

ACUPUNCTURE AND CARPAL TUNNEL SYNDROME

About carpal tunnel syndrome

Carpal tunnel syndrome comprises potentially disabling sensory and/or motor symptoms in the hand. Around 1 in 10 people develop carpal tunnel syndrome at some point, and it is particularly common in women (Hughes 2007), with one study in the UK indicating an incidence of 139.4 cases per 100,000 women per year and 67.2 cases per 100,000 men (Bland 2003). The condition carries considerable implications for employment and healthcare costs (Bland 2007).

The symptoms of carpal tunnel syndrome are caused by compression of the median nerve in the carpal tunnel at the wrist and include numbness, tingling, and burning sensations, and a dull ache in the hand and fingers (Hughes 2009). These symptoms are usually restricted to the thumb, index, middle and ring fingers, but may affect the little finger and/or the palm as well (Stevens 2005). They usually occur at night, often waking the patient from sleep, but can be relieved within a few minutes by shaking the hand (Stevens 2005). Pain sometimes radiates up the forearm as far as the elbow, and even as high as the shoulder or root of the neck (Stevens 2005). Other, less common, symptoms include weakness or clumsiness of the hand, and dry skin, swelling or colour changes in the hand (Bland 2007). Symptoms may recur during the day when the hands are used for carrying things, and for activities that involve holding them up, such as driving or using a keyboard (Stevens 2005).

Predisposing factors include genetic predisposition (Hakim 2002), diabetes mellitus, pregnancy, obesity, myxoedema, acromegaly, and infiltration of the flexor retinaculum in primary and hereditary amyloidosis (Stevens 2005). Carpal tunnel syndrome may also develop as a consequence of wrist joint involvement in rheumatoid arthritis or osteoarthritis, or deformity related to an old fracture (Stevens 2005). Whether overuse of the hands is a cause of the syndrome is not clear, although most patients report that symptoms are aggravated by heavy use of the hands (Bland 2007). Current standard treatment options are splinting, local corticosteroid injections and surgery.

References

Bland JDP, Rudolfer SM. Clinical surveillance of carpal tunnel syndrome in two areas of the United Kingdom, 1991–2001. *J Neurol Neurosurg Psychiatry* 2003; 74: 1674–9.

Bland JDP. Carpal tunnel syndrome. *BMJ* 2007; 335: 343–6.

Hakim AJ et al. The genetic contribution to carpal tunnel syndrome in women: a twin study. *Arthritis Rheum* 2002; 47: 275–9.

Hughes RAC et al. Peripheral nerve disorders. In: Candelise L et al (Eds). *Evidence-based neurology. Management of neurological disorders*. London; BMJ Books, 2007.

Hughes RAC, Thomas PK. Diseases of the peripheral nerves. In: Warrell DA et al (Eds). *Oxford textbook of medicine*. London: Oxford University Press, 2009.

Stevens JC. Median neuropathy. In: Dyck PJ, Thomas PK (Eds). *Peripheral neuropathy*. Philadelphia: Saunders, 2005.

How acupuncture can help

This Factsheet focuses on the evidence for acupuncture in the management of carpal tunnel syndrome. There are also factsheets on neuropathic pain, osteoarthritis and rheumatoid arthritis.

There has been one systematic review, which demonstrated that the evidence for acupuncture as a symptomatic therapy for carpal tunnel syndrome is encouraging but not convincing (Sim 2011).

In addition there are a few randomised controlled trials (RCTs) published since this systematic review. All were for mild-to-moderate carpal tunnel syndrome. Two compared acupuncture with sham acupuncture. In both cases acupuncture produced improvement over baseline levels but in one the real version was superior to the sham (Saeidi 2012) and in the other it was not (Yao 2012). Such contradictory results are common in sham acupuncture trials, for 'sham' interventions are not inert placebos, hence potentially underestimating the effect of 'real' acupuncture and making interpretation of the results difficult (Lundeberg 2011). In another two RCTs acupuncture was compared with orthodox treatments, either steroids (Yang 2009 and 2011) or splinting (Kumnerddee 2010). It was found to be at least as effective as these, and in some circumstances superior.

