

ACUPUNCTURE AND TENNIS ELBOW

About tennis elbow

Tennis elbow (lateral epicondylitis) is characterised by pain and tenderness over the lateral epicondyle of the humerus. In the UK, the annual incidence of lateral elbow pain in general practice is around 4/1000 to 7/1000 people.(Hamilton 1986) It is most common in people aged between 40 and 50 years (Allander 1974); for example, the incidence is as much as 10% in women aged 42 to 46 years.(Chard 1989; Verhaar 1994)

Tennis elbow is considered an overload injury, and it typically occurs after minor trauma of the extensor muscles of the forearm; tennis is a direct cause in only 5% of people with the condition.(Murtagh 1988). It is primarily a type of tendonitis though the muscles and bones of the epicondyle joint may also be involved. Pain can also occur on the inner side of the elbow, which is known as golfer's elbow. Although generally self-limiting, symptoms of tennis elbow can persist for 1.5 to 2 years or even longer in a minority of people.(Hudak 1996)

The aims of conventional medical interventions are to relieve pain, control inflammation and accelerate repair in order to improve function. Treatments include corticosteroid injections, topical and oral NSAIDs, other analgesics, exercises, ultrasound, orthoses and surgery.

References

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How acupuncture can help

One systematic review concluded that acupuncture was beneficial for pain, at least in the short term, although the amount of evidence was limited (Green 2002). Two years later, a second review with more data available, found strong evidence of short-term pain relief (Trinh 2004). Most randomised controlled trials not included in these systematic reviews have compared different types of acupuncture, so can tell us little about the overall effectiveness of acupuncture for the treatment of tennis elbow.(Su 2010; Gu 2007; Xia 2004; Tsui 2002) One trial, however, compared electroacupuncture plus moxibustion with lidocaine plus prednisone treatment, and found the acupuncture treatment to be more effective.(Jiang 2005) The fact sheet on Sports Injuries has more information on other tendinopathies.

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. Stimulation of certain acupuncture points has been shown to affect areas of the brain that are known to reduce sensitivity to pain and stress, as well as promoting relaxation and deactivating the analytical brain, which is responsible for anxiety (Wu 1999).

Acupuncture may help relieve symptoms of tennis elbow, such as pain and inflammation by:

- stimulating nerves located in muscles and other tissues, which leads to release of endorphins and other neurohumoral factors (e.g. neuropeptide Y, serotonin), and changes the processing of pain in the brain and spinal cord (Pomeranz 1987, Han 2004, Zhao 2008, Zhou 2008, Lee 2009, Cheng 2009);
- delivering analgesia via alpha-adrenoceptor mechanisms (Koo 2008);
- increasing the release of adenosine, which has antinociceptive properties (Goldman 2010);
- modulating the limbic-paralimbic-neocortical network (Hui 2009);
- reducing inflammation, by promoting release of vascular and immunomodulatory factors (Kavoussi 2007, Zijlstra 2003);
- improving muscle stiffness and joint mobility by increasing local microcirculation (Komori 2009), which aids dispersal of swelling.

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

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The evidence

Research	Conclusion
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Systematic reviews (SRs)

<p>Trinh KV et al. Acupuncture for the alleviation of lateral epicondyle pain: a systematic review. <i>Rheumatology</i> 2004; 43: 1085-90.</p>	<p>A systematic review that evaluated the effectiveness of acupuncture as a treatment for lateral epicondylitis. Six randomised controlled trials (four sham-controlled) were included. All the studies suggested that acupuncture was effective in the short-term relief of lateral epicondyle pain. Five of the six studies indicated that acupuncture treatment was more effective compared to a control treatment. The reviewers concluded that there was strong evidence suggesting that acupuncture is effective in the short-term relief of lateral epicondyle pain.</p>
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<p>Green S et al. Acupuncture for lateral elbow pain. <i>Cochrane Database of Systematic Reviews</i> 2002, Issue 1. Art. No.: CD003527. DOI: 10.1002/14651858.CD003527.</p>	<p>A systematic review that included four small randomised controlled trials. One trial found that needle acupuncture resulted in relief of pain for significantly longer than placebo and was more likely to result in a 50% or greater reduction in pain after one treatment (RR 0.33, 95% CI 0.16 to 0.69). A second trial demonstrated needle acupuncture to be more likely to result in overall participant reported improvement than placebo in the short term (RR = 0.09, 95% CI 0.01 to 0.64). No significant differences were found in the longer term (after 3 or 12 months). A third trial of laser acupuncture versus placebo demonstrated no differences between laser acupuncture and placebo with respect to overall benefit. A fourth trial found no difference between Vitamin B12 injection plus acupuncture, and Vitamin B12 injection alone. The reviewers concluded that there is insufficient evidence to either support or refute the use of acupuncture (either needle or laser) in the treatment of lateral elbow pain, but that needle acupuncture is of short term benefit with respect to pain.</p>
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Randomised controlled trials (not in the SRs)

