

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 *The Journal of the American Osteopathic Association (JAOA)* 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 (mseffingerdo@osteopathic.org), or JAOA Editorial Advisory Board Member Hollis H. King, DO, PhD (hhking@ucsd.edu).

“As the Twig Is Bent, so Grows the Tree”: Part 4

Kluba S, Lypke J, Kraut W, Krimmel M, Haas-Lude K, Reinert S. Preclinical pathways to treatment in infants with positional cranial deformity [published online July 15, 2014]. *Int J Oral Maxillofac Surg*. 2014. doi:10.1016/j.ijom.2014.05.011.

This observational study describes the “preclinical” course (authors defined *preclinical* as all health care visits occurring before being seen in their clinic) of 218 children with positional cranial deformity. Researchers in the Department of Oral and Maxillofacial Surgery at the University Hospital Tübingen, Germany, were concerned about delays in referral for helmet therapy because in their experience there are time-dependent elements for optimal outcomes.

Positional skull deformities fall into 3 types, as follows: (1) plagiocephaly or parallelogram-style sloping head, which was measured by the cranial vault asymmetry index (CVAI) consisting of a ratio of head diameter, head length, and angles between the skull diagonals; (2) brachycephaly, which was determined by the head width-to-length ratio called the *cranial index*; and (3) a combination of plagiocephaly and brachycephaly.

The data collected in this study indicated that the deformity typically became noticeable at between 3 to 4 months and that the average time to presentation at the Tübingen clinic was 6 months. These researchers were concerned that helmet therapy, if indicated, should start by age 4 to 6 months. In this study, if the

child had been seen for physiotherapy or osteopathy, he or she presented to the clinic significantly later ($P=.023$). This implied criticism of physiotherapy and osteopathy is later discussed in the context of the need to rule out craniosynostosis by ultrasonographic examination, which typically occurs only in oral maxillofacial surgery clinics. It is also mentioned that if parents agree to helmet therapy, then physiotherapy and osteopathy can be simultaneously applied.

More than half of the children seen in this study received helmet therapy, which the authors describe as low risk and noninvasive. There is mention of research describing the long-term consequences of head shape deformities including cognitive or motor dysfunction, but there is no description of the research on the outcomes of helmet therapy. My own clinical experience in evaluating and treating children with cranial deformity and who have had helmet therapy leads me to advise caution before helmet therapy is undertaken. Overall, this article is informative, especially in making the case for early evaluation to rule out craniosynostosis, a potentially lethal condition. (doi:10.7556/jaoa.2014.156)

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Editor’s Note: This review is 1 of 4 pertaining to the unique contribution osteopathic medicine has to make in the evaluation and treatment of pediatric conditions. Part 1 appeared in the October 2011 issue and parts 2 and 3 in the January 2012 issue of *The Journal of the American Osteopathic Association*.

Manual Therapy Effects in Patients With Cervicogenic Dizziness

Reid SA, Callister R, Katekar MG, Rivett DA. Effects of cervical spine manual therapy on range of motion, head positioning, and balance in participants with cervicogenic dizziness: a randomized controlled trial [published online May 2, 2014]. *Arch Phys Med Rehabil*. doi:10.1016/j.apmr.2014.04.009.

Australian physical therapy researchers used 2 manual therapy interventions compared with placebo in patients with cervicogenic dizziness to assess the effects of therapy on cervical range of motion (ROM), head repositioning accuracy, and balance. The study was part of a clinical trial that showed that the Mulligan sustained natural apophyseal glide (SNAG) and Maitland passive joint mobilization (PJM) both reduced dizziness intensity and frequency after intervention and at 12 weeks compared with baseline.¹ These results are consistent with osteopathic research, which showed that osteopathic manipulative treatment (OMT) reduced dizziness and vertigo² and improved balance in healthy elderly adults.³

This article was selected for review in “The Somatic Connection” to highlight the outcome measures of cervical ROM and head repositioning, which to my knowledge have never been assessed in osteopathic research, and the uniqueness of the placebo, all of which in my opinion should be considered in future osteopathic research. The SNAG intervention is similar to articular forces being sustained through the ROM in upper cervical segments with the patient seated, and the PJM intervention appears equivalent to soft tissue and myofascial release to the cervical spine with the patient supine.¹

Participants were included if they had cervicogenic dizziness for 3 months or longer and did not have symptoms consistent with other forms of dizziness such as vertigo. Participants (N=86) were randomly assigned to the SNAG, PJM, or placebo intervention groups. The placebo consisted of a deactivated laser device that emitted a light and beeping sound; the “laser probe was positioned 0.5 to 1 cm from the skin for 2 minutes to each of 3 sites on the neck.”