In general, acupuncture is believed to stimulate the nervous system and cause the release of neurochemical messenger molecules. The resulting biochemical changes influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being.

Research has shown that acupuncture treatment may specifically help in the management of carpal tunnel syndrome by:

- acting on areas of the brain known to reduce sensitivity to pain and stress, as well as promoting relaxation and deactivating the 'analytical' brain, which is responsible for anxiety and worry (Hui 2010; Hui 2009);
- increasing the release of adenosine, which has antinociceptive properties (Goldman 2010);
- regulating the limbic network of the brain, including the hypothalamus and amygdala (Napadow 2007a);
- inducing beneficial cortical plasticity (i.e. conditioning the brain to stop processing sensory nerve input from the affected fingers maladaptively, which leads to improved symptoms) (Napadow 2007b).

Lundeberg T et al. Is Placebo Acupuncture What It is Intended to Be? Evid Based Complement Alternat Med. 2011; 2011: 932407

About traditional acupuncture

Acupuncture is a tried and tested system of traditional medicine, which has been used in China and other eastern cultures for thousands of years to restore, promote and maintain good health. Its benefits are now widely acknowledged all over the world, and in the past decade traditional acupuncture has begun to feature more prominently in mainstream healthcare in the UK. In conjunction with needling, the practitioner may use techniques such as moxibustion, cupping, massage or electro-acupuncture. They may also suggest dietary or lifestyle changes.

Traditional acupuncture takes a holistic approach to health and regards illness as a sign that the body is out of balance. The exact pattern and degree of imbalance is unique to each individual. The traditional acupuncturist's skill lies in identifying the precise nature of the underlying disharmony and selecting the most effective treatment.

The choice of acupuncture points will be specific to each patient's needs. Traditional acupuncture can also be used as a preventive measure to strengthen the constitution and promote general wellbeing.

An increasing weight of evidence from Western scientific research (see overleaf) is demonstrating the effectiveness of acupuncture for treating a wide variety of conditions. From a biomedical viewpoint, acupuncture is believed to stimulate the nervous system, influencing the production of the body's communication substances – hormones and neurotransmitters. The resulting biochemical changes activate the body's self-regulating homeostatic systems, stimulating its natural healing abilities and promoting physical and emotional wellbeing.

About the British Acupuncture Council

With over 3000 members, the British Acupuncture Council (BAcC) is the UK's largest professional body for traditional acupuncturists. Membership of the BAcC guarantees excellence in training, safe practice and professional conduct. To find a qualified traditional acupuncturist, contact the BAcC on 020 8735 0400 or visit www.acupuncture.org.uk

