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

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

Product: **Specialty**

POLICY

American Specialty Health – Specialty (ASH) clinical committees have determined the use of acupuncture for the treatment of chronic cervical and lumbar spinal pain is established as clinically effective. There is also evidence to support the use of acupuncture for acute cervical and lumbar spinal pain and sciatica. A trial of acupuncture for acute and chronic thoracic pain may be supported based on the evidence for cervical and lumbar pain. The use of acupuncture for the management of spinal pain is professionally recognized, scientifically plausible, and appears to have a favorable benefit:risk profile.

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

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

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

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

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

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

Acupuncture Safety

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

Description/Background

Neck Pain

The etiology of neck pain is poorly understood yet the international prevalence ranges from 27-48% (Carroll et al., 2008). Estimates of individuals limiting activities resultant to neck pain range from 11-14%, and males between the ages of 20-40 are more likely to miss work due to this condition (Côté et al., 2008a; Côté et al., 2008b). Recent data suggest that neck pain results from multi-factorial interactions in two key areas: 1) individual risk factors (e.g., age and history of musculoskeletal pain) and 2) workplace risk factors (e.g., repetitive work and job insecurity) (Côté et al., 2008b). The Task Force on Neck Pain recently concluded that acupuncture, low-level laser therapy and exercise appear to be the most viable treatment options for non-whiplash related neck pain (Hurwitz et al., 2008; Guzman et al., 2008a; Guzman et al., 2008b). To date no prevention strategies have been shown to reduce the incidence of neck pain in workers (Côté et al., 2008b). The poorly understood etiology and treatment options call for focused study on evaluation, prevention strategies and noninvasive options for the treatment of cervical neck pain (Carroll et al., 2008; Hurwitz et al., 2008).

Low Back Pain

The etiology of chronic low back pain is poorly understood, despite the significant incidence (70%) in developed countries (van Tulder & Koes, 2006; Andersson, 1997). Low back pain is defined as pain or stiffness inferior to the costal margin and superior to the inferior gluteal folds, with or without sciatica, and approximately 2-7% of reported acute cases become chronic (>12-weeks) (Andersson, 1997). Nonspecific low back pain is the most common diagnoses, accounting for 85% of cases and is defined as pain non-attributable to recognizable pathology (e.g., fracture, infection, tumor, rheumatoid arthritis) (van Tulder & Koes, 2006). Risk factors for nonspecific low back pain include sedentary lifestyle, age (35-55), heavy physical work, stress/anxiety, and previous history of low back pain.

Chronic low-back pain is responsible for half of all workers compensation cases, demonstrating the endemic nature of chronic pain in the United States (Grabois, 2005). The estimated annual cost of low back pain is $14 billion and accounts for a total of 19 million doctors visits. The goal of chronic pain therapy is to mitigate symptoms, decrease healthcare visits and increase patient function through an interdisciplinary approach (Grabois, 2005). In support of this recommendation, a recent survey found that 54% of individuals suffering from back or neck pain chose a complementary and alternative medicine (CAM) technique over usual medical care (34%) (Wolsko et al., 2003). In line with this finding it is well documented that back pain is the most common reason to seek treatment with acupuncture (Xue et al., 2008; Maiers et al., 2008; Burke et al., 2006; Eisenberg et al., 1998).

Evidence and Research

Neck Pain

Despite the high prevalence of neck pain (27-48%), its etiology is poorly understood (Carroll et al., 2008; Côté et al., 2008b). Currently accepted usual care treatment options demonstrate limited effectiveness, warranting study on the evaluation, prevention, and noninvasive options for cervical neck pain (Carroll et al., 2008; Hurwitz et al., 2008; Vas et al., 2006). Of three systematic reviews conducted to date (Fu et al., 2009; Trinh et al., 2006; White & Ernst, 1999), the two most recent concluded that acupuncture is an effective treatment for the short-term relief of chronic cervical neck pain (Fu et al., 2009; Trinh et al., 2006). Long-term benefits from acupuncture are not readily apparent from the trials, yet authors conclude that future, long-term investigations are warranted.