Each participant received the assigned intervention 2 to 6 times over 6 weeks, the average being approximately 4 times per participant in each group. Outcome measures were made at baseline and immediately, 6 weeks, and 12 weeks after intervention. Sustained natural apophyseal glide improved cervical ROM ($P \leq .05$) in all 6 cervical planes of motion immediately after intervention and at 12 weeks compared with placebo. Passive joint mobilization improved only left rotation. There was no change in head repositioning accuracy nor in balance improvement. These findings may be limited by the nature of cervicogenic dizziness, but they do provide precedent for further study. (doi:10.7556/jaoa.2014.157)

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OMT Is Efficacious for Patients With High Baseline Low Back Pain

Licciardone JC, Aryal S. Clinical response and relapse in patients with chronic low back pain following osteopathic manual treatment: results from the OSTEOPATHIC Trial [published online June 24, 2014]. *Man Ther*. doi:10.1016/j.math.2014.05.012.

Last year, researchers at The Osteopathic Research Center at the University of North Texas Health Science Center Texas College of Osteopathic Medicine reported their results of the largest osteopathic clinical trial to date, called the OSTEOPATHIC trial,

which was a randomized, double-blind, sham-controlled study that demonstrated the efficacy of osteopathic manual treatment (more commonly known as *osteopathic manipulative treatment* [OMT]) for patients with chronic low back pain (LBP).¹ In a subgroup analysis of that study reported last year,² they found that patients with high baseline pain (defined as ≥ 50 mm on a 100-mm pain scale) responded significantly better than those with lower baseline pain. In this subgroup analysis of the same randomized clinical trial, the investigators assessed not only the clinical response to OMT vs sham therapy, but also the relapse rate following a series of OMT visits. This study is the first published report on the stability of patients' responses to OMT in a rigorously designed investigation.

This subgroup analysis included 186 participants (mean age, 43 years; 115 women [62%]) with high baseline pain. Fifty-five percent had LBP for more than 1 year. Participants received OMT or sham therapy and were assessed for clinical response at weeks 1, 2, 4, 6, 8, and 12. Fifty percent or greater pain reduction relative to baseline qualified as a substantial improvement in LBP. Sixty-two of 95 participants (65%) in the OMT group attained an initial clinical response, at a median time of 4 weeks, compared with 41 of 91 participants (45%) in the sham therapy group (RR, 1.45; 95% CI, 1.11-1.90). Typically, responding participants received 3 OMT sessions over a 4-week period. Relapse was greater in the sham group. There were 31 participants with an initial clinical response before week 12 that relapsed: 13 participants (24%) in the OMT group vs 18 (51%) in the sham therapy group (RR, 0.47; 95% CI, 0.26-0.83). Overall, 49 participants (52%) in the OMT group attained or maintained a clinical response at week 12 compared with 23 (25%) in the sham therapy group (RR, 2.04; 95% CI, 1.36-3.05). The authors commented that the large effect size for short-term efficacy of OMT was driven by stable responders who did not relapse.

This study demonstrates that after only 3 OMT sessions, a subgroup of patients with high baseline

chronic LBP responded and maintained improvement for at least 3 months. These results help to answer a long-held research question as to what are the characteristics of patients that respond best to OMT. (doi:10.7556/jaoa.2014.158)

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Dose-Response Research in Chiropractic Care and Possible Comparisons With OMT

Haas M, Vavrek D, Petersen D, Polissar N, Neradilek MB. Dose-response and efficacy of spinal manipulation for care of chronic low back pain: a randomized controlled trial. *Spine J*. 2014;14(7):1106-1116. doi:10.1016/j.spinee.2013.07.468.

Chiropractic researchers at the University of Western States in Portland, Oregon, carried out a practice-based randomized controlled trial to assess dose-response and efficacy of spinal manipulative therapy (SMT) for chronic low back pain (LBP). All participants (N=400) had current chronic LBP “of mechanical origin of at least 3 months duration” and some chronic LBP “on 30 days in the previous 6 weeks.” Participants who received manual therapy during the previous 90 days were excluded.

