

Clinical Practice Guideline: **Acupuncture for the Treatment of Extremity Pain**

Date of Implementation: **March 18, 2010**

Product: **Specialty**

POLICY

American Specialty Health – Specialty (ASH) clinical committees have determined that the evidence supports the use of acupuncture for the treatment of extremity pain, and that such treatment is professionally recognized, scientifically plausible, and the benefit:risk profile appears favorable.

PROCESS AND DEFINITIONS

When developing, reviewing, and approving clinical policy, ASH peer-review committees consider whether the technique/procedure:

- Is established as clinically effective by:
 - Scientific information published in an acceptable peer-reviewed clinical science resource, and
 - The consensus opinion of the Evidence Evaluation Committee (EEC) when available;
- Is professionally recognized by:
 - Inclusion in the educational standards accepted by the majority of the professions' educational institutions,
 - Wide acceptance and use of the practice, and
 - Recommendations for use made by healthcare practitioners practicing in the relevant clinical area;
- Poses a health and safety risk; and
- Is plausible or implausible
 - A belief, theory, or mechanism of health and disease that can be explained within the existing framework of scientific methods, reasoning, and available knowledge is considered plausible.
 - A treatment intervention or diagnostic procedure that requires the existence of forces, mechanisms, or biological processes that are not known to exist within the current framework of scientific methods, reasoning, and available knowledge is considered implausible.

Substitution harm (indirect harm): Compromised clinical outcomes caused by:

- Utilizing a specific diagnostic or therapeutic procedure when the safety, clinical effectiveness, or diagnostic utility is either unknown or is known to be unsafe, ineffective, or of no diagnostic utility, *instead of* a diagnostic or therapeutic

- 1 procedure known to be safe, be clinically effective, or to have diagnostic utility;
 2 or
 3 • The utilization of a diagnostic or therapeutic procedure that is substantially less
 4 effective or safe than another procedure with established safety, and clinical
 5 effectiveness or utility.

6
 7 **Labeling effects (non-specific harm):** The harm that results from identifying in a
 8 patient a condition or a finding that is not clinically valid.

9
 10 **Safe:** The terms “safe” and “safety,” are used only with specific reference to the
 11 absence of direct harm. Direct harm would include any injury to a patient caused
 12 by the mechanical, thermal, biological, chemical, pharmacological, electrical,
 13 electromagnetic, or psycho-dynamic properties of a diagnostic or therapeutic
 14 procedure, and as such, the procedure would be considered unsafe.

15
 16 **Direct harm:** Any injury to a patient caused by the mechanical, thermal, biological,
 17 chemical, pharmacological, electrical, electromagnetic, or psycho-dynamic
 18 properties of a diagnostic or therapeutic procedure.

19
 20 **Benefit versus risk profile:** The relative effectiveness or utility of a therapeutic
 21 intervention or diagnostic procedure versus its potential for direct harm.

- 22 • Positive (benefits outweigh risks),
 23 • Negative (risks outweigh benefits), or
 24 • Equivocal (available information is inconclusive).

25 26 **Acupuncture Safety**

- 27 • Major adverse events associated with acupuncture are exceedingly rare.
 28 • Minor adverse events (e.g., bruising, soreness at needle insertion point)
 29 associated with acupuncture were found to be common and transient.
 30 • The incidence of adverse events of acupuncture is substantially lower than
 31 that of many drugs or other accepted invasive procedures.
 32 • Proper acupuncture technique and patient selection is very important for
 33 acupuncture safety.

34 35 **Description/Background**

36 In 1997 the National Institutes of Health (NIH) released a consensus statement on
 37 acupuncture acknowledging evidence of efficacy for the use of acupuncture in treating
 38 nausea and musculoskeletal and related disorders. In 2002 the World Health Organization
 39 (WHO) issued an updated report on acupuncture which analyzed clinical trials. These
 40 reports presented substantial evidence that acupuncture is an effective therapy for
 41 particular conditions.

Numerous and reproducible effects on the peripheral, central, and autonomic nervous systems have been demonstrated in humans and animals correlating to reductions in pain, inflammation, and endocrine regulation. Experiments in animal models demonstrate that mixed frequency electroacupuncture (100/2 Hz) releases the full spectrum of the known neuropeptides: enkephalin, β -endorphin, endomorphin, and dynorphin. These endogenous opioid peptides released within the central nervous system are proposed to induce the analgesic and relaxation effects of acupuncture.

The relative paucity of methodologically sound, large scale randomized controlled trials (RCTs), the lack of systematic or appropriate inclusion criteria utilized during the selection of RCTs, and the dearth of ‘well-designed’ trials that are replicated can limit the ability to draw clearly defined and appropriate conclusions from the literature regarding whether the clinical effectiveness of acupuncture is established. However, the literature supports the benefits of acupuncture treatment for pain and dysfunction for a variety of extremity conditions (e.g., lateral epicondylitis, shoulder pain, carpal tunnel syndrome, osteoarthritis of the knee).

The following describes the literature relative to the use of acupuncture in the treatment of lateral epicondylitis, carpal tunnel syndrome, shoulder pain, and osteoarthritis pain:

Lateral Epicondylitis

The benefits of acupuncture in the treatment of lateral epicondylitis have been summarized in two (2) systematic reviews (Trinh et al., 2004; Green et al., 2002). The earliest of these reviews identified four (4) small RCTs and suggested a lack of evidence to either support or refute the use of acupuncture (either needle or laser) in the treatment of lateral epicondylitis. (Green et al., 2002) Despite the limitations of the literature a trend of short-term benefits in pain was evident.