The most recent and most rigorous review of the literature (Vickers et al., 2012) used individual patient data in a meta-analysis of the effectiveness of acupuncture for back and neck pain, osteoarthritis, chronic headache and shoulder pain. 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.

The earliest review, which is now over a decade old, drew conclusions from a dearth of well designed randomized controlled trials (RCTs) and called for future trials to control for common methodological pitfalls (White & Ernst, 1999). Interestingly, the conclusions of this review were questioned for methodological flaws in a revised analysis and review (White et al., 2002). The commentary by White et al. opined the inappropriateness for systematic reviews to draw conclusions from numerous low quality RCTs and suggested that if more appropriate inclusion criteria were utilized, three (3) rather than fourteen (14) RCTs would have been included in the review. These three trials are of mixed results, leading the authors to state that no appropriate conclusions can be drawn from the evidence. They go further to call for higher quality RCTs to be conducted (for acupuncture and neck pain) prior to subsequent systematic reviews. This call was answered in the past decade as evidenced by the recent large scale clinical trial from Germany (Witt et al., 2006) and the subsequent systematic review and meta-analysis of pooled data (Fu et al., 2009). The recent large trial from Germany was not only clinically relevant with its treatment protocol (individualized acupuncture), but provided an assessment of cost effectiveness, both unique and critical features for current clinical trials.

One RCT from China (Huang, 2004) is also worth noting. This trial highlights a methodological concern often not addressed in acupuncture research: the differing view

of disease between traditional Chinese medicine (TCM) and biomedicine; TCM recognizes numerous patterns for a single biomedical condition. Utilizing this concept, investigators stratified patients with cervical spondylopathy to one of four sub-groups. The results indicated that the effect of electroacupuncture was superior to Transcutaneous Electrical Nerve Stimulation (TENS) for two subgroups and inferior to TENS for one of the subgroups.

Low Back Pain

Numerous RCTs and subsequent systematic review have been conducted on the benefits of acupuncture in the treatment of lumbar spinal conditions and the vast majority focus on non-specific chronic low back pain. The most recent and robust meta-analysis strengthens the evidence regarding the benefits of acupuncture for the treatment of low back pain (Yuan et al., 2008). The authors suggest that in comparison to current usual care (e.g., exercise, NSAIDS, behavioral treatments) the equivalent effect sizes of acupuncture and its cost-effectiveness warrant inclusion in the European Guidelines (Airaksinen et al., 2006) for the treatment of chronic low back pain. In regards to the inability of acupuncture to demonstrate more efficacious findings than physiologically active sham controls, the authors discuss secondary analyses of the pooled data (Yuan et al., 2008). It appears that acupuncture is not significantly different from sham acupuncture, yet when more pragmatic designs are utilized (e.g., acupuncture adjunctive to usual care) the findings are more promising, yet inconclusive.

An RCT performed in Austria investigated the differences in manual (MA) and electro (EA) auricular acupuncture for patients with chronic low back pain recalcitrant to pharmaceutical intervention (Sator-Katzenschlager et al., 2004). Participants (n=61) were randomized to receive treatment at identical auricular acupoints once per week for six (6) weeks. All acupuncture needles remained in situ for forty-eight (48) hours; the EA group received the addition of two (2) Hz of EA via a small device worn behind the ear. Although both groups demonstrated a decrease in pain post-treatment, the EA group was significantly better and the results were maintained at three (3) month follow-up. Increases were observed in psychological wellbeing, physical activity, and quality of sleep for the EA group. As well, the EA group demonstrated a significant decrease during treatment in the amount of rescue medication (tramadol) needed as compared to the manual acupuncture group.

An active comparison study, reporting a one-year follow-up of an RCT comparing acupuncture, spinal manipulation, and medication for chronic spinal pain (e.g., neck or back pain), demonstrated that spinal manipulation was superior to acupuncture and medication (Muller & Giles, 2005). This finding supports the original study (Giles & Muller, 2003) that demonstrated a superior effect of spinal manipulation. However, the authors concluded that the data does not support the use of only one form of therapy, e.g.,

acupuncture plus spinal manipulation would be more efficacious. This statement is in concert with the guidelines of proper interdisciplinary treatment for chronic pain management (Grabois, 2005).

