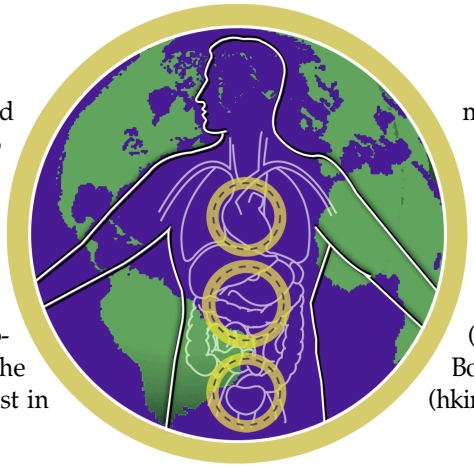
JAOA

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* Editorial Advisory Board Member Michael A. Seffinger, DO (mseffinger@ westernu.edu), or Editorial Board Member Hollis H. King, DO, PhD (hking@atsu.edu).

Manual Therapy for Patients With Fibromyalgia

While osteopathic physicians use osteopathic manipulative treatment procedures in addition to medication and counseling to treat patients with fibromyalgia (*J Am Osteopath Assoc.* 2002;102:321-325), it is currently unknown which manual techniques are best for this patient population.

Turkish researchers Gamze Ekici, PT, PhD, and colleagues—comprising physical therapists, physiatrists, and physiotherapists—conducted the first randomized clinical trial comparing effectiveness of two manual techniques in 53 women with primary fibromyalgia.

Patients were aged 25 years or older with neck or shoulder pain rated 4 or higher on a subjective 10-point visual analog scale. In addition, they were naïve to treatment for primary fibromyalgia. Patients were excluded if they had comorbid conditions or were pregnant or breastfeeding. Patients were asked not to use nonsteroidal anti-inflammatory drugs, myorelaxants, or antidepressants for the duration of the study.

A blinding protocol was used in subject diagnosis, pain assessment, and administration of standard validated surveys before and after the interventions. Subjects were randomly assigned to one of two groups and treated five times a week for 3 weeks with either manual lymphatic drainage therapy or connective tissue massage by trained physiotherapists.

In the manual lymphatic drainage therapy group, treatment consisted of 45 minutes of lightly stroking the skin overlying lymphatic channels in the abdominal, thoracic, cervical and head regions, axillae, bilateral lateral trunk, inguinal, and cervical lymph nodes.

Physiotherapists treated subjects in the connective tissue massage group by using the middle fingers of both hands to rhythmically and sequentially create a traction or strain between cutaneous and subcutaneous connective tissues along the spine—from sacrum to occiput—to obtain a vascular response. Patients remained in a seated position for the massage treatment, which lasted 5 to 20 minutes. One participant discontinued treatment in the manual therapy group and two in the massage group, leaving 25 subjects in each group.

Both treatments resulted in statistically significant and progressive improvements in sleep, physical mobility, physical energy, and algometry, as well as reductions in pain, emotional reactions, social isolation, and visual analog scale and Fibromyalgia Impact Questionnaire scores compared to baseline values ($P<.05$). Subjects in the manual lymphatic drainage therapy group showed more improvement than those in the connective tissue massage group, with statistically significant decreases in feelings of morning tiredness and anxiety ($P<.05$). Future studies along these lines should include a larger sample size, comparison of more varied types of manual techniques (eg, counterstrain, high-velocity, low-amplitude, and myofascial release) and long-term follow up. —MAS

Ekici G et al. *J Manipulative Physiol Ther.* 2009;32:127-133.

HVLA Effectiveness in Patients With Back Pain

In the United States, osteopathic physicians use a variety of osteopathic manipulative medicine (OMM) procedures in clinical practice, yet there are no prospective randomized trials assessing the effectiveness of one method or approach vs another in patients with low back pain (LBP). Clinical practice guidelines for the management of subacute LBP recommend patient counseling, mobilization, manipulation, exercise, analgesics, or a combination of these treatment modalities.

In Europe, physical therapists use orthopedic manual therapy and the McKenzie method of assessment and treatment. Both methods include patient counseling, exercise, and mobilization—and, if needed, manipulation using high-velocity, low-amplitude (HVLA) technique.

Markku Paatelma, MSc, PT, and colleagues, an international interdisciplinary research team of physiatrists and physiotherapists, examined the effectiveness of these two

commonly used manual approaches for patients with LBP, leg pain, and disability. Results were compared to control patients who were advised to continue their daily routines as actively as possible with minimal bed rest. To differentiate between the manual treatments provided by the therapist (20 years' experience) using orthopedic manual therapy and the one using the McKenzie method (10 years' experience), only the orthopedic manual therapy physiotherapist used HVLA procedures.

This randomized control trial included 134 participants (aged 18-65 years; employed) with low back disorders, with or without associated leg pain, from four occupational healthcare centers in Finland. The study included patients with acute to chronic, first or recurrent, and idiopathic or mechanical back pain. Exclusion criteria included underlying pathology ("red flags"), pregnancy, and recent low back surgery.