The more recent of the reviews identified a total of six (6) RCTs and suggests evidence of the benefit of acupuncture for the treatment of lateral epicondylitis (Trinh et al., 2004). Heterogeneity of trials, including a lack of definition for lateral epicondylitis, acupuncture treatment protocols, and outcome assessments precluded pooling data for meta-analyses. Four (4) trials compared acupuncture to sham acupuncture and demonstrated positive effects in the short term as compared to sham (Irnich et al., 2003; Fink et al., 2002; Molsberger & Hille, 1994; Haker & Lundeborg, 1990). The remaining two (2) RCTs compared acupuncture to ultrasound therapy (Davidson et al., 2001; Grua et al., 1999). An Italian trial demonstrated the superiority of acupuncture (including six (6) month follow-up) (Grúa et al., 1999); the other trial, from Canada, indicated no difference between groups (Davidson et al., 2001). Combined in a best evidence synthesis, the data indicated that acupuncture is effective in the short-term relief of lateral epicondyle pain (Trinh et al., 2004). Despite the low number of large scale trials, the authors conclude, “There is strong evidence suggesting that acupuncture is effective...”

No RCTs have been conducted since the publication of the most recent systematic review (Trinh et al., 2004). Of the RCTs contained within this review, a German-based trial is worth mention (Fink et al., 2002). Participants (n=45) were randomized to receive ten (10) treatments (two (2)/week) of standardized acupuncture or invasive sham acupuncture. The primary outcomes (isometric arm strength, VAS of pain, and function via the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire) were assessed two (2) weeks and two (2) months post-treatment. Both groups improved at the two (2) week follow-up; however, the verum acupuncture group demonstrated statistically significant effects compared to sham acupuncture for all outcomes. The results were less conclusive at the two (2) month follow-up, as acupuncture was only superior for function (DASH questionnaire). The authors conclude that acupuncture should be considered as an effective alternative treatment option or as a potential therapy in refractory lateral epicondylitis.

Carpal Tunnel Syndrome

The evidence base for the treatment of carpal tunnel syndrome (CTS) with acupuncture is in its infancy; a single RCT for acupuncture treatment has been performed. The results of the sole RCT suggest benefit of acupuncture for the treatment of carpal tunnel syndrome (Yang et al., 2009). Additional experimental and outcomes research, as well as laser acupuncture studies, support the findings of this trial and are worth mention.

A recent U.S. study investigated the effect of acupuncture on clinical symptoms of CTS as well as on cortical reorganization assessed with functional magnetic resonance imaging (MRI) (Napadow et al., 2006b). A total of twenty-five (25) participants were recruited, thirteen (13) diagnosed with CTS and twelve (12) healthy controls matched for age and gender. The acupuncture group received thirteen (13) semi-standardized treatments over five weeks: three times per-week for three weeks followed by twice per-week for two weeks. All participants were assessed prior to initiation of treatment as well as at the end of treatment for the following measures: 1) the Boston Carpal Tunnel Syndrome Questionnaire (BCTSQ); 2) clinical evaluation by a physician who did not know whether participants were CTS versus control (e.g., nerve conduction, sensory threshold testing, and grip strength); and 3) Functional Magnetic Resonance Imaging (fMRI) scans. Improvements were observed post-treatment in most measures: dysesthesia and paresthesia levels on the BCTSQ ($p<0.005$), grip strength ($p<0.05$), and sensory nerve latency ($p<0.05$). No changes were observed in overt pain levels assessed with BCTSQ. It has been documented that patients with CTS have a lack of separation within the cortical representation of median nerve innervated digits (1st - 3rd digits and radial side of 4th digit) (Napadow et al., 2006a). In the present study, the authors hypothesized that acupuncture will: 1) separate the cortical representations and 2) diminish the extent of somatosensory cortical hyperactivation (also observed in patients with CTS). Results demonstrated a significant increase in median nerve cortical separation in acupuncture participants, which correlated with a decrease in paresthesias.

As well, acupuncture patients demonstrated a significant decrease in somatosensory cortical hyperactivation in both Brodmann Area (BA) 1 and BA 5 ($p < 0.05$), primary areas of the somatosensory cortex.

An early outcomes trial based in the U.S. supports the benefit of acupuncture for the treatment of recalcitrant (patient who had failed the standard surgical release procedures) carpal tunnel syndrome (Chen, 1990). Thirty-six (36) patients were treated with acupuncture daily, every other day, or twice per week (depending on the severity of their symptoms) with a standardized set of acupoints for one (1) to three (3) months. A 97% effective rate was reported, based on patients' subjective improvements in pain and discomfort. Prior to treatment, seven (7) patients were randomly chosen to assess hand grip strength with a dynamometer; all seven demonstrated trends of significant improvements at the end of treatment. Follow-up data is difficult to interpret, but it is reported that patients averaged 5.1 years of relief with an overall effectiveness of 83%.

Sim et al. (2011) evaluated the evidence of acupuncture for CTS through systematic review. All RCTs of acupuncture were included and quality was assessed. Only 6 studies met the inclusion criteria. This systematic review and meta-analysis demonstrated that the evidence for acupuncture as a treatment of CTS is encouraging but not convincing at this time. Further higher quality studies are needed to confirm results. Yang et al. (2011) prospectively followed up on patients with CTS after one year of study comparing oral steroids versus acupuncture. Two patient groups were evaluated: 1) 2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily ($n = 39$); and 2) acupuncture administered in 8 sessions over 4 weeks ($n = 38$). Patients were followed up again at 7 and 13 months using the Global symptom score assessment and nerve conduction studies. Results suggest that short-term acupuncture treatment may result in long-term improvement in mild-to-moderate CTS. Yao et al. (2012) completed a randomized controlled trial comparing acupuncture with placebo for treatment of mild to moderate CTS. Thirty-four subjects completed the study. The primary outcome measure was self-reported change in the Carpal Tunnel Self-Assessment Questionnaire. Subjects were randomly assigned to either (1) acupuncture ($n = 21$) or (2) placebo acupuncture ($n = 20$) with use of Streitberger placebo acupuncture needles. Both groups received weekly sessions of acupuncture for 6 weeks. Wrist braces were also given to both groups for night wear. No statistically significant difference was found between the groups treated with acupuncture and placebo acupuncture with respect to improvement in CTS symptoms, function, tip/key pinch, or combined sensory index. Acupuncture was not shown to be superior to placebo acupuncture when used in conjunction with bracing for patients with mild to moderate CTS. Khosrawi et al. (2012) randomly assigned participants to a control group (night splinting, vitamin B1 and B6 intake and sham acupuncture) or intervention group (8 sessions over 4 weeks of acupuncture and night splinting). Sixty-four patients completed the 4 week intervention. There was a statistically significant difference between the control and intervention groups for self-

