



ACUPUNCTURE, NAUSEA AND VOMITING

About nausea and vomiting

Many patients undergoing chemotherapy experience nausea and vomiting (Gralla 1999; Hesketh 1998). The symptoms can be severe, impairing a patient's quality of life (Osoba 1997), causing emotional distress (Love 1989), and aggravating cancer-related symptoms such as cachexia, lethargy and weakness (Griffin 1996; Roscoe 2000).

Postoperative nausea and vomiting (PONV) are common complaints after general, regional, or local anaesthesia (Watcha 1992). These symptoms can occur in up to 80% of people given an anaesthetic (Sadhasivam 1999).

Nausea and vomiting are commonly experienced by women in early pregnancy; the prevalence rates are 50-80% for nausea, and 50% for vomiting and retching (Miller 2002; Woolhouse 2006). The symptoms are most common in the first trimester, between 6 and 12 weeks, but can continue to 20 weeks and last longer than this in up to 20% of women (Jewell 2003; Miller 2002). If vomiting is intractable, it can be associated with weight loss, dehydration and electrolyte imbalances, and may lead to hospitalisation (Miller 2002). The symptoms are thought to be associated with rising levels of human chorionic gonadotrophin (hCG) or oestrogens (Goodwin 2002). Women experiencing nausea and vomiting during pregnancy can suffer considerable physical and psychological effects (Attard 2002; Chou 2003; Chou 2008). The symptoms can affect daily activities and relationships, and result in lost productivity and increased healthcare costs (Attard 2002; Piwko 2007).

Drug treatment for nausea and vomiting includes 5-HT₃ receptor antagonists, antimuscarinics, antihistamines, dopamine antagonists, corticosteroids and vitamins (i.e. B₆ and B₁₂). The teratogenic effects of drugs (such as thalidomide) used in the past to control these symptoms have led to caution about prescribing medications in the first trimester of pregnancy.

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Vivamus sollicitudin risus odio. Vestibulum consectetur rhoncus turpis, eu semper nisi interdum sed. Sed eget odio quis mauris auctor eleifend.

Suspendisse iaculis dui feugiat arcu malesuada in vulputate quam laoreet. Curabitur a felis lectus, eu ultrices mauris. Nunc commodo lacus risus, pretium viverra augue.

Etiam id augue nibh, et ornare risus. Pellentesque at elementum odio. Sed convallis eros et risus faucibus rhoncus. Curabitur rutrum lectus non nisl pharetra in blandit dolor vestibulum.

How acupuncture can help

The best evidence for acupuncture's effectiveness is with postoperative nausea and vomiting (PONV) (Ezzo 2006a). The latest systematic review, based on 40 trials and nearly 5,000 patients, found acupuncture to be significantly better than sham treatment and at least as good as anti-emetic drugs, with minimal side-effects (Lee 2009). Trials published since this review gathered its data have also been consistently positive: acupressure at P6 (Soltani 2010), acupoint injection of droperidol at P6 (Zhu 2010), 24-hour acupoint stimulation (Frey 2009), acupuncture at several points (Ayoglu 2009), acupuncture at P6 (Puyang 2009, Frey 2009) and ear acupuncture (Sahmaddini 2008). There is one less consistently favourable review but that looked specifically at caesarean delivery under neuraxial anaesthesia (6 trials only): (Allen 2008).

For chemotherapy-induced nausea and vomiting, there is also substantial evidence supporting acupuncture and associated procedures, although it is not as consistent as that for PONV. The latest systematic review (Ezzo 2006b) is now several years old. It found that electro- (but not manual) acupuncture reduced the incidence of acute vomiting and self-administered acupressure appears to have a protective effect for acute nausea and can readily be taught to patients. Subsequent individual trials of acupuncture or electroacupuncture (Yang 2009; You 2009; Sima 2009; Gottschling 2008) have all reported significant benefits, while those for acupressure applied using a wristband have been mixed (Jones 2008; Molassiotis 2007; Shin 2006).

For nausea and vomiting in pregnancy, the results have been less convincing, with a mix of positive and equivocal results according to Ezzo et al's (2006a) systematic review and in subsequent trials (Aghadam 2010; Shin 2007; Heazell 2006). A review covering various treatments, including acupuncture, ginger, vitamin B and medications, concluded that there is a lack of high-quality evidence to support advice on any of them (Matthews 2010).

Acupuncture, electroacupuncture or acupressure have been used successfully as treatments for nausea and vomiting arising in various other circumstances, for example opioid-induced (Zheng 2008), radiotherapy-induced (Roscoe 2009; Bridge 2003), and post-myocardial infarction.(Dent 2003).