<p>Su X et al. Effects of electroacupuncture of different frequencies for treatment of patients with refractory tennis elbow syndrome. <i>Zhongguo Zhen Jiu</i> 2010; 30: 43-5.</p>	<p>A randomised controlled trial that assessed the different effects of electroacupuncture of different frequencies in 85 patients with refractory tennis elbow syndrome. The patients were allocated to continuous wave or rarefaction wave electroacupuncture at the same acupoints. A Visual Analogue Scale (VAS) was used to evaluate the tenderness score. The effective rate was 82.9% in continuous wave group and 84.1% in rarefaction wave group, with no significant difference between the two groups. The healing rate was better in rarefaction wave group (56.8% vs. 31.7% in the continuous wave group; $p < 0.05$). The VAS scores were significantly reduced after electroacupuncture treatment in both groups (both $p < 0.001$). The researchers concluded that rarefaction wave electroacupuncture is better than continuous wave</p>
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electroacupuncture for refractory tennis elbow syndrome.

Gu JQ, Shan YH. Therapeutic effect of triple puncture at Tianzong (SI 11) as main method on obstinate tennis elbow. *Zhongguo Zhen Jiu* 2007; 27: 109-11.

A randomised controlled trial that compared the therapeutic effects of triple puncture at SI11 plus routine acupuncture with routine acupuncture alone in 62 patients with obstinate tennis elbow. Changes in symptoms and signs were compared between the two treatment groups. The cure rate was better in the triple puncture group (71.9% vs. 43.3% with routine acupuncture alone; $p < 0.05$). The researchers concluded that triple puncture combined with routine acupoint selection therapy has a better therapeutic effect on obstinate tennis elbow than routine acupuncture alone.

Jiang ZY et al. Controlled observation on electroacupuncture combined with cake-separated moxibustion for treatment of tennis elbow. *Zhongguo Zhen Jiu* 2005; 25: 763-4.

A randomised controlled trial that compared electroacupuncture plus moxibustion with lidocaine plus prednisone treatment in the treatment of 128 patients with tennis elbow. The cure rate and the effective rate were 40.6% and 93.7% in the electroacupuncture group, and 25.0% and 78.1% in the conventional medicine group, respectively, with a significant difference between the two groups in favour of acupuncture ($p < 0.05$). The researchers concluded that electroacupuncture combined with moxibustion is an effective treatment for tennis elbow.

Xia DB, Huang Y. Combination of Fu needling with electric acupuncture for tennis elbow. *Di Yi Jun Yi Da Xue Xue Bao* 2004; 24: 1328-9.

A randomised controlled trial that assessed the clinical effect of Fu needling combined with electroacupuncture in 100 patients with tennis elbow. Patients were allocated to receive Fu needling, electroacupuncture or a combination of the two. All three therapies had good effects, but the combined therapy was the most effective. The researchers concluded that Fu needling combined with electroacupuncture may produce a higher cur rate of tennis elbow than either of the therapies used alone.

Tsui P, Leung MC. Comparison of the effectiveness between manual acupuncture and electro-acupuncture on patients with tennis elbow. *Acupunct Electrother Res* 2002; 27: 107-17.

A single-blinded randomised controlled trial that compared the relative effectiveness of manual acupuncture and electroacupuncture in 20 patients with chronic tennis elbow. After 6 treatments, significant differences were observed between groups favouring electroacupuncture in relation to pain relief (measured on a pain visual analogue scale) and pain free hand grip strength. The researchers concluded that electroacupuncture is superior to manual acupuncture in treating patients with tennis elbow.

Research on mechanisms for acupuncture

Goldman N et al. Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture. *Nat Neurosci* 2010 May 30. [Epub ahead of print]