ACUPUNCTURE AND FACIAL PAIN

The evidence

Research	Conclusion
Systematic reviews	
Sim H et al. Acupuncture for carpal tunnel syndrome: a systematic review of randomized controlled trials. <i>J Pain</i> . 2011;12(3):307-14.	A systematic review that evaluated the evidence for the effectiveness of acupuncture and acupuncture-like treatments for carpal tunnel syndrome. Six trials were included, 2 of which compared the effectiveness of acupuncture with a sham control and 4 of which compared it with active controls. A meta-analysis of acupuncture versus corticosteroid block therapy favoured acupuncture (2 studies, n = 144; risk ratio, 1.28; 95% CI, 1.08 to 1.52) in terms of responder rate. The reviewers concluded that their review and meta-analysis demonstrated that the evidence for acupuncture as a symptomatic therapy for carpal tunnel syndrome is encouraging but not convincing.
Randomised controlled trials	
Yao E et al. Randomized controlled trial comparing acupuncture with placebo acupuncture for the treatment of carpal tunnel syndrome. <i>PM & R: Journal of Injury, Function & Rehabilitation (PM R)</i> , 2012;4(5):367-73.	A randomised controlled trial that investigated the efficacy of acupuncture for the treatment of mild to moderate carpal tunnel syndrome in 41 adults. Patients were assigned to acupuncture or placebo acupuncture using Streitberger placebo acupuncture needles. Wrist braces were provided to both groups to wear at night, and compliance was monitored. Compared with pre-treatment baseline values, patients in the acupuncture group had a 0.58 improvement (p=0.03) on the Carpal Tunnel Self Assessment Questionnaire (CTSAQ) Symptom scale score at 3 months after the last treatment, whereas 0.81 improvement (p=0.001) was noted in the placebo acupuncture group. No statistically significant difference was found between the 2 groups with respect to improvement in symptoms, function, tip/key pinch, or combined sensory index. The researchers concluded that both acupuncture and placebo acupuncture resulted in improvements from baseline, but that acupuncture was not shown to be superior to placebo acupuncture when used in conjunction with bracing for patients with mild to moderate carpal tunnel syndrome.
Saeidi K et al. Acupuncture in treatment of carpal tunnel syndrome: a randomized controlled trial study. <i>Journal of Research in Medical Sciences</i> , 2012;17(1):1-7.	A randomised controlled trial that assessed the short-term effects of acupuncture in the treatment of mild to moderate carpal tunnel syndrome in 64 patients. Participants were assigned to either a control group that received night splinting, vitamin B1, B6 and sham acupuncture, or an intervention group that received acupuncture and night splinting. There was a statistically significant difference in global symptom score (GSS) between the two groups (p < 0.001) in favour of acupuncture. With respect to electrophysiological parameters, nerve conduction velocity (NCV) was significantly different between the two groups after 4 weeks (p = 0.02). The researchers concluded that their findings indicated that acupuncture can improve the overall subjective symptoms of carpal tunnel syndrome.
Yang CP et al. Acupuncture in patients with carpal tunnel syndrome: A randomized controlled trial. <i>Clin J Pain</i> . 2009;25(4):327-33.	A randomised controlled trial that investigated the efficacy of acupuncture compared with steroid treatment in 77 patients with mild-to-moderate carpal tunnel syndrome as measured by objective changes in nerve conduction studies (NCS) and subjective symptoms assessment. The patients were randomly

assigned to either 2 weeks of prednisolone 20 mg daily followed by 2 weeks of prednisolone 10 mg daily or to acupuncture. The evaluation of global symptom score showed that there was a high percentage of improvement in both groups at weeks 2 and 4 ($p < 0.01$), which was not significantly different between the 2 groups ($p = 0.15$). Of the 5 main symptoms scores (pain, numbness, paresthesia, weakness/clumsiness, nocturnal awakening), only 1, nocturnal awakening, showed a significant decrease with acupuncture compared with the steroid group at week 4 ($p = 0.03$). Patients with acupuncture treatment had a significant decrease in distal motor latency compared with the steroid group at week 4 ($p = 0.012$). Acupuncture was well tolerated with minimal adverse effects. The researchers concluded that short-term acupuncture treatment is as effective as short-term low-dose prednisolone for mild-to-moderate carpal tunnel syndrome.

Yang CP et al. A randomized clinical trial of acupuncture versus oral steroids for carpal tunnel syndrome: a long-term follow-up. *J Pain*. 2011;12(2):272-9.

A prospective follow up of the patients after 1 year. Compared with baseline levels, the percentages of patients with treatment failure, moderate improvement, and good improvement were significantly different between the 2 groups at month 7 (10.5, 2.6, and 86.8% for the acupuncture group and 33.3, 7.7, and 59% for the steroid group, respectively; $p = 0.014$) and month 13 (15.8, 2.6, and 81.6% versus 51.3, 0, and 48.7%, respectively; $p = 0.002$). The acupuncture group had a significantly better improvement in GSS, distal motor latencies and distal sensory latencies when compared to the steroid group throughout the 1-year follow-up period ($P < .01$). Furthermore, significant correlation was observed between changes of GSS (month 13-baseline) and all parameters of the electrophysiological assessments except for compound muscle action potential amplitude. The researchers concluded that this follow-up study demonstrates that short-term acupuncture treatment may result in long-term improvement in mild-to-moderate idiopathic carpal tunnel syndrome.

Kumnerddee W, Kaewtong A. Efficacy of acupuncture versus night splinting for carpal tunnel syndrome: a randomized clinical trial. *J Med Assoc Thai*. 2010;93(12):1463-9.