Numerous outcomes studies from China document the effectiveness of acupuncture for the treatment of sciatica (Xu & Chen, 2000; Pei, 1994; Hu, 1993; Li et al., 1989; Qi et al., 1985; Jiang et al., 1984; Leung, 1973). A recent report, not covered in the sciatica review by Longworth and McCarthy (1997), compared two forms of acupuncture for the treatment of sciatica (Xu & Chen, 2000). A total of one hundred (100) participants were treated with a classical needling technique whereby the acupoint is initially needled and de qi obtained. The needle is then surrounded on the 'X and Y' axis by four (4) additional needles, all aimed at the tip of the center needle. A total of seventy-four (74) participants in the control group received the standard needling technique, one (1) acupuncture needle per acupoint. Results indicate that the treatment group was significantly more effective than the comparison group; however both groups achieved ~75% effective rates.

A recent systematic review and meta-analysis by Lam, et. al. (2013) found supporting evidence for the use of acupuncture for non-specific chronic low back pain. The review also concluded that the low overall methodological quality of the studies limited the confidence in this conclusion. A review by Hutchinson, et. al. (2012) found that acupuncture provided greater relief than no treatment for chronic low back pain, but the evidence on acupuncture's effectiveness compared to other standard treatments was conflicting and no conclusions could be drawn.

Conclusions

1. The evidence supports the short-term benefit of acupuncture for chronic neck pain.
2. There have been no RCTs to assess the effectiveness of acupuncture for acute neck pain.
3. The limited available evidence is equivocal regarding the long term benefit of acupuncture for chronic neck pain.
4. The evidence supports the short-term benefit of acupuncture for chronic low back pain.
5. There is limited evidence to support the effectiveness of acupuncture for acute low back pain.
6. The limited available evidence is equivocal regarding the long term benefit of acupuncture for chronic low back pain.
7. Limited evidence supports the benefit of acupuncture for the treatment of pregnancy-related non-specific mechanical back/pelvic pain.
8. The evidence is insufficient to support or refute the benefit of acupuncture for the treatment of sciatica.

References - Cervical Pain

Acupuncture. (1997). *NIH Consensus Statement, 15*(5), 1-34. Retrieved January 4, 2010, from http://consensus.nih.gov/1997/1997Acupuncture107PDF.pdf

Birch S, Jamison RN. Controlled trial of Japanese acupuncture for chronic myofascial neck pain: assessment of specific and nonspecific effects of treatment. *Clin J Pain*. 1998 Sep;14(3):248-55.

Carroll LJ, Hogg-Johnson S, Côté P, van der Velde G, Holm LW, Carragee EJ, Hurwitz EL, Peloso PM, Cassidy JD, Guzman J, Nordin M, Haldeman S; Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Course and prognostic factors for neck pain in workers: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* (Phila Pa 1976). 2008 Feb 15;33(4 Suppl):S93-100. Review.

Côté P, Kristman V, Vidmar M, Van Eerd D, Hogg-Johnson S, Beaton D, Smith PM. The prevalence and incidence of work absenteeism involving neck pain: a cohort of Ontario lost-time claimants. *Spine* (Phila Pa 1976). 2008A Feb 15;33(4 Suppl):S192-8.

Côté P, van der Velde G, Cassidy JD, Carroll LJ, Hogg-Johnson S, Holm LW, Carragee EJ, Haldeman S, Nordin M, Hurwitz EL, Guzman J, Peloso PM; Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. The burden and determinants of neck pain in workers: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* (Phila Pa 1976). 2008 Feb 15;33(4 Suppl):S60-74. Review.

Dong H, Wang X, Meng X, Liu G. Forty-six cases of the nerve root-involved cervical spondylopathy treated by needling the "Sitian" points. *J Tradit Chin Med*. 2005 Sep;25(3):163-5.

Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA*. 1998 Nov 11;280(18):1569-75.

Freedman J. An audit of 500 acupuncture patients in general practice. *Acupunct Med*. 2002 Mar;20(1):30-4.