The SMT intervention was high-velocity, low-amplitude technique to the lumbar and lower thoracic areas. A comparator intervention of focused light massage was used rather than sham SMT because the researchers wanted to avoid participant disappointment if the participant thought he or she was receiving a sham intervention.

Four groups were identified by dose received: 0, 6, 12, or 18 SMT applications. All participants were seen 18 times, 3 times per week for 6 weeks. For the sessions in which SMT was not applied, focused light massage was administered. The primary outcome measures were the self-reported Van Korff pain and disability scales. Secondary measures were administered regarding pain unpleasantness. Follow-up data were collected for 1 year.

All groups who received SMT reported a small but statistically significant improvement in both pain and disability, improving by 20 points at 12 weeks compared with the light massage-only group, and these improvements were sustained through 52 weeks. The authors indicated that this finding may not be clinically significant because of the design aspects of the trial. However, regarding the dose-response consideration, 12 SMT sessions in 6 weeks yielded the most favorable pain and functional disability improvement for chronic LBP as compared with the 6- or 18-SMT sessions.

Although osteopathic research has yet to directly address the dose-response question for osteopathic manipulative treatment (OMT), salient points were made by Licciardone¹ in reference to Licciardone et al² in which comparable pain improvement was achieved at 12 weeks after only 6 OMT sessions. The OMT protocol in Licciardone et al² was more comprehensive, as it included soft tissue, myofascial release, muscle energy, and counterstrain procedures. (doi:10.7556/jaoa.2014.159)

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How to Win the Match Against Tennis Elbow: A Comparison of Different Techniques

Trivedi P, Sathiyavani D, Nambi G, Khuman R, Shah K, Bhatt P. Comparison of active release technique and myofascial release technique on pain, grip strength & functional performance in patients with chronic lateral epicondylitis. *Int J Physiother Res*. 2014;2(3):488-494.

Lateral epicondylitis, commonly referred to as *tennis elbow*, is an overuse injury of the lateral humeral epicondyle. Pain from this lesion may refer to the wrist. Traditional treatments include rest, ice, nonsteroidal anti-inflammatory drugs, steroid injections, bracing, physical therapy, and iontophoresis. Researchers in Gujarat, India, investigated the effectiveness of 2 alternative therapies for chronic lateral epicondylitis: active release technique (ART) and myofascial release technique (MFR).

As defined in the study, ART is the “application of deep digital tension over tenderness.” During application of ART, the patient was asked “to actively move the tissue from [a] shortened to a lengthened position” to theoretically break tissue adhesions. The authors defined MFR as “the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain and improve function.”

Thirty-six patients aged 30 to 45 years with symptomatic chronic epicondylitis were referred from outpatient clinicians. Notable exclusion criteria were history of trauma, surgery, cervical or upper limb dysfunction, steroid injection, and receipt of physiotherapy in the previous 3 months. During the study period, patients continued normal activities and avoided other forms of treatment. Patients were assigned to 1 of 3 groups: (1) the control group received conventional physiotherapy, which included pulsed ultrasound therapy and graduated stretching and strengthening exercises, (2) the ART group received ART plus conventional physiotherapy, and (3) the MFR group received MFR and conventional physiotherapy. Participants received 3 treatment sessions per

week for 4 weeks. Active release technique was applied to “the extensor carpi radialis longus and brevis muscles by applying pressure to the muscles distal to their attachment at the elbow.” To release adhesions between the muscle planes, the therapist moved the pressure proximally as the patient extended the elbow and pronated and flexed the wrist. Myofascial release technique entailed 3 procedures. The first began with treating the common extensor tendon to the extensor retinaculum of the wrist, beginning at the humerus. The therapist engaged the periosteum using his fingertips and moved distally to the common extensor tendon toward the retinaculum while the patient slowly flexed and extended the elbow. The second procedure used a similar technique applied to the ulna using alternating ulnar and radial deviation. The third procedure involved engaging the periosteum at specific bony landmarks and applying a line of tension in a lateral and distal direction to spread the radius and ulna apart.

Outcome measures were Numeric Pain Rating Scale, hand grip strength, and Patient-Rated Tennis Elbow Evaluation taken at baseline and 4 weeks after intervention. Results demonstrated that all 3 groups showed significant improvement after 4 weeks ($P < .001$), but MFR showed the most improvement in all 3 outcome measures.