A randomised controlled trial that compared the efficacy of electroacupuncture with night splinting for carpal tunnel syndrome in 61 patients with mild-to-moderate disease. Outcomes were assessed at baseline and the end of treatment protocol by the Boston Carpal Tunnel Scale comprising a symptom severity scale (SSS) and a functional status scale (FSS). Pain was measured by a 100 mm visual analogue scale (VAS). The VAS score decreased more with acupuncture than with night splinting ($p = 0.028$), whereas there was no significant difference in terms of improvements in SSS and FSS between the groups. The researchers concluded that electroacupuncture was as effective as night splinting in terms of overall symptoms and function, and superior to it for pain control.

Physiology and animal studies

Hui KK et al. Acupuncture, the limbic system, and the anticorrelated networks of the brain. *Auton Neurosci* 2010; 157: 81-90.

Studies have shown that acupuncture stimulation, when associated with sensations comprising deqi, evokes deactivation of a limbic-paralimbic-neocortical network, as well as activation of somatosensory brain regions. These networks closely match the default mode network and the anti-correlated task-positive network. The effect of acupuncture on the brain is integrated at multiple levels, down to the brainstem and cerebellum and appears to go beyond either simple placebo or somatosensory needling effects. Needling needs to be done carefully, as very strong or painful sensations can attenuate or even reverse the

	<p>desired effects. Their results suggest that acupuncture mobilises the functionally anti-correlated networks of the brain to mediate its actions, and that the effect is dependent on the psychophysical response. They discuss potential clinical application to disease states including chronic pain, major depression, schizophrenia, autism, and Alzheimer's disease.</p>
<p>Goldman N et al. Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture. <i>Nat Neurosci</i> 2010; May 30.</p>	<p>A study showing that the neuromodulator adenosine, which has anti-nociceptive properties, was released during acupuncture in mice, and that its anti-nociceptive actions required adenosine A1 receptor expression. Direct injection of an adenosine A1 receptor agonist replicated the analgesic effect of acupuncture. Inhibition of enzymes involved in adenosine degradation potentiated the acupuncture-elicited increase in adenosine, as well as its anti-nociceptive effect. The researchers concluded that their observations indicate that adenosine mediates the effects of acupuncture and that interfering with adenosine metabolism may prolong the clinical benefit of acupuncture.</p>
<p>Hui K.K.-S. The salient characteristics of the central effects of acupuncture needling: limbic-paralimbic-neocortical network modulation. <i>Human Brain Mapping</i> 2009; 30: 1196-206.</p>	<p>This study assessed the results of functional MRI (fMRI) on 10 healthy adults during manual acupuncture at 3 acupuncture points and a sham point on the dorsum of the foot. Although certain differences were seen between real and sham points, the hemodynamic and psychophysical responses were generally similar for all 4 points. Acupuncture produced extensive deactivation of the limbic-paralimbic-neocortical system. Clusters of deactivated regions were seen in the medial prefrontal cortex, the temporal lobe and the posterior medial cortex. The sensorimotor cortices, thalamus and occasional paralimbic structures such as the insula and anterior middle cingulate cortex showed activation. The researchers concluded that their results provided additional evidence that acupuncture modulates the limbic-paralimbic-neocortical network. They hypothesised that acupuncture may mediate its analgesic, anti-anxiety, and other therapeutic effects via this intrinsic neural circuit that plays a central role in the affective and cognitive dimensions of pain.</p>
<p>Napadow V et al. Hypothalamus and amygdala response to acupuncture stimuli in Carpal Tunnel Syndrome. <i>Pain</i>. 2007a;130(3):254-66.</p>	<p>A study that used fMRI to evaluate 'real' and sham acupuncture stimulation at acupoint LI-4 in patients with carpal tunnel syndrome and healthy controls. Both the short-term brain response to acupuncture stimulation, and the influence of longer-term acupuncture therapy effects on this short-term response were investigated. The patients responded to real acupuncture with greater activation in the hypothalamus and deactivation in the amygdala compared with the healthy controls. The researchers found evidence suggesting that chronic pain patients respond to acupuncture differently than healthy controls, that is through a coordinated limbic network including the hypothalamus and amygdala.</p>