Fu LM, Li JT, Wu WS. Randomized Controlled Trials of Acupuncture for Neck Pain: Systematic Review and Meta-Analysis. *J Altern Complement Med*. 2009 Feb 13.

Guzman J, Haldeman S, Carroll LJ, Carragee EJ, Hurwitz EL, Peloso P, Nordin M, Cassidy JD, Holm LW, Côté P, van der Velde G, Hogg-Johnson S; Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Clinical practice implications of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders: from concepts and findings to recommendations. *Spine* (Phila Pa 1976). 2008A Feb 15;33(4 Suppl):S199-213.

Guzman J, Hurwitz EL, Carroll LJ, Haldeman S, Côté P, Carragee EJ, Peloso PM, van der Velde G, Holm LW, Hogg-Johnson S, Nordin M, Cassidy JD; Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. A new conceptual model of neck pain: linking onset, course, and care: the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* (Phila Pa 1976). 2008B Feb 15;33(4 Suppl):S14-23.

Han, JS. Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. *Trends Neurosci*. 2003 Jan;26(1):17-22.

Han, JS. Acupuncture and endorphins. *Neurosci Lett*. 2004 May 6;361(1-3):258-61. Review.

Huang L. Comparison of the effects of electroacupuncture plus cupping with that of the electrical pulse therapy for different types of cervical spondylopathy. *J Tradit Chin Med*. 2004 Mar;24(1):33-5.

Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J, Peloso PM, Holm LW, Côté P, Hogg-Johnson S, Cassidy JD, Haldeman S; Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* (Phila Pa 1976). 2008 Feb 15;33(4 Suppl):S123-52. Review.

Irnich D, Behrens N, Gleditsch JM, Stör W, Schreiber MA, Schöps P, Vickers AJ, Beyer A. Immediate effects of dry needling and acupuncture at distant points in chronic neck pain: results of a randomized, double-blind, sham-controlled crossover trial. Pain. 2002 Sep;99(1-2):83-9.

Irnich D, Behrens N, Molzen H, König A, Gleditsch J, Krauss M, Natalis M, Senn E, Beyer A, Schöps P. Randomised trial of acupuncture compared with conventional massage and "sham" laser acupuncture for treatment of chronic neck pain. *BMJ*. 2001 Jun 30;322(7302):1574-8.

Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: Evidence for a mechanotransduction-based mechanism. *J Cell Physiol*. 2006A Jun;207(3):767-74.

Langevin HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J Altern Complement Med*. 2007 Apr;13(3):355-60.

Langevin HM, Churchill DL, Wu J, Badger GJ, Yandow JA, Fox JR, Krag MH. Evidence of connective tissue involvement in acupuncture. *FASEB J*. 2002 Jun;16(8):872-4. Epub 2002 Apr 10.

Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS. Tissue displacements during acupuncture using ultrasound elastography techniques. *Ultrasound Med Biol*. 2004 Sep;30(9):1173-83.

Langevin HM, Storch KN, Cipolla MJ, White SL, Buttolph TR, Taatjes DJ. Fibroblast spreading induced by connective tissue stretch involves intracellular redistribution of alpha- and beta-actin. *Histochem Cell Biol*. 2006B May;125(5):487-95. Epub 2006 Jan 14.

Langevin HM, Yandow JA. Relationship of acupuncture points and meridians to connective tissue planes. *Anat Rec*. 2002 Dec 15;269(6):257-65.

Li A, Lao L, Wang Y, Xin J, Ren K, Berman BM, Tan M, Zhang R. Electroacupuncture activates corticotrophin-releasing hormone-containing neurons in the paraventricular nucleus of the hypothalammus to alleviate edema in a rat model of inflammation. *BMC Complement Altern Med*. 2008 May 12;8:20.

Li P, Ayannusi O, Reid C, Longhurst JC. Inhibitory effect of electroacupuncture (EA) on the pressor response induced by exercise stress. *Clin Auton Res*. 2004 Jun;14(3):182-8.