It is characteristic of virtually all the Western trials of acupuncture for nausea and vomiting that they have used just the one point, P6. While this point is certainly strongly indicated for these symptoms, and appears to have a marked specific effect, it is by no means the only candidate; in traditional practice a mixture of different points would usually be employed, related to individual patient characteristics.

See Table overleaf for further details of the cited studies.

In general, acupuncture is believed to stimulate the nervous system and cause the release of neurochemical messenger molecules (Han 2004; Zhou 2008; Lee 2009). The resulting biochemical changes influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being (Pomeranz, 1987; Zhao 2008; Samuels 2008; Cheng 2009).. 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 (Hui 2010).

Acupuncture may help to alleviate nausea and vomiting by:

- regulating gastric myo-electrical activity (Streitberger 2006)
- modulating the actions of the vagal nerve and autonomic nervous system (Huang2005)
- reducing vasopressin-induced nausea and vomiting and suppressing retrograde peristaltic contractions (Tatewaki 2005)
- regulating vestibular activities in the cerebellum (Streitberger 2006)

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, NAUSEA AND VOMITING

The evidence

Research	Conclusion
Systematic reviews	
<p>Matthews A et al. Interventions for nausea and vomiting in early pregnancy. <i>Cochrane Database of Systematic Reviews</i> 2010, Issue 9. Art. No.: CD007575. DOI: 10.1002/14651858.CD007575.pub2.</p>	<p>A systematic review that assessed the effectiveness and safety of interventions for nausea, vomiting and retching in early pregnancy (previously published in 2003). Twenty-seven randomised controlled trials, with 4,041 women, were included. They covered many interventions, including acupressure, acustimulation, acupuncture, ginger, vitamin B6 and several antiemetic drugs. Evidence regarding the effectiveness of P6 acupressure, auricular (ear) acupressure and acustimulation of the P6 point was limited. Acupuncture (P6 or traditional) showed no significant benefit to women in pregnancy. The evidence of effectiveness for ginger was limited and not consistent. There was only limited evidence from trials to support the use of pharmacological agents including vitamin B6, and anti-emetic drugs to relieve mild or moderate nausea and vomiting. There was little information on maternal and fetal adverse outcomes and on psychological, social or economic outcomes. Meta-analysis was not possible for most outcomes due to heterogeneity in study participants, interventions, comparison groups, and outcomes measured or reported. The methodological quality of the included studies was mixed. <u>The reviewers concluded that there is a lack of high-quality evidence to support advice on interventions for nausea and vomiting in pregnancy.</u></p>
<p>Lee A, Fan LTY. Stimulation of the wrist acupuncture point P6 for preventing postoperative nausea and vomiting. <i>Cochrane Database of Systematic Reviews</i> 2009, Issue 2. Art. No.: CD003281. DOI: 10.1002/14651858.CD003281.pub3.</p>	<p>A systematic review that assessed the efficacy and safety of P6 acupoint stimulation in preventing postoperative nausea and vomiting (PONV) (first published in 2004). Forty randomised controlled trials involving 4,858 participants of techniques that stimulated the P6 acupoint compared with sham treatment or drug therapy for the prevention of PONV were included. Interventions used included acupuncture, electro-acupuncture, transcutaneous nerve stimulation, laser stimulation, capsicum plaster, an acu-stimulation device, and acupressure in patients undergoing surgery. Primary outcomes were the risks of nausea and vomiting. Secondary outcomes were the need for rescue antiemetic therapy and adverse effects. Compared with sham treatment P6 acupoint stimulation significantly reduced: nausea (RR 0.71, 95% CI 0.61 to 0.83); vomiting (RR 0.70, 95% CI 0.59 to 0.83), and the need for rescue antiemetics (RR 0.69, 95% CI 0.57 to 0.83). There was no clear difference in the effectiveness of P6 acupoint stimulation for invasive and noninvasive acupoint stimulation. There was no evidence of difference between P6 acupoint stimulation and antiemetic drugs in the risk of nausea (RR 0.82, 95% CI 0.60 to 1.13), vomiting (RR 1.01, 95% CI 0.77 to 1.31), or the need for rescue antiemetics (RR 0.82, 95% CI 0.59 to 1.13). The side effects associated with P6</p>