report outcomes and nerve conduction study results. Findings indicated that acupuncture can improve overall subjective symptoms of CTS and could be part of a comprehensive treatment program. Ho et al. (2014) studied the clinical effectiveness of acupuncture for CTS. Twenty-six participants were divided into two treatment groups based on a modified neurophysiological grading scale. Of the total number of participants, 15 received acupuncture and 11 received electroacupuncture on both upper limbs. The treatment program consisted of 24 sessions of 15 min duration over 6 weeks. Findings demonstrated that grip strength and electrophysiologic nerve function improved after acupuncture.

Shoulder Pain

Numerous RCTs have been conducted on the benefits of acupuncture for the treatment of shoulder pain due to varying etiologies. A single systematic review summarized half of the trials (through 2003), while eight (8) additional RCTs have subsequently been conducted. The small sample size ($n < 50$) of the majority 62.5% (5/8) of the recent trials impede firm conclusions from being made. Likewise, long-term effects of acupuncture for shoulder pain (regardless of cause) are limited. Of the four (4) trials that assessed long-term effects (Johansson et al., 2005; He et al., 2004; Guerra de Hoyos et al., 2004; Nabeta & Kawakita, 2002), two (2) are of sufficient sample size for comment (Johansson et al., 2005; Guerra de Hoyos et al., 2004). The comparative effectiveness trial of acupuncture and ultrasound therapy demonstrated (at three, six, and twelve month follow-up) that acupuncture provides lasting, long-term effects for pain and function. The efficacy trial demonstrated that acupuncture was found superior to non-invasive sham acupuncture for pain, function, quality of life, and reduction in use of rescue analgesics at three (3) and six (6) month follow-up.

A single systematic review noted that the heterogeneity of early trials precludes pooling of data for meta-analyses (Green et al., 2005). Heterogeneity in the more current literature includes differences in condition (e.g., tendonitis or impingement syndrome), trial design (e.g., efficacy or effectiveness), and treatment protocol (standardized or individualized acupuncture). Combined with the lack of an updated systematic review, firm conclusions based on an analysis of the literature is challenging.

Li et al. (2009) studied the therapeutic effect of acupuncture and massage for shoulder-hand syndrome in patients with hemiplegia. One hundred and twenty patients were randomly separated into two groups (standard electric acupuncture and massage and typical rehabilitation for 6 weeks. At post treatment evaluation, pain ratings and Fugl-Meyer scores were improved compared to the typical rehabilitation group. Lathia, Jung and Chen (2009) studied the efficacy of acupuncture as a treatment for chronic shoulder pain. Thirty one subjects were randomized to one of three groups: individualized acupuncture point treatment, fixed, standard acupuncture point treatment, and sham, non-penetrating acupuncture. Subjects received 12 treatments over 6 weeks. Mean change in

total SPADI score was assessed as the outcome measure. After 6 weeks, each group improved but only the two acupuncture groups demonstrated a significant improvement over time. The two groups were also significantly improved compared to the sham group. No significant differences existed between the individualized and standardized acupuncture groups. Johansson et al. (2011) compared corticosteroid injection and acupuncture with a home exercise program for patients with subacromial impingement. One-hundred and seventeen patients were randomized into two groups-corticosteroid injections or 10 acupuncture treatments. Pain and shoulder function, as well as quality of life and global assessment of change were evaluated post intervention at 3, 6 and 12 months. No significant differences existed between groups for pain, shoulder function and quality of life, however both groups did improved significantly over time. Neither treatment was superior to the other. Jain and Sharma (2014) completed a systematic review on the effectiveness of interventions for adhesive capsulitis of the shoulder. They concluded that therapeutic exercise and mobilization are strongly recommended for reduction in pain and improvement in ROM and function. Additionally, acupuncture with therapeutic exercise is moderately recommended for pain relief and improved function and ROM.

Osteoarthritis

The most rigorous assessment of the literature was provided by Manheimer et al., via a meta-analysis of pooled data (Manheimer et al., 2005). Viewed in comparison, the two (2) most recent reviews (Manheimer et al., 2007; White et al., 2007) are quite similar; the primary discrepancy being the addition of a single trial in the analysis of sham data by Manheimer et al. The addition of this trial yielded a less promising effect of acupuncture as compared to sham controls; statistically significant yet clinically irrelevant benefits were noted. The discourse of this review suggests caution when interpreting the results as heterogeneity exists within the use of sham interventions, acupuncture protocols, and proficiencies of the treating clinician, all of which warrant further study and clarification. The authors also suggested that although it is premature to recommend acupuncture as part of routine patient care, several trials that had yet to be published would impact the existing evidence.

Unfortunately, subsequent trials are also heterogeneous in regard to patient population and treatment protocols (Williamson et al., 2007; Foster et al., 2007). As such they do not, as Manheimer et al. hoped, bring clarity to the question regarding the benefits of acupuncture in the treatment of OA. The RCT by Foster et al. (2007) utilized a treatment protocol that was, admittedly, a potential limitation of the study. Due to constraints of the clinical trial and the general practice of physiotherapy in the United Kingdom (UK), only six (6) acupuncture sessions were administered over three (3) weeks. The additional published RCT by Williamson et al. (2007) was also unable to lend clarity due to its treatment protocol. The short course of therapy utilized for this population reflects the aim of the trial: to determine if acupuncture can provide immediate pain relief in patients

1 diagnosed with severe knee OA awaiting knee arthroplasty. Both trial protocols are
2 arguably invalid for the assessment of acupuncture in the treatment of chronic knee OA.