Loy TT. Treatment of cervical spondylosis. Electroacupuncture versus physiotherapy. Med J Aust. 1983 Jul 9;2(1):32-4.

Nabeta T, Kawakita K. Relief of chronic neck and shoulder pain by manual acupuncture to tender points-a sham-controlled randomized trial. Complement Ther Med. 2002 Dec;10(4):217-22.

Nahin RL, Barnes PM, Stussman BJ, Bloom B. Costs of complementary and alternative medicine (CAM) and frequency of visits to CAM practitioners: United States, 2007. *Natl Health Stat Report*. 2009 Jul 30;(18):1-14.

Napadow V, Ahn A, Longhurst J, Lao L, Stener-Victorin E, Harris R, Langevin HM. The status and future of acupuncture research. *J Altern Complement Med*. 2008 Sep;14(7):861-9.

Napadow V, Kettner N, Liu J, Li M, Kwong KK, Vangel M, Makris N, Audette J, Hui KK. Hypothalamus and amygdala response to acupuncture stimuli in carpal tunnel syndrome. *Pain*. 2007 Aug;130(3):254-66. Epub 2007 Jan 19.

Smith LA, Oldman AD, McQuay HJ, Moore RA. Teasing apart quality and validity in systematic reviews: an example from acupuncture trials in chronic neck and back pain. *Pain*. 2000 May;86(1-2):119-32.

Trinh KV, Graham N, Gross AR, Goldsmith CH, Wang E, Cameron ID, Kay T; Cervical Overview Group. Acupuncture for neck disorders. Cochrane Database Syst Rev. 2006 Jul 19;3:CD004870. Review.

Ulett GA, Han S, Han JS. Electroacupuncture: mechanisms and clinical application. *Biol Psychiatry*. 1998 Jul 15;44(2):129-38. Review.

Vas J, Perea-Milla E, Méndez C, Sánchez Navarro C, León Rubio JM, Brioso M, García Obrero I. Efficacy and safety of acupuncture for chronic uncomplicated neck pain: A randomised controlled study. *Pain*. 2006 Dec 15;126(1-3):245-55. Epub 2006 Aug 23.

Vickers AJ, Cronin AM, Maschino AC, et al. Acupuncture for Chronic Pain: Individual Patient Data Meta-analysis. Arch Intern Med. Published online September 10, 2012. doi:10.1001/archinternmed.2012.3654.

Wang L, Wang D, Tian Y. Treatment by electro-acupuncture and massage in 172 cases of cervical spondylopathy. *J Tradit Chin Med*. 2003 Jun;23(2):129-30.

White AR, Ernst E. A systematic review of randomized controlled trials of acupuncture for neck pain. *Rheumatology* (Oxford). 1999 Feb;38(2):143-7. Review.

White P, Lewith G, Berman B, Birch S. Reviews of acupuncture for chronic neck pain: pitfalls in conducting systematic reviews. *Rheumatology* (Oxford). 2002 Nov;41(11):1224-31. Review.

White P, Lewith G, Prescott P, Conway J. Acupuncture versus placebo for the treatment of chronic mechanical neck pain: a randomized, controlled trial. *Ann Intern Med*. 2004 Dec 21;141(12):911-9.

Willich SN, Reinhold T, Selim D, Jena S, Brinkhaus B, Witt CM. Cost-effectiveness of acupuncture treatment in patients with chronic neck pain. *Pain*. 2006 Nov;125(1-2):107-13. Epub 2006 Jul 13.

Witt CM, Jena S, Brinkhaus B, Liecker B, Wegscheider K, Willich SN. Acupuncture for patients with chronic neck pain. *Pain*. 2006 Nov;125(1-2):98-106. Epub 2006 Jun 14.

Zhang RX, Lao L, Wang X, Fan A, Wang L, Ren K, Berman BM. Electroacupuncture attenuates inflammation in a rat model. *J Altern Complement Med*. 2005 Feb;11(1):135-42.

Zhu XM, Polus B. A controlled trial on acupuncture for chronic neck pain. *Am J Chin Med*. 2002;30(1):13-28.