	<p>acupoint stimulation were minor. <u>The reviewers concluded that P6 acupoint stimulation prevented PONV.</u></p>
<p>Allen TK, Habib AS. P6 stimulation for the prevention of nausea and vomiting associated with cesarean delivery under neuraxial anesthesia: a systematic review of randomized controlled trials. <i>Anesthesia and Analgesia</i> 2008; 107: 1308-12.</p>	<p>A systematic review that compared the overall efficacy of different methods of P6 stimulation with placebo in women having caesarean delivery under neuraxial anaesthesia. The primary outcomes including the incidence of nausea, vomiting, and the need for rescue antiemetic therapy, both intraoperatively and postoperatively. Six studies involving 649 patients were included. Of these, two studies reported a significant reduction in the incidence of intraoperative nausea with P6 stimulation, and one study reported a significant reduction in rescue antiemetic requirement. However, none of the studies reported any differences between the treatment and control groups with respect to vomiting. Four studies reported postoperative outcomes. Of these, one study reported a significant reduction in postoperative nausea, two studies reported a significant reduction in postoperative vomiting, and one study reported a significant reduction in the need for postoperative rescue antiemetic therapy. <u>The reviewers concluded that some studies showed a benefit of P6 stimulation, but the finding was not consistent and it was not possible to draw definitive conclusions on the efficacy of P6 stimulation in reducing intraoperative or postoperative nausea and vomiting associated with caesarean delivery performed under neuraxial anaesthesia.</u></p>
<p>Ezzo J et al. Cochrane systematic reviews examine P6 acupuncture-point stimulation for nausea and vomiting. <i>Journal of Alternative and Complementary Medicine</i> 2006a; 12: 489-95.</p>	<p>A summary of Cochrane systematic reviews assessing P6 stimulation for nausea and vomiting. Reviews were found on postoperative sickness, chemotherapy-induced nausea and vomiting, and pregnancy-related nausea and vomiting. Results for postoperative nausea and vomiting were the most consistent, with 26 trials and more than 3,000 patients showing that real P6 stimulation was more effective than sham in both adults and children and for both nausea and vomiting. Pooled data of trials including different antiemetics showed that P6 stimulation seems to be superior to antiemetic medication for nausea and equivalent for vomiting. For chemotherapy-induced nausea and vomiting, there were 11 trials and over 1,200 patients. Electroacupuncture, but not manual acupuncture, was beneficial for first-day vomiting. Acupressure was effective for first-day nausea but not vomiting. Wristwatch-like electrical devices were not effective for any outcome. Results for pregnancy-related nausea and vomiting comprised six trials and about 1,150 patients. Results were mixed, with some positive trials and others providing equivocal results. <u>The reviewers concluded that P6 stimulation may be beneficial for various conditions involving nausea and vomiting, but that the added value to antiemetics remains unclear.</u></p>
<p>Ezzo J et al. Acupuncture-point stimulation for chemotherapy-induced nausea or vomiting. <i>Cochrane Database of Systematic Reviews</i> 2006b, Issue 2. Art. No.: CD002285. DOI:</p>	<p>A systematic review that assessed the effectiveness of acupuncture-point stimulation on acute and delayed chemotherapy-induced nausea and vomiting in cancer patients. Eleven randomised trials including 1,247 patients assessed acupuncture-point stimulation by any method (needles, electrical stimulation, magnets, or acupressure) for</p>

10.1002/14651858.CD002285.pub2. chemotherapy-induced nausea or vomiting, or both were included. Overall, acupuncture-point stimulation of all methods combined reduced the incidence of acute vomiting (RR = 0.82; 95% confidence interval 0.69 to 0.99; P = 0.04), but not acute or delayed nausea severity compared to control. By modality, stimulation with needles reduced proportion of acute vomiting (RR = 0.74; 95% confidence interval 0.58 to 0.94; P = 0.01), but not acute nausea severity. Electroacupuncture reduced the proportion of acute vomiting (RR = 0.76; 95% confidence interval 0.60 to 0.97; P = 0.02), but manual acupuncture did not; delayed symptoms for acupuncture were not reported. Acupressure reduced mean acute nausea severity (SMD = -0.19; 95% confidence interval -0.37 to -0.01; P = 0.04) but not acute vomiting or delayed symptoms. Noninvasive electrostimulation showed no benefit for any outcome. All trials used concomitant pharmacologic antiemetics, and all, except electroacupuncture trials, used state-of-the-art antiemetics. The reviewers concluded that electroacupuncture has demonstrated benefit for chemotherapy-induced acute vomiting, and that self-administered acupressure appears to have a protective effect for acute nausea and can readily be taught to patients though studies did not involve placebo control.

Streitberger K et al. Acupuncture for nausea and vomiting: an update of clinical and experimental studies. *Auton Neurosci* 2006; 129: 107-17.

An overview of clinical and experimental studies. The clinical results have already been presented above. Experimental studies showed effects of P6-stimulation on gastric myoelectrical activity, vagal modulation and cerebella vestibular activities in functional magnetic resonance imaging. There is good clinical evidence from more than 40 randomised controlled trials that acupuncture has some effect in preventing or attenuating nausea and vomiting. A growing number of experimental studies suggest mechanisms of action.

Randomised controlled trials

PONV

Soltani AE et al. Acupressure using ondansetron versus metoclopramide on reduction of postoperative nausea and vomiting after strabismus surgery. *Archives of Iranian Medicine* 2010; 13: 288-93.