3
4 An exploratory review on the benefits of acupuncture for knee OA also highlights the
5 area of treatment adequacy (Vas & White, 2007). The review suggests that a minimum of
6 ten (10) treatments are needed and further suggests that the clinician promotes sufficient
7 stimulation of the acupuncture needles at each session. Noting this caveat, an analysis of
8 a potentially suboptimal treatment should not be used to make generalized statements of
9 any modality, including a complex intervention such as acupuncture.

10
11 Comment on the findings of equivalence between acupuncture and sham acupuncture, yet
12 both outperforming usual medical care, are best summarized by the large well-designed
13 trial from Germany (Scharf et al., 2006). The overarching aim of this trial was to
14 determine if acupuncture (for the treatment of OA) should be reimbursed by the German
15 social health care insurance organizations. The authors concluded “...our findings support
16 the role of acupuncture in the multimodal treatment of patients with pain and functional
17 limitations due to osteoarthritis of the knee, even if the mechanisms of its effects remain
18 unclear.”

19
20 A systematic review and meta-analysis on use of acupuncture to manage pain in
21 osteoarthritis was completed in 2014 by Manyanga et al. Previous trial results were
22 conflicting and other systematic reviews may have presented results that were
23 overestimated according to authors. Twelve trials of 1763 participants were included that
24 compared acupuncture to sham, no treatment or usual care. Most trials were considered to
25 either have high or unclear bias. According to analysis, acupuncture was associated with
26 significant reductions in pain and improvement in functional mobility and quality of life.
27 Thus, current evidence appears to support the use of acupuncture for patients with
28 osteoarthritis. In contrast, McAlindon et al. (2014) published expert consensus guidelines
29 for the non-surgical management of knee osteoarthritis. Acupuncture was considered a
30 treatment of uncertain appropriateness for certain clinical sub-phenotypes.

31 Numerous RCTs have been conducted on the effects of acupuncture in the treatment of
32 osteoarthritis, primarily focusing on the knee. Several are large multi-center trials and
33 most include research designs to assess acupuncture adjunctive to or in place of usual
34 medical care. The lack of homogeneous, large scale, well-designed RCTs precludes firm
35 conclusions from being drawn.

36 **Multiple Conditions**

37 Lee and Ernst (2011) published an overview of Cochrane Reviews of acupuncture and its
38 effectiveness in reducing pain of many of the conditions previously described here. Eight
39 reviews were included. Four reviews concluded that acupuncture was effective for
40 migraines, neck disorders, tension-type headaches and peripheral joint osteoarthritis.
41 Three reviews were inclusive for shoulder pain, lateral elbow pain and low back pain.
42

Acupuncture was found not effective for rheumatoid arthritis. A recent and rigorous review of the literature (Vickers et al., 2012) used individual patient data in a meta-analysis of the effectiveness of acupuncture for shoulder pain, back and neck pain, osteoarthritis, and chronic headache. The analysis concluded that the positive effects of acupuncture for these conditions could not be attributed to placebo effects alone. This review concluded that, “acupuncture is a reasonable referral option for patients with chronic pain.” The wording of this conclusion reflects the sensible supposition that for chronic musculoskeletal pain conditions beyond those that are specifically mentioned in this review, acupuncture is also a reasonable option.

An important consideration is the influence of the control group on effect size in trials of acupuncture. A secondary analysis by MacPherson et al. (2014) further studied individual patient data of individuals with chronic pain. Acupuncture trials involving patients with headache, migraine, osteoarthritis, back and neck pain and shoulder pain were included. Findings suggest that acupuncture was significantly better to all categories of control groups. If penetrating needles were used for the sham control group, acupuncture had a smaller effect size than a non-penetrating sham or sham control without needles. Thus, penetrating needles appear to have an important physiologic influence, so authors recommend that this type of sham be avoided.

Conclusions

1. There is limited evidence to support the benefit of acupuncture for the treatment of pain associated with lateral epicondylitis.
2. There is limited evidence to support the use of acupuncture for the treatment of carpal tunnel syndrome.
3. The limited available evidence suggests a benefit of acupuncture for the treatment of shoulder pain.
4. The evidence supports the use of acupuncture for short-term improvement in pain and function in patients with osteoarthritis of the knee.
5. There is insufficient evidence to support or refute the use of acupuncture in the treatment in pain and function in patients with osteoarthritis of the hip.

References

- Acupuncture. (1997). *NIH Consensus Statement*, 15(5), 1-34. Retrieved January 4, 2010, from <http://consensus.nih.gov/1997/1997Acupuncture107PDF.pdf>
- Arden N, Nevitt MC. Osteoarthritis: epidemiology. *Best Pract Res Clin Rheumatol*. 2006 Feb;20(1):3-25. Review.
- Berman BM, Lao L, Greene M, Anderson RW, Wong RH, Langenberg P, Hochberg MC. Efficacy of traditional Chinese acupuncture in the treatment of symptomatic knee osteoarthritis: a pilot study. *Osteoarthritis Cartilage*. 1995 Jun;3(2):139-42.