A study that found 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>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>A study that assessed the results of 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>Cheng CH et al. Endogenous Opiates in the Nucleus Tractus Solitarius Mediate Electroacupuncture-induced Sleep Activities in Rats. <i>Evid Based Complement Alternat Med</i> 2009 Sep 3. [Epub ahead of print]</p>	<p>An animal study that investigated the involvement of the nucleus tractus solitarius opioidergic system in electroacupuncture-induced alterations in sleep, the findings of which suggested that mechanisms of sleep enhancement may be mediated, in part, by cholinergic activation, stimulation of the opioidergic neurons to increase the concentrations of beta-endorphin and the involvement of the μ-opioid receptors.</p>
<p>Lee B et al. Effects of acupuncture on chronic corticosterone-induced depression-like behavior and expression of neuropeptide Y in the rats. <i>Neuroscience Letters</i> 2009; 453: 151-6.</p>	<p>In animal studies, acupuncture has been found to significantly reduce anxiety-like behaviour, and increase brain levels of neuropeptide Y, which appear to correlate with reported anxiety.</p>
<p>Komori M et al. Microcirculatory responses to acupuncture stimulation and phototherapy. <i>Anesth Analg</i> 2009; 108: 635-40.</p>	<p>Experimental study on rabbits in which acupuncture stimulation was directly observed to increase diameter and blood flow velocity of peripheral arterioles, enhancing local microcirculation.</p>
<p>Koo ST et al. Electroacupuncture-induced analgesia in a rat model of ankle sprain pain is mediated by spinal alpha-adrenoceptors. <i>Embase Pain</i> 2008; 135: 11-9.</p>	<p>An animal study that investigated the underlying mechanism of electroacupuncture (EA) analgesia, and the effects of various antagonists on known endogenous analgesic systems in a rat model of ankle sprain. EA significantly improved the weight-bearing capacity of the affected hind limb for 2 hours, suggesting an analgesic effect. The alpha-adrenoceptor antagonist phentolamine completely blocked the EA-induced analgesia, whereas naloxone failed to block the effect. Further experiments showed that intrathecal administration of yohimbine, an alpha2-adrenergic antagonist, reduced the EA-induced analgesia in a dose-dependent manner, whereas terazosin, an alpha1-adrenergic antagonist, did not produce any effect. The researchers concluded that the results suggest EA-induced analgesia is mediated by alpha-adrenoceptor mechanisms and, at least in part, mediated by spinal alpha2-adrenoceptor mechanisms.</p>

Zhao ZQ. Neural mechanism Review article that discusses the various peripheral and central

underlying acupuncture analgesia. Prog Neurobiol 2008; 85: 355-75.	nervous system components of acupuncture anaesthesia in detail.
Zhou Q et al. The effect of electro-acupuncture on the imbalance between monoamine neurotransmitters and GABA in the CNS of rats with chronic emotional stress-induced anxiety. Int J Clin Acupunct 2008;17: 79-84.	A study of the regulatory effect of electro-acupuncture on the imbalance between monoamine neurotransmitters and GABA in the central nervous system of rats with chronic emotional stress-induced anxiety. The levels of serotonin, noradrenaline and dopamine fell significantly, while GABA levels were significantly higher in the rats given acupuncture (P<0.05, or P<0.0). The researchers concluded that the anti-anxiety effect of electro-acupuncture may relate to its regulation of the imbalance of neurotransmitters.
Kavoussi B, Ross BE. The neuroimmune basis of anti-inflammatory acupuncture. Integr Cancer Ther 2007; 6: 251-7.	Review article that suggests the anti-inflammatory actions of traditional and electro-acupuncture are mediated by efferent vagus nerve activation and inflammatory macrophage deactivation.
Han JS. Acupuncture and endorphins. Neurosci Lett 2004; 361: 258-61.	A literature review of studies relating to the release of endorphins by acupuncture.
Zijlstra FJ et al. Anti-inflammatory actions of acupuncture. Mediators Inflamm 2003; 12: 59-69.	An article that suggests a hypothesis for anti-inflammatory action of acupuncture: Insertion of acupuncture needles initially stimulates production of beta-endorphins, CGRP and substance P, leading to further stimulation of cytokines and NO. While high levels of CGRP have been shown to be pro-inflammatory, CGRP in low concentrations exerts potent anti-inflammatory actions. Therefore, a frequently applied 'low-dose' treatment of acupuncture could provoke a sustained release of CGRP with anti-inflammatory activity, without stimulation of pro-inflammatory cells.
Wu MT et al. Central nervous pathway for acupuncture stimulation: localization of processing with functional MR imaging of the brain--preliminary experience. Radiology 1999 ; 212: 133-41.	An experimental study using MRI to characterise the central nervous system pathway for acupuncture stimulation, which found that acupuncture activates structures of descending antinocioceptive pathway and deactivates areas mediating pain modulation.
Pomeranz B. Scientific basis of acupuncture. In: Stux G, Pomeranz B, eds. Acupuncture Textbook and Atlas. Heidelberg: Springer-Verlag; 1987: 1-18.	Needle activation of A delta and C afferent nerve fibres in muscle sends signals to the spinal cord, where dynorphin and enkephalins are released. Afferent pathways continue to the midbrain, triggering excitatory and inhibitory mediators in the spinal cord. Ensuing release of serotonin and norepinephrine onto the spinal cord leads to pain transmission being inhibited both pre- and postsynaptically in the spinothalamic tract. Finally, these signals reach the hypothalamus and pituitary, triggering release of adrenocorticotrophic hormones and beta-endorphin.

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