References - Lumbar Pain

Airaksinen, O., Brox, J.I., Cedraschi, C., Hildebrandt, J., Klaber-Moffett, J., Kovacs, F., Mannion, A.F., Reis, S., Staal, J.B., Ursin, H., Zanoli, G. Chapter 4 European guidelines for the management of chronic nonspecific low back pain. Eur Spin J (2006) 15 (Suppl. 2): S192-S300.

Andersson, G. B. (1997). The epidemiology of spinal disorders. In: The Adult Spine: Principles and Practice. In J.W.Frymoyer (Ed.), (2nd ed., pp. 93-141). New York, N.Y.: Raven Press.

Burke, A, Upchurch, DM, Dye, C, Chyu, L. Acupuncture use in the United States: findings from the National Health Interview Survey. *J Altern Complement Med*. 2006 Sep;12(7):639-48.

Ceccherelli, F, Rigoni, MT, Gagliardi, G, Ruzzante, L. Comparison of superficial and deep acupuncture in the treatment of lumbar myofascial pain: a double-blind randomized controlled study. *Clin J Pain*. 2002 May-Jun;18(3):149-53.

Cherkin DC, Sherman KJ, Avins AL, Erro JH, Ichikawa L, Barlow WE, Delaney K, Hawkes R, Hamilton L, Pressman A, Khalsa PS, Deyo RA. A randomized trial comparing acupuncture, simulated acupuncture, and usual care for chronic low back pain. *Arch Intern Med*. 2009 May 11;169(9):858-66.

Ee CC, Manheimer E, Pirotta MV, White AR. Acupuncture for pelvic and back pain in pregnancy: a systematic review. *Am J Obstet Gynecol*. 2008 Mar;198(3):254-9. Review.

Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA*. 1998 Nov 11;280(18):1569-75.

Ernst E, White AR. Acupuncture for back pain: a meta-analysis of randomized controlled trials. *Arch Intern Med*. 1998 Nov 9;158(20):2235-41.

Ezzo J, Berman B, Hadhazy VA, Jadad AR, Lao L, Singh BB. Is acupuncture effective for the treatment of chronic pain? A systematic review. *Pain*. 2000 Jun;86(3):217-25.

Freedman J. An audit of 500 acupuncture patients in general practice. *Acupunct Med*. 2002 Mar;20(1):30-4.

Furlan AD, van Tulder MW, Cherkin DC, Tsukayama H, Lao L, Koes BW, Berman BM. Acupuncture and dry-needling for low back pain. *Cochrane Database Syst Rev*. 2005 Jan 25;(1):CD001351. Review.

Giles LG, Muller R. Chronic Spinal Pain: A Randomized Clinical Trial Comparing Medication, Acupuncture, and Spinal Manipulation. *Spine* (Phila Pa 1976). 2003 Jul 15;28(14):1490-502; discussion 1502-3.

Grabois M. Management of chronic low back pain. *Am J Phys Med Rehabil*. 2005 Mar;84(3 Suppl):S29-41. Review.

Han, JS. Acupuncture: neuropeptide release produced by electrical stimulation of different frequencies. *Trends Neurosci*. 2003 Jan;26(1):17-22. Review.

Han, JS. Acupuncture and endorphins. *Neurosci Lett*. 2004 May 6;361(1-3):258-61. Review.

Henderson, H. Acupuncture: Evidence for its use in chronic low back pain. *Br J Nurs*. 2002 Nov 28-Dec 11;11(21):1395-403. Review.

Herman PM, Szczurko O, Cooley K, Mills EJ. Cost-effectiveness of naturopathic care for chronic low back pain. *Altern Ther Health Med*. 2008 Mar-Apr;14(2):32-9.

Hu, R. Treatment of Acute Lumbar Sprain by Acupuncture at Fuyang. *J Tradit Chin Med*. 1993 Dec;13(4):264-5.

Hutchinson AJ, Ball S, Andrews JC, Jones GG. The effectiveness of acupuncture in treating chronic non-specific low back pain: a systematic review of the literature. J Orthop Surg Res. 2012 Oct 30;7:36.