This study can help osteopathic researchers to design beneficial regimens for the management of chronic lateral epicondylitis. However, a larger sample size is needed to validate these findings. Additionally, further comparison of counterstrain and muscle energy techniques may prove useful to determine which has the most benefit in this patient population. (doi:10.7556/jaoa.2014.160)

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Osteopathic Manipulative Treatment Induces Enhanced Intracellular Immune Response

Walkowski S, Singh M, Puertas J, Pate M, Goodrum K, Benencia F. Osteopathic manipulative therapy induces early plasma cytokine release and mobilization of a population of blood dendritic cells. *PLoS One*. 2014;9(3):e90132. doi:10.1371/journal.pone.0090132.

Osteopathic lymphatic techniques have long been associated with an improved healing response in the cellular tissues and improved immune response, but research has lagged in the cytokine, chemokine, and growth factor analysis of these effects.¹ Lymphatic techniques may enhance treatment by increasing lymphatic flow and fluid removal and enhancing filtration and removal of inflammatory mediators and waste products from the interstitium.² Researchers at the Ohio University Heritage College of Osteopathic Medicine investigated the impact of lymphatic techniques.

In the first series, 21 healthy volunteers were recruited with 2 lost to attrition; in the second series, 36 were recruited and 3 were lost to attrition. In these 2 series, the groups were randomly assigned to an osteopathic manipulative treatment (OMT) group receiving 7 minutes of combined lymphatic techniques or a control group receiving light touch (sham therapy). Blood was drawn from each participant at baseline, 5 minutes, and 30 minutes in the first series and baseline, 30 minutes, and 60 minutes in the second series.

The phenotype and presence of circulating leukocytes was analyzed in the OMT and sham groups, as well as the presence of cytokines and chemokines (eotaxin, granulocyte-colony stimulating factor [G-CSF], interleukin-1 α (IL)-1 α , IL-1 β , granulocyte-macrophage colony-stimulating factor [GM-CSF], IL-2, IL-8, IL-4, IL-6, IL-10, monocyte chemoattractant protein-1 [MCP-1], and macrophage inflammatory protein-1 α [MIP-1 α]), and growth factors. In addition, nitric oxide and C-reactive protein (CRP) levels were measured.

Results demonstrated no statistically significant differences in CRP at 5 and 30 minutes and no differences in leukocyte populations immediately after OMT; however, levels of 4 inflammatory cytokines (eotaxin, eotaxin-2, IL-10, IL-16) in the 30-minute samples were elevated only in the OMT group. In addition, multiple other cytokines were elevated in the OMT group but not in the control group. A small but statistically significant increase in nitric oxide was observed only in the OMT group.

In the peripheral blood mononuclear cells (PBMC) fraction there were statistically significant increases in B cells and a decrease in the monocytes in both the OMT and sham groups, but more so in the OMT group. The investigators also looked at the antigen-presenting cell within the PBMC fraction 60 minutes after treatment in the sham and intervention groups and found that subpopulations of dendritic cells were significantly decreased in the PBMC fraction at 60 minutes compared with the whole blood analysis at 60 minutes in the group receiving OMT. The results demonstrated an increase in the overall dendritic cell population in whole blood in the OMT group at 60 minutes. This finding is particularly important given that dendritic cells have the ability to stimulate T-cell response and are responsible for the success of vaccinations.

In the second series at 60 minutes, plasma levels of MIP-1 α , G-CSF, and IL-8 were significantly increased in the OMT group compared with baseline

levels. Granulocyte-colony stimulating factor, which induces monocyte production in the bone marrow, was up-regulated in the OMT groups at 30 and 60 minutes.

One limitation of this study is that only a homogeneous healthy population was used for sample analysis. Future studies should explore patient samples with substantial somatic dysfunction and infectious disease.

In conclusion, this study shows that OMT can modify the distribution of blood dendritic cells and thus can help patients fight infections or even increase vaccine efficacy. Further study is needed to demonstrate the duration of these modifications. This study shows promising data, which could potentially impact hospital length of stay and efficacy of treatment and ultimately decrease health care costs. (doi:10.7556/jaoa.2014.161)

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"The Somatic Connection" appears quarterly in *The Journal of the American Osteopathic Association (JAOA)*. This section highlights important scientific findings on the musculoskeletal system's role in health and disease. If you spot a scientific report that you would like to see reviewed in "The Somatic Connection," or if you would like to review the study yourself, contact JAOA Associate Editor Michael A. Seffinger, DO (mseffingerdo@osteopathic.org), or Editorial Advisory Board Member Hollis H. King, DO, PhD (hhking@mail.ucsd.edu).