- 1
- 2 Berman BM, Lao L, Langenberg P, Lee WL, Gilpin AM, Hochberg MC. Effectiveness of
- 3 acupuncture as adjunctive therapy in osteoarthritis of the knee: A randomized,
- 4 controlled trial. *Ann Intern Med*. 2004 Dec 21;141(12):901-10.
- 5 Berman BM, Singh BB, Lao L, Langenberg P, Li H, Hadhazy V, Bareta J, Hochberg M.
- 6 A randomized trial of acupuncture as an adjunctive therapy in osteoarthritis of the
- 7 knee. *Rheumatology* (Oxford). 1999 Apr;38(4):346-54.
- 8
- 9 Bijlsma JW, Knahr K. Strategies for the prevention and management of osteoarthritis of
- 10 the hip and knee. *Best Pract Res Clin Rheumatol*. 2007 Feb;21(1):59-76. Review.
- 11
- 12 Bisset L, Paungmali A, Vicenzino B, Beller E. A systematic review and meta-analysis of
- 13 clinical trials on physical interventions for lateral epicondylalgia. *Br J Sports Med*.
- 14 2005 Jul;39(7):411-22; discussion 411-22. Review.
- 15
- 16 Brattberg G. Acupuncture therapy for tennis elbow. *Pain*. 1983 Jul;16(3):285-8.
- 17
- 18 Brooks PM. A template for diagnosis and management of musculoskeletal diseases. *Med*
- 19 *J Aust*. 1996 Sep 16;165(6):331.
- 20
- 21 Chard MD, Hazleman R, Hazleman BL, King RH, Reiss BB. Shoulder disorders in the
- 22 elderly: a community survey. *Arthritis Rheum*. 1991 Jun;34(6):766-9.
- 23
- 24 Chen CH, Chen TW, Weng MC, Wang WT, Wang YL, Huang MH. The effect of
- 25 electroacupuncture on shoulder subluxation for stroke patients. *Kaohsiung J Med Sci*.
- 26 2000 Oct;16(10):525-32.
- 27
- 28 Chen GS. The effect of acupuncture treatment on carpal tunnel syndrome. *Am J Acup*
- 29 1990;18:5–9.
- 30
- 31 Chumbley EM, O'Connor FG, Nirschl RP. Evaluation of overuse elbow injuries. *Am Fam*
- 32 *Physician*. 2000 Feb 1;61(3):691-700. Review.
- 33
- 34 Davidson JH, Vandervoort A, Lessard L, Miller L. The effect of acupuncture versus
- 35 ultrasound on pain level, grip strength and disability in individuals with lateral
- 36 epicondylitis: a pilot study. *Physiother Can*. 2001;53:195–202.
- 37
- 38 Deignan, C. Acupuncture Treatment of Lateral Epicondylitis in an Occupational
- 39 Medicine Clinic. *Med Acupunct*. 2001;13:21-22.

- 1 Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC.
2 Trends in alternative medicine use in the United States, 1990-1997: results of a
3 follow-up national survey. *JAMA*. 1998 Nov 11;280(18):1569-75.
- 4
- 5 Ezzo J, Berman B, Hadhazy VA, Jadad AR, Lao L, Singh BB. Is acupuncture effective
6 for the treatment of chronic pain? A systematic review. *Pain*. 2000 Jun;86(3):217-25.
- 7
- 8 Felts W, Yelin E. The economic impact of the rheumatic diseases in the United States. *J*
9 *Rheumatol*. 1989 Jul;16(7):867-84. Review.
- 10
- 11 Feuerstein M, Burrell LM, Miller VI, Lincoln A, Huang GD, Berger R. Clinical
12 management of carpal tunnel syndrome: a 12-year review of outcomes. *Am J Ind*
13 *Med*. 1999 Mar;35(3):232-45. Review.
- 14
- 15 Fink M, Wolkenstein E, Karst M, Gehrke A. Acupuncture in chronic epicondylitis: a
16 randomized controlled trial. *Rheumatology (Oxford)*. 2002 Feb;41(2):205-9.
- 17
- 18 Foster NE, Thomas E, Barlas P, Hill JC, Young J, Mason E, Hay EM. Acupuncture as an
19 adjunct to exercise based physiotherapy for osteoarthritis of the knee: randomised
20 controlled trial. *BMJ*. 2007 Sep 1;335(7617):436. Epub 2007 Aug 15.
- 21
- 22 Freedman J. An audit of 500 acupuncture patients in general practice. *Acupunct Med*.
23 2002 Mar;20(1):30-4.
- 24
- 25 Gartsman GM, Brinker MR, Khan M, Karahan M. Self-assessment of general health
26 status in patients with five common shoulder conditions. *J Shoulder Elbow Surg*.
27 1998 May-Jun;7(3):228-37.
- 28
- 29 Gilbertson B, Wenner K, Russell LC..Acupuncture and arthroscopic acromioplasty. *J*
30 *Orthop Res*. 2003 Jul;21(4):752-8.
- 31
- 32 Green S, Buchbinder R, Barnsley L, Hall S, White M, Smidt N, Assendelft W.
33 Acupuncture for lateral elbow pain. *Cochrane Database Syst Rev*.
34 2002;(1):CD003527. Review.
- 35
- 36 Green S, Buchbinder R, Glazier R, Forbes A. Interventions for shoulder pain. *Cochrane*
37 *Database Syst Rev*. 2000;(2):CD001156.
- 38
- 39 Green S, Buchbinder R, Hetrick S. Acupuncture for shoulder pain. *Cochrane Database*
40 *Syst Rev*. 2005 Apr 18;(2):CD005319. Review.
- 41