A randomised controlled trial that compared the clinical efficacy of acupressure with ondansetron or metoclopramide for postoperative nausea and vomiting (PONV) after strabismus surgery. There were 200 patients included. Acupressure wrist bands were applied 30 minutes before anaesthesia induction and removed six hours after surgery. PONV was evaluated within 0-2 hours and 2-24 hours after surgery by a blinded observer. Neither the incidence nor the severity of PONV was significantly different among acupressure, metoclopramide and ondansetron groups. The researchers concluded that acupressure at P6 on the wrist causes a significant reduction in the incidence and severity of PONV 24 hours after strabismus surgery, which is similar to the reduction seen with metoclopramide and ondansetron.

Zhu HX et al. Preventive effect of

A randomised controlled trial that investigated methods for

<p><u>acupoint injection at neiguan (PC 6) on postoperative nausea and vomiting after laparoscopic gynecologic surgery.</u> <i>Chinese acupuncture & moxibustion</i> 2010; 30: 72-4.</p>	<p>preventing the postoperative nausea and vomiting (PONV) after laparoscopic gynaecological surgery. One hundred and twenty patients were divided into three groups – droperidol injection into P6 (group I), intravenous injection of droperidol (group II) or no treatment (group III). Twenty four hours after the operation, the frequency and degree of nausea and vomiting were observed and scored according to the criteria standard. The incidence rate of nausea was 10% in group I and 57.5% in group II, which was significantly different from 80% in group III ($p < 0.01$, $p < 0.05$, respectively), while it was lower in group I than in group II ($p < 0.01$). The incidence rate of vomiting was 7.5% in group I and 52.5% in group II, which was significantly different from 75% in group III ($p < 0.01$, $p < 0.05$ respectively), while it was lower in group I than in group II ($p < 0.01$). No complication, such as obvious drowsiness, anxiety and extracortical tract reaction, was observed among the three groups. <u>The researchers concluded that acupoint injection at P6 with a small dose of droperidol can effectively prevent PONV after laparoscopic gynaecological surgery without adverse effects.</u></p>
<p>Frey UH et al. P6 acustimulation effectively decreases postoperative nausea and vomiting in high-risk patients. <i>British Journal of Anaesthesia</i> 2009; 102: 620-5.</p>	<p>A randomised controlled trial that investigated the effectiveness of acustimulation in relation to known risk factors for PONV. Two hundred women undergoing vaginal hysterectomy were given 24 hours of acustimulation (subdivided into groups of pre-induction and post-induction) or sham stimulation, (similarly subdivided). Nausea and vomiting/retching was recorded for 24 hours after operation in the whole group and stratified by risk factors (female gender, non-smoker, history of PONV/motion sickness, and postoperative morphine usage). The incidence of PONV and need for rescue therapy was significantly lower in the acustimulation than in the sham group (PONV, 33% vs. 63%, $P < 0.001$; rescue therapy, 39% vs. 61%, $P = 0.001$). The risk ratio for acustimulation and PONV was 0.29 [95% confidence interval (CI) 0.16-0.52] and for rescue therapy it was 0.38 (95% CI 0.21-0.66). No significant difference in PONV reducing effects could be detected between pre- and post-induction. <u>The researchers concluded that continuous 24 hour acustimulation decreases PONV, particularly in patients at high risk.</u></p>
<p>Ayoglu H et al. The effects of preoperative acupuncture needle and capsicum plaster applications of extra 1, pericardium 6 and large intestine 4 points on preoperative anxiety, postoperative nausea-vomiting and analgesic consumption. <i>Journal of Medical Sciences</i> 2009; 29: 1063-70.</p>	<p>A randomised controlled trial that investigated the effects of preoperative acupuncture or capsicum plaster on the acupuncture points P6, LI 4, E1 for postoperative nausea and vomiting. Sixty patients undergoing laparoscopic gynaecological operations were divided into four groups - acupuncture dry needle at points P6, Li 4 and E1 in group I; capsicum plaster application at the same points in group II; midazolam (intramuscularly) and placebo plaster application at different non-acupuncture points (sham) in group III, and only placebo plaster at sham points in group IV. Nausea and vomiting rates were lower in group I and II ($p < 0.05$). <u>The researchers concluded that preoperative acupuncture needle and capsicum plaster application at P6, E1, and Li 4 points were found to be effective in reducing postoperative nausea and vomiting. Noninvasive capsicum plasters are concluded to</u></p>

be a good alternative method for needles that may cause side effects.

Ouyang MW et al. Prophylactic effect of acupuncture on nausea and vomiting after laparoscopic operation. *Chinese acupuncture & moxibustion* 2009; 29: 915-8.

A randomised controlled trial that explored the prophylactic effect of acupuncture