Study participants were randomly assigned to three treatment groups: an orthopedic manual therapy group (n=45), a McKenzie method group (n=52), and an "advice-only" group, in which participants did not receive manual therapy but were told to remain active and avoid bed rest (n=37). Researchers used a subjective visual analog scale and the Roland-Morris Disability questionnaire to gather data on leg and LBP intensity and disability. Data were collected at baseline and at 3-, 6-, and 12-month follow-up visits. The average number of visits for participants in the therapy groups was six (range, 3-7). It was not stated how often the interventions were provided.

Patients in all three groups reported reductions in LBP, leg pain, and associated disability at 3-month follow-up, but with no statistically significant differences between groups. More reductions in leg pain, back pain, and associated disability were reported in the McKenzie method group than in the advice-only group at 6-month follow-up ($P<.05$). At 1-year follow-up, improvements on the disability index were greater in the McKenzie method group ($P=.028$) than the advice-only group. The orthopedic manual therapy group showed no statistically significant differences in pain and disability score changes compared to the other two study groups during follow-up.

It is unknown whether orthopedic manual therapy or high-velocity type manipulation performed by the physiotherapist in the study is comparable to osteopathic manipulative treatment provided by American-trained osteopathic physicians. Researchers did not provide a cost-of-care analysis or subgroup analysis for patients on sick leave as a result of their back disorder (16 in the orthopedic manual therapy group, 17 in the McKenzie group, and 8 in the advice-only group). Medication use was not mentioned and may have been a confounding factor in data analysis.

Americans with work-related back pain who receive OMM should be studied in a prospective randomized clinical trial to establish the efficacy and cost-effectiveness of this intervention, which involves osteopathic manipulative treatment along with patient education (eg, advice, exercise) and pharmacotherapy. —MAS

Paatelma M et al. *J Rehabil Med.* 2008;40:858-863.

Mechanical Strain and Asthma

The treatment of patients with asthma using osteopathic manipulative medicine (OMM) includes managing the related somatic dysfunction with osteopathic manipulative treatment (OMT) in addition to providing appropriate medication and education. The goal of these therapeutic options is to relax bronchospams, decrease airway hyperactivity, and restore normal airflow volume and velocity to and from the lungs.

Researchers in the osteopathic medical profession such as Meltzer and Standley (*J Am Osteopath Assoc.* 2007;107:527-536) and Dodd et al (*J Am Osteopath Assoc.* 2006;106:157-166) have published state-of-the-art research investigating mechanisms of OMM using fibroblast cell cultures. Mechanical strain and the stimulation of cytokines are two important mechanisms leading to airway remodeling. A research model to investigate the mechanical strain relationship to cytokine production in bronchial fibroblasts in patients with asthma would help further elucidate mechanisms of OMT in this patient population.

A study conducted in Montreal, Quebec, Canada, investigated whether bronchial and nasal fibroblasts differentially alter cytokine secretion in response to mechanical strain in patients with asthma vs healthy controls. Primary fibroblasts were isolated by bronchoscopic biopsy from 7 patients with asthma (β-agonist inhaler users with no history of steroid use) and 8 healthy participants. The patients with asthma did not smoke, were atopic (positive skin reaction to at least one allergen), and had a PC_{20} methacholine response range of 0 to 4.21 mg/mL. The healthy controls did not smoke, were nonatopic, and had PC_{20} methacholine responsiveness greater than 16 mg/mL. Nasal polyp fibroblasts from 3 healthy controls were also isolated for cell culture.

The isolated normal, asthmatic, and nasal bronchial fibroblasts were cultured on collagen type 1 coated flexible membrane plates and subjected to excessive mechanical strain for 24 hours or were exposed to control conditions (unstrained). After cell culture preparation, a biaxial strain corresponding to inspiratory capacity (30% amplitude at a frequency of 1 Hz) was applied for 3, 6, and 24 hours. Supernatants were collected and analyzed using cytokine arrays.

Cytokine release in cell supernatants was assessed by enzyme-linked immunoassay. Total cellular RNA was isolated using extraction columns and reverse transcribed. Real-time polymerase chain reaction quantified the mRNA message coding for the profibrotic cytokine, interleukin 6 (IL-6) and the proinflammatory cytokines, IL-8 and monocyte chemotactic protein 1 (MCP-1), and versican, an extracellular matrix proteoglycan that is upregulated in asthmatic airways.

No differences in cytokine secretion were observed among the fibroblast samples under unstrained control conditions. After 24 hours' strain, asthmatic bronchial fibroblasts secreted more IL-6 than normal controls. Interleukin 8 mRNA increased in normal, asthmatic, and bronchial fibroblasts under mechanical strain. An increase in IL-6 and versican mRNA occurred in asthmatic bronchial fibroblasts. In vitro mechanical strain resulted in increased secretion of the prore-modeling cytokine, IL-6, and the extracellular matrix protein, versican. It is unknown whether the function of these two molecules is dependent, independent, or synergistic.

Researchers concluded that cytokines respond to mechanical strain in different airway fibroblast populations, depending on the site of origin and the underlying inflammatory state. Strain resulted in IL-6 upregulation and increased message for extracellular matrix protein in bronchial fibroblasts from asthmatic patients only, and may reflect a propensity among these patients for airway remodeling. Whether OMT can alter the response of this characteristic bronchial airway fibroblast response during in vitro mechanical strain remains unknown. —MAS

Le Bellego F et al. *Allergy.* 2009;64:32-39.