- 1 Grua D, Mattioda A, Quirico P, Lupi G, Allais G. [Acupuncture in the treatment of lateral
2 epicondylitis: evaluation of the effectiveness and comparison with ultrasound
3 therapy]. *G Ital Riflessot Agopunt*. 1999;11:63–9.
- 4
- 5 Guan, J. H. Treating Tennis Elbow by Warmed Needling and Local Massage. *Intl J Clin*
6 *Acu*. 1995;6:9596.
- 7
- 8 Guerra de Hoyos J, Bassas E, Andres M, Verdugo F, Gonzalez M. Acupuncture for soft
9 tissue shoulder disorders: a series of 201 cases. *Acupunct Med*. 2003 Jun;21(1-2):18-
10 22; discussion 22.
- 11
- 12 Guerra de Hoyos JA, Andrés Martín Mdel C, Bassas y Baena de Leon E, Vigára Lopez
13 M, Molina López T, Verdugo Morilla FA, González Moreno MJ. Randomised trial of
14 long term effect of acupuncture for shoulder pain. *Pain*. 2004 Dec;112(3):289-98.
- 15
- 16 Johansson K, Bergström A, Schröder K, Foldevi M. Subacromial corticosteroid injection
17 or acupuncture with home exercises when treating patients with subacromial
18 impingement in primary care--a randomized clinical trial. *Fam Pract*. 2011
19 Aug;28(4):355-65.
- 20
- 21 Haker E, Lundeberg T. Acupuncture treatment in epicondylalgia: a comparative study of
22 two acupuncture techniques. *Clin J Pain*. 1990 Sep;6(3):221-6.
- 23
- 24 Han, JS. Acupuncture: neuropeptide release produced by electrical stimulation of
25 different frequencies. *Trends Neurosci*. 2003 Jan;26(1):17-22. Review.
- 26
- 27 Han, JS. Acupuncture and endorphins. *Neurosci Lett*. 2004 May 6;361(1-3):258-61.
28 Review.
- 29
- 30 He D, Veiersted KB, Høstmark AT, Medbø JI. Effect of acupuncture treatment on
31 chronic neck and shoulder pain in sedentary female workers: a 6-month and 3-year
32 follow-up study. *Pain*. 2004 Jun;109(3):299-307.
- 33
- 34 Hiltz,R. Fighting work related injuries. *NatUnderwrit*. 1985;89(13):15.
- 35
- 36 Ho et al. Clinical effectiveness of acupuncture for carpal tunnel syndrome. *Am J Chin*
37 *Med*. 2014;42(2):303-14.
- 38
- 39 Hutton CW. Can the distribution of symptomatic and radiographic osteoarthritis within
40 the human body be explained? *Br J Rheumatol*. 1989A Apr;28(2):143.

- 1 Hutton CW. Osteoarthritis: the cause not result of joint failure? *Ann Rheum Dis*. 1989B
2 Nov;48(11):958-61. Review.
- 3
- 4 Iannotti JP, Kwon YW. Management of persistent shoulder pain: a treatment algorithm.
5 *Am J Orthop*. 2005 Dec;34(12 Suppl):16-23. Review.
- 6
- 7 Irnich D, Karg H, Behrens N, et al. Controlled trial on point specificity for acupuncture in
8 the treatment of lateral epicondylitis (tennis elbow). *Phys Med Rehab Kurortmed*
9 2003; 13:215-219.
- 10 Itoh K, Hirota S, Katsumi Y, Ochi H, Kitakoji H. Trigger point acupuncture for treatment
11 of knee osteoarthritis - a preliminary RCT for a pragmatic trial. *Acupunct Med*. 2008
12 Mar;26(1):17-26.
- 13
- 14 Jain TK, Sharma NK. The effectiveness of physiotherapeutic interventions in treatment
15 of frozen shoulder/adhesive capsulitis: A systematic review. *J Back Musculoskelet*
16 *Rehabil*. 2014;27(3):247-73.
- 17
- 18 Johnson GW, Cadwallader K, Scheffel SB, Epperly TD. Treatment of lateral
19 epicondylitis. *Am Fam Physician*. 2007 Sep 15;76(6):843-8. Review.
- 20
- 21 Johansson KM, Adolfsson LE, Foldevi MO. Effects of acupuncture versus ultrasound in
22 patients with impingement syndrome: randomized clinical trial. *Phys Ther*. 2005
23 Jun;85(6):490-501.
- 24
- 25 Jubb RW, Tukmachi ES, Jones PW, Dempsey E, Waterhouse L, Brailsford S. A blinded
26 randomised trial of acupuncture (manual and electroacupuncture) compared with a
27 nonpenetrating sham for the symptoms of osteoarthritis of the knee. *Acupunct Med*.
28 2008 Jun;26(2):69-78.
- 29
- 30 Kang, P. & Shen, J. (1989). Lateral Humeral Epicondylitis, Treatment Using
31 Acupuncture and Manipulation Therapy. *J Am Coll Trad Chin Med*. 1989;7:21-23.
- 32
- 33 Khosrawi S, Moghtaderi A, Haghighat S. Acupuncture in treatment of carpal tunnel
34 syndrome: A randomized controlled trial study. *J Res Med Sci*. 2012;17(1):1-7.
- 35
- 36 Kurppa K, Viikari-Juntura E, Kuosma E, Huuskonen M, Kivi P. Incidence of
37 tenosynovitis or peritendinitis and epicondylitis in a meat-processing factory. *Scand J*
38 *Work Environ Health*. 1991 Feb;17(1):32-7.
- 39
- 40 Kwon YD, Pittler MH, Ernst E. Acupuncture for peripheral joint osteoarthritis: A
41 systematic review and meta-analysis. *Rheumatology* (Oxford). 2006
42 Nov;45(11):1331-7. Epub 2006 Aug 27. Review.

- 1 Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue
2 fibroblast cytoskeletal remodeling induced by acupuncture: Evidence for a
3 mechanotransduction-based mechanism. *J Cell Physiol*. 2006A Jun;207(3):767-74.
4
- 5 Langevin HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast
6 response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J*
7 *Altern Complement Med*. 2007 Apr;13(3):355-60.
- 8 Langevin HM, Churchill DL, Wu J, Badger GJ, Yandow JA, Fox JR, Krag MH.
9 Evidence of connective tissue involvement in acupuncture. *FASEB J*. 2002
10 Jun;16(8):872-4. Epub 2002 Apr 10.
11
- 12 Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS.
13 Tissue displacements during acupuncture using ultrasound elastography techniques.
14 *Ultrasound Med Biol*. 2004 Sep;30(9):1173-83.
15
- 16 Langevin HM, Storch KN, Cipolla MJ, White SL, Buttolph TR, Taatjes DJ. Fibroblast
17 spreading induced by connective tissue stretch involves intracellular redistribution of
18 alpha- and beta-actin. *Histochem Cell Biol*. 2006B May;125(5):487-95. Epub 2006
19 Jan 14.
20
- 21 Langevin HM, Yandow JA. Relationship of acupuncture points and meridians to
22 connective tissue planes. *Anat Rec*. 2002 Dec 15;269(6):257-65.
23
- 24 Lathia AT, Jung SM, Chen LX.. Efficacy of acupuncture as a treatment for chronic
25 shoulder pain. *J Altern Complement Med*. 2009 Jun;15(6):613-8.
26
- 27 Lee MS, Ernst E. Acupuncture for pain: an overview of Cochrane reviews. *Chin J Integr*
28 *Med*. 2011;17(3):187-9.
29
- 30 Li A, Lao L, Wang Y, Xin J, Ren K, Berman BM, Tan M, Zhang R. Electroacupuncture
31 activates corticotrophin-releasing hormone-containing neurons in the paraventricular
32 nucleus of the hypothalamus to alleviate edema in a rat model of inflammation.
33 *BMC Complement Altern Med*. 2008 May 12;8:20.
34
- 35 Li P, Ayannusi O, Reid C, Longhurst JC. Inhibitory effect of electroacupuncture (EA) on
36 the pressor response induced by exercise stress. *Clin Auton Res*. 2004 Jun;14(3):182-
37 8.
38
- 39 Li et al. Therapeutic effect of acupuncture and massage for shoulder-hand syndrome in
40 hemiplegia patients: a clinical two-center randomized controlled trial. *J Tradit Chin*
41 *Med*. 2012 Sep;32(3):343-9.