Jiang YG, Mu JS, Zhang XY, Bai QL. Clinical observation on acupuncture treatment of 106 cases of trunk-sciatica. *J Tradit Chin Med*. 1984 Sep;4(3):183-5.

Lam M, Galvin R, Curry P. Effectiveness of acupuncture for nonspecific chronic low back pain: a systematic review and meta-analysis. Spine. 2013 Nov 15;38(24):2124-38.

Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: Evidence for a mechanotransduction-based mechanism. *J Cell Physiol*. 2006A Jun;207(3):767-74.

Langevin HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J Altern Complement Med*. 2007 Apr;13(3):355-60.

Langevin HM, Churchill DL, Wu J, Badger GJ, Yandow JA, Fox JR, Krag MH. Evidence of connective tissue involvement in acupuncture. *FASEB J*. 2002 Jun;16(8):872-4. Epub 2002 Apr 10.

Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS. Tissue displacements during acupuncture using ultrasound elastography techniques. *Ultrasound Med Biol*. 2004 Sep;30(9):1173-83.

Langevin HM, Storch KN, Cipolla MJ, White SL, Buttolph TR, Taatjes DJ. Fibroblast spreading induced by connective tissue stretch involves intracellular redistribution of alpha- and beta-actin. *Histochem Cell Biol*. 2006B May;125(5):487-95. Epub 2006 Jan 14.

Langevin HM, Yandow JA. Relationship of acupuncture points and meridians to connective tissue planes. *Anat Rec*. 2002 Dec 15;269(6):257-65.

Leung, SJ. Acupuncture treatment for pain syndrome. I. Treatment for sciatica (report on 90 cases). *Am J Chin Med* (Gard City N Y). 1973 Jul;1(2):317-26.

Li A, Lao L, Wang Y, Xin J, Ren K, Berman BM, Tan M, Zhang R. Electroacupuncture activates corticotrophin-releasing hormone-containing neurons in the paraventricular nucleus of the hypothalammus to alleviate edema in a rat model of inflammation. *BMC Complement Altern Med*. 2008 May 12;8:20.

Li P, Ayannusi O, Reid C, Longhurst JC. Inhibitory effect of electroacupuncture (EA) on the pressor response induced by exercise stress. *Clin Auton Res*. 2004 Jun;14(3):182-8.

Li Q, Lu S, Luo JM, Liang SZ. An observation on the therapeutic effect of acupuncture in the treatment of sciatica. *J Tradit Chin Med*. 1989 Jun;9(2):90-2.

Longworth W, McCarthy PW. A review of research on acupuncture for the treatment of lumbar disk protrusions and associated neurological symptomatology. *J Altern Complement Med*. 1997 Spring;3(1):55-76. Review.

Maiers M, McKenzie E, Evans R, McKenzie M. Patient outcomes at a traditional Chinese medicine teaching clinic: a prospective data collection project. *J Altern Complement Med*. 2008 Nov;14(9):1083-8.

Manheimer E, White A, Berman B, Forys K, Ernst E. Meta-analysis: acupuncture for low back pain. *Ann Intern Med*. 2005 Apr 19;142(8):651-63. Review.

Molsberger AF, Mau J, Pawelec DB, Winkler J. Does acupuncture improve the orthopedic management of chronic low back pain - a randomized, blinded, controlled trial with 3 months follow up. *Pain*. 2002 Oct;99(3):579-87.

Muller R, Giles LG. Long-term follow-up of a randomized clinical trial assessing the efficacy of medication, acupuncture, and spinal manipulation for chronic mechanical spinal pain syndromes. *J Manipulative Physiol Ther*. 2005 Jan;28(1):3-11.

Nahin RL, Barnes PM, Stussman BJ, Bloom B. Costs of complementary and alternative medicine (CAM) and frequency of visits to CAM practitioners: United States, 2007. *Natl Health Stat Report*. 2009 Jul 30;(18):1-14.

Napadow V, Ahn A, Longhurst J, Lao L, Stener-Victorin E, Harris R, Langevin HM. The status and future of acupuncture research. *J Altern Complement Med*. 2008 Sep;14(7):861-9.

