromuscular inhibition, that are taught in osteopathic medical school—yet this structural massage technique was no more effective than the relaxation massage technique. It should also be noted that non-DO professionals who use their hands in the delivery of health care—especially massage therapists—are adopting terminology similar to that used in training for osteopathic manual medicine. The question of whether massage therapy is as effective as, or more effective than, osteopathic manipulative treatment is yet to be determined. Nevertheless, there is no doubt that the quality of massage therapy research is often very good, and this research needs to be taken into account by researchers in osteopathic medicine.—H.H.K.

Oropharyngeal Exercises Improve Sleep Apnea

Guimarães KC, Drager LF, Genta PR, Marcondes BF, Lorenzi-Filho G. Effects of oropharyngeal exercises on patients with moderate obstructive sleep apnea syndrome. *Am J Respir Crit Care Med.* 2009;179(10):962-966.

Obstructive sleep apnea syndrome (OSAS) is an increasingly recognized problem worldwide and has been linked to cardiovascular decompensation if left untreated. Patients with OSAS present with complaints of excessive daytime sleepiness, chronic fatigue, snoring, morning headache, and nocturnal arousals. Poorly controlled hypertension, recurrent exacerbations of congestive heart failure, and nocturnal angina are common cardiovascular manifestations of untreated OSAS.[1] These effects are more often associated with severe OSAS, defined by the apnea-hypopnea index (AHI) as greater than 30 apnic events per hour. Severe OSAS is effectively treated with continuous positive airway pressure (CPAP). However, for moderately affected patients (AHI between 15 and 29.9 events per hour), CPAP may not be necessary. Because a major aspect of OSAS is oropharyngeal muscle hypotonicity, strengthening these muscles may benefit patients with moderate OSAS. Researchers in Brazil studied the effect of speech therapy–derived oropharyngeal exercises on OSAS symptoms in patients with moderate OSAS as diagnosed with a standard sleep study.

A total of 31 patients with moderate OSAS, predominantly middle-aged overweight or obese men, were randomly selected for the control or experimental group. Both groups performed a daily 30-minute regimen for 3 months. The control group (n=15; 73% men; mean [standard deviation {SD}] age, 47.7 [9.8] years) was assigned sham therapy. The experimental group (n=16; 63% men; mean [SD] age, 51.5 [6.8] years) was assigned a set of oropharyngeal exercises, which consisted of isometric and isotonic exercises involving the tongue, soft palate, and lateral pharyngeal wall, including functions of suction, swallowing, chewing, breathing, and speech. Sham therapy involved a weekly, supervised, 30-minute session of deep nasal breathing while sitting. The participants were also instructed to perform the same procedure at home once a day for 30 minutes, with nasal lavage of 10 mL of saline in each nostril 3 times daily and recommendation of bilateral chewing with meals. Exclusion criteria were body mass index of 40 or greater, craniofacial malformations, regular use of hypnotic medications, hypothyroidism, previous stroke, neuromuscular disease, heart failure, coronary artery disease, or severe obstructive nasal disease.

Objective measurements included anthropometrics, full polysomnography, and snoring frequency and intensity. Subjective measures included Epworth daytime sleepiness and Pittsburgh sleep quality questionnaires.

No statistically significant change occurred in the control group across all variables. In contrast, patients assigned to oropharyngeal exercises had a statistically significant decrease ($P<.05$) in neck circumference, snoring frequency and intensity, daytime sleepiness, and OSAS severity as defined by AHI, as well as an increase in sleep quality score on the Pittsburgh scale. Furthermore, changes in neck circumference correlated inversely with changes in AHI (r=0.59; $P<.001$). Ten participants (62.5%) in the treatment group shifted from moderate to mild (n=8) or no (n=2) OSAS.

The results of this pioneer randomized clinical trial led the authors to conclude that oropharyngeal exercises significantly reduced OSAS severity and symptoms. Larger population studies are warranted using this research design.—M.A.S.

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Adjunctive OMT May Improve Exercise Capacity for Patients With Severe COPD

Zanotti E, Berardinelli P, Bizzarri C, et al. Osteopathic manipulative treatment effectiveness in severe chronic obstructive pulmonary disease: a pilot study. *Complement Ther Med.* 2012;20(1-2):16-22.

There have been several recent clinical trials that have evaluated the effect of osteopathic manipulative treatment (OMT) or osteopathic manipulative therapy (OMTh) on pulmonary function in patients with chronic obstructive pulmonary disease (COPD). In a 2008 study,[1] researchers at the A.T. Still University-Kirksville College of Osteopathic Medicine in Missouri reported that a multitechnique OMT protocol for patients with COPD resulted in worsening of air trapping for 30 minutes after the OMT session, relative to a sham control group. Following up on those results, in 2009, Noll et al[2] published a study that identified how a particular OMT technique—lymphatic pump with activation—was responsible for the air trapping observed in the first study. In a study reported earlier this year, researchers at a pulmonary rehabilitation institute in Italy assessed the efficacy of OMTh as performed by 3 osteopathic practitioner-students on patients with severe COPD.

A total of 20 stable patients with severe COPD (5 women; mean [standard deviation {SD}] age, 63.8 [5.1] years; mean [SD] forced expiratory volume in 1 second, 26.9% [6.3%] of predicted) were randomly assigned to 2 groups: (1) OMTh plus pulmonary rehabilitation or (2) sham touch plus pulmonary rehabilitation. Osteopathic manipulative therapy techniques were customized to each patient. Sham touch was not described. Pulmonary rehabilitation included individually designed exercise training, educational support, and nutritional and psychological counseling. Treatments were provided 5 days per week for 4 weeks. Exercise capacity was measured using the Borg scale in the 6-minute walk test (primary outcome) and the pulmonary function test (secondary outcome). Outcomes were measured at the beginning and at the end of the interventions.

The results of the 6-minute walk test significantly improved in both groups. Between-group comparison showed a difference of 48.8 m (95% CI, 17 to 80.6; P=.04) farther in the OMTh group. The OMTh group also had a significant decrease in mean (SD) residual volume, from 4.4 (1.5) L to 3.9 (1.5) L. Between-group comparison further delineated the treatment effect of OMTh on residual volume (-0.44 L; 95% CI, -0.26 to -0.62; P=.001). Although the OMTh group experienced an increase of 0.14 L in forced expiratory volume in 1 second (95% CI, 0 to 0.26), there was not a significant between-group difference (0.13 L; 95% CI, -0.66 to 0.9). Authors concluded that OMTh plus pulmonary rehabilitation may improve exercise capacity and reduce residual volume in severely impaired patients with COPD with respect to pulmonary rehabilitation alone. Although this is a pilot study, it is off to an encouraging start, and further research by this group should prove to be quite interesting.—M.A.S.

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