- 1 MacPherson et al. Influence of control group on effect size in trials of acupuncture for
2 chronic pain: a secondary analysis of an individual patient data meta-analysis. *PLoS*
3 *One*. 2014;9(4):e93739.
- 4
- 5 Manheimer E, White A, Berman B, Forys K, Ernst E. Meta-analysis: acupuncture for low
6 back pain. *Ann Intern Med*. 2005 Apr 19;142(8):651-63. Review.
- 7
- 8 Manyanga T, Froese M, Zarychanski R, Abou-Setta A, Friesen C, Tennenhouse M, Shay
9 BL. Pain management with acupuncture in osteoarthritis: a systematic review and
10 meta-analysis. *BMC Complement Altern Med*. 2014;14:312.
- 11
- 12 McAlindon et al. OARSI guidelines for the non-surgical management of knee
13 osteoarthritis. *Osteoarthritis Cartilage*. 2014;22(3):363-88.
- 14
- 15 Meislin RJ, Sperling JW, Stitik TP. Persistent shoulder pain: epidemiology,
16 pathophysiology, and diagnosis. *Am J Orthop*. 2005 Dec;34(12 Suppl):5-9. Review.
- 17
- 18 Molsberger A, Hille E. The analgesic effect of acupuncture in chronic tennis elbow pain.
19 *Br J Rheumatol*. 1994 Dec;33(12):1162-5.
- 20
- 21 Muller M, Tsui D, Schnurr R, Biddulph-Deisroth L, Hard J, MacDermid JC.
22 Effectiveness of hand therapy interventions in primary management of carpal tunnel
23 syndrome: a systematic review. *J Hand Ther*. 2004 Apr-Jun;17(2):210-28. Review.
- 24
- 25 Nabeta T, Kawakita K. Relief of chronic neck and shoulder pain by manual acupuncture
26 to tender points--a sham-controlled randomized trial. *Complement Ther Med*. 2002
27 Dec;10(4):217-22.
- 28
- 29 Nahin RL, Barnes PM, Stussman BJ, Bloom B. Costs of complementary and alternative
30 medicine (CAM) and frequency of visits to CAM practitioners: United States, 2007.
31 *Natl Health Stat Report*. 2009 Jul 30;(18):1-14.
- 32
- 33 Napadow V, Ahn A, Longhurst J, Lao L, Stener-Victorin E, Harris R, Langevin HM. The
34 status and future of acupuncture research. *J Altern Complement Med*. 2008
35 Sep;14(7):861-9.
- 36
- 37 Napadow V, Kettner N, Liu J, Li M, Kwong KK, Vangel M, Makris N, Audette J, Hui
38 KK. Hypothalamus and amygdala response to acupuncture stimuli in carpal tunnel
39 syndrome. *Pain*. 2007 Aug;130(3):254-66. Epub 2007 Jan 19.

- 1 Napadow V, Kettner N, Ryan A, Kwong KK, Audette J, Hui KK. Somatosensory cortical
2 plasticity in carpal tunnel syndrome--a cross-sectional fMRI evaluation. *Neuroimage*.
3 2006 Jun;31(2):520-30. Epub 2006 Feb 3.
- 4
- 5 Napadow V, Liu J, Li M, Kettner N, Ryan A, Kwong KK, Hui KK, Audette JF.
6 Somatosensory cortical plasticity in carpal tunnel syndrome treated by acupuncture.
7 *Hum Brain Mapp*. 2006B Mar;28(3):159-71.
- 8
- 9 NIH Consensus Conference. Acupuncture. *JAMA*. 1998 Nov 4;280(17):1518-24. Review.
- 10 Pope DP, Croft PR, Pritchard CM, Silman AJ, Macfarlane GJ. Occupational factors
11 related to shoulder pain and disability. *Occup Environ Med*. 1997 May;54(5):316-21.
- 12
- 13 Ranney D, Wells R, Moore A. Upper limb musculoskeletal disorders in highly repetitive
14 industries: precise anatomical physical findings. *Ergonomics*. 1995 Jul;38(7):1408-
15 23.
- 16
- 17 Razavi M, Jansen GB. Effects of acupuncture and placebo TENS in addition to exercise
18 in treatment of rotator cuff tendinitis. *Clin Rehabil*. 2004 Dec;18(8):872-8.
- 19
- 20 Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder
21 pain and disability index. *Arthritis Care Res*. 1991 Dec;4(4):143-9.
- 22
- 23 Scharf HP, Mansmann U, Streitberger K, Witte S, Krämer J, Maier C, Trampisch HJ,
24 Victor N. Acupuncture and knee osteoarthritis: a three-armed randomized trial. *Ann*
25 *Intern Med*. 2006 Jul 4;145(1):12-20.
- 26
- 27 Selfe TK, Taylor AG. Acupuncture and osteoarthritis of the knee: a review of
28 randomized, controlled trials. *Fam Community Health*. 2008 Jul-Sep;31(3):247-54.
29 Review.
- 30
- 31 Sim et al. Acupuncture for carpal tunnel syndrome: a systematic review of randomized
32 controlled trials. *J Pain*. 2011;12(3):307-14.
- 33
- 34 Smith LA, Oldman AD, McQuay HJ, Moore RA. Teasing apart quality and validity in
35 systematic reviews: an example from acupuncture trials in chronic neck and back
36 pain. *Pain*. 2000 May;86(1-2):119-32.
- 37
- 38 Szczurko O, Cooley K, Mills EJ, Zhou Q, Perri D, Seely D. Naturopathic treatment of
39 rotator cuff tendinitis among Canadian postal workers: a randomized controlled trial.
40 *Arthritis Rheum*. 2009 Aug 15;61(8):1037-45.