Napadow V, Kettner N, Liu J, Li M, Kwong KK, Vangel M, Makris N, Audette J, Hui KK. Hypothalamus and amygdala response to acupuncture stimuli in carpal tunnel syndrome. *Pain*. 2007 Aug;130(3):254-66. Epub 2007 Jan 19.

Pei, J. Treatment of sciatica by acupuncture at jiaji points--a report of 168 cases. *J Tradit Chin Med*. 1994 Dec;14(4):266-8.

Prady SL, Thomas K, Esmonde L, Crouch S, MacPherson H. The natural history of back pain after a randomised controlled trial of acupuncture vs usual care - long term outcomes. *Acupunct Med*. 2007 Dec;25(4):121-9.

Qi LY, Duan SJ, Liao WJ. Acupuncture treatment of sciatica and a preliminary study of the analgesic mechanism. *J Tradit Chin Med*. 1985 Sep;5(3):179-84. No abstract available.

Ratcliffe J, Thomas KJ, MacPherson H, Brazier J. A randomised controlled trial of acupuncture care for persistent low back pain: cost effectiveness analysis. *BMJ*. 2006 Sep 23;333(7569):626. Epub 2006 Sep 15.

Sator-Katzenschlager SM, Scharbert G, Kozek-Langenecker SA, Szeles JC, Finster G, Schiesser AW, Heinze G, Kress HG. The short- and long-term benefit in chronic low back pain through adjuvant electrical versus manual auricular acupuncture. *Anesth Analg*. 2004 May;98(5):1359-64.

Smith LA, Oldman AD, McQuay HJ, Moore RA. Teasing apart quality and validity in systematic reviews: an example from acupuncture trials in chronic neck and back pain. *Pain*. 2000 May;86(1-2):119-32.

Thomas KJ, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell M, Fitter M, Roman M, Walters S, Nicholl JP. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. *Health Technol Assess*. 2005 Aug;9(32):iii-iv, ix-x, 1-109.

Ulett GA, Han S, Han JS. Electroacupuncture: mechanisms and clinical application. *Biol Psychiatry*. 1998 Jul 15;44(2):129-38. Review.

van Tulder MW, Cherkin DC, Berman B, Lao L, Koes BW. The effectiveness of acupuncture in the management of acute and chronic low back pain. A systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine* (Phila Pa 1976). 1999 Jun 1;24(11):1113-23.

van Tulder, M. W., Cherkin, D. C., Berman, B., Lao, L., & Koes, B. W. (2000). Acupuncture for low back pain. *Cochrane.Database.Syst.Rev*., CD001351.

van Tulder M & Koes B. Low back pain (chronic). *Clin Evid*. 2006 Jun;(15):1634-53. Review.

White P, Lewith G, Berman B, Birch S. Reviews of acupuncture for chronic neck pain: pitfalls in conducting systematic reviews. *Rheumatology* (Oxford). 2002 Nov;41(11):1224-31. Review.

Wolsko PM, Eisenberg DM, Davis RB, Kessler R, Phillips RS. Patterns and perceptions of care for treatment of back and neck pain: results of a national survey. *Spine* (Phila Pa 1976). 2003 Feb 1;28(3):292-7; discussion 298.

Xu M, Chen W. One hundred cases of sciatica treated by surrounding puncture. *J Tradit Chin Med*. 2000 Jun;20(2):128-9.

Xue CC, Zhang AL, Lin V, Myers R, Polus B, Story DF. Acupuncture, chiropractic and osteopathy use in Australia: a national population survey. *BMC Public Health*. 2008 Apr 1;8:105.

Yuan J, Purepong N, Kerr DP, Park J, Bradbury I, McDonough S. Effectiveness of Acupuncture for Low Back Pain: A Systematic Review. *Spine* (Phila Pa 1976). 2008 Nov 1;33(23):E887-900. Review.

Zhang RX, Lao L, Wang X, Fan A, Wang L, Ren K, Berman BM. Electroacupuncture attenuates inflammation in a rat model. *J Altern Complement Med*. 2005 Feb;11(1):135-42.