- 1 Trinh KV, Phillips SD, Ho E, Damsma K. Acupuncture for the alleviation of lateral
2 epicondyle pain: a systematic review. *Rheumatology* (Oxford). 2004 Sep;43(9):1085-
3 90. Epub 2004 Jun 22. Review.
- 4
- 5 Ulett GA, Han S, Han JS. Electroacupuncture: mechanisms and clinical application. *Biol*
6 *Psychiatry*. 1998 Jul 15;44(2):129-38. Review.
- 7
- 8 van der Heijden GJ. Shoulder disorders: a state-of-the-art review. *Baillieres Best Pract*
9 *Res Clin Rheumatol*. 1999 Jun;13(2):287-309. Review.
- 10
- 11 Vas J, White A. Evidence from RCTs on optimal acupuncture treatment for knee
12 osteoarthritis-an exploratory review. *Acupunct Med*. 2007 Jun;25(1-2):29-35. Review.
- 13
- 14 Vickers AJ, Cronin AM, Maschino AC, et al. Acupuncture for Chronic Pain: Individual
15 Patient Data Meta-analysis. *Arch Intern Med*. Published online September 10, 2012.
16 doi:10.1001/archinternmed.2012.3654.
- 17
- 18 Verdugo RJ, Salinas RA, Castillo JL, Cea JG. Surgical versus non-surgical treatment for
19 carpal tunnel syndrome. *Cochrane Database Syst Rev*. 2008 Oct 8;(4):CD001552.
20 Review.
- 21
- 22 Weiner DK, Rudy TE, Morone N, Glick R, Kwoh CK. Efficacy of periosteal stimulation
23 therapy for the treatment of osteoarthritis-associated chronic knee pain: an initial
24 controlled clinical trial. *J Am Geriatr Soc*. 2007 Oct;55(10):1541-7.
- 25
- 26 Werner RA, Andary M. Carpal tunnel syndrome: pathophysiology and clinical
27 neurophysiology. *Clin Neurophysiol*. 2002 Sep;113(9):1373-81. Review.
- 28
- 29 Werner RA, Hamann C, Franzblau A, Rodgers PA. Prevalence of carpal tunnel syndrome
30 and upper extremity tendinitis among dental hygienists. *J Dent Hyg*. 2002
31 Spring;76(2):126-32.
- 32
- 33 White A, Foster NE, Cummings M, Barlas P. Acupuncture treatment for chronic knee
34 pain: a systematic review. *Rheumatology* (Oxford). 2007 Mar;46(3):384-90. Epub
35 2007 Jan 10. Review.
- 36
- 37 White P, Lewith G, Berman B, Birch S. Reviews of acupuncture for chronic neck pain:
38 pitfalls in conducting systematic reviews. *Rheumatology* (Oxford). 2002
39 Nov;41(11):1224-31. Review.

- 1 Williamson L, Wyatt MR, Yein K, Melton JT. Severe knee osteoarthritis: a randomized
2 controlled trial of acupuncture, physiotherapy (supervised exercise) and standard
3 management for patients awaiting knee replacement. *Rheumatology* (Oxford). 2007
4 Sep;46(9):1445-9. Epub 2007 Jun 29.
- 5
- 6 Witt C, Brinkhaus B, Jena S, Linde K, Streng A, Wagenpfeil S, Hummelsberger J,
7 Walther HU, Melchart D, Willich SN. Acupuncture in patients with osteoarthritis of
8 the knee: a randomised trial. *Lancet*. 2005 Jul 9-15;366(9480):136-43.
- 9
- 10 Wu, Z. Successful treatment of epicondylitis with chize-through-tender point puncturing
11 method. *J Tradit Chin Med*. 1990 Jun;10(2):122-3.
- 12
- 13 Yang CP, Hsieh CL, Wang NH, Li TC, Hwang KL, Yu SC, Chang MH. Acupuncture in
14 patients with carpal tunnel syndrome:A randomized controlled trial. *Clin J Pain*. 2009
15 May;25(4):327-33.
- 16
- 17 Yang et al. A randomized clinical trial of acupuncture versus oral steroids for carpal
18 tunnel syndrome: a long-term follow-up. *J Pain*. 2011;12(2):272-9.
- 19
- 20 Yao E et al. Randomized controlled trial comparing acupuncture with placebo
21 acupuncture for the treatment of carpal tunnel syndrome. *PMR*. 2012;4(5):367-73.
- 22
- 23 Yassi A, Sprout J, Tate R. Upper limb repetitive strain injuries in Manitoba. *Am J Ind*
24 *Med*. 1996 Oct;30(4):461-72.
- 25
- 26 Zhang, H. 32 cases of tennis elbow treated by the three-needle therapy on the elbow. *J*
27 *Tradit Chin Med*. 1998 Sep;18(3):197-8.
- 28
- 29 Zhang RX, Lao L, Wang X, Fan A, Wang L, Ren K, Berman BM. Electroacupuncture
30 attenuates inflammation in a rat model. *J Altern Complement Med*. 2005
31 Feb;11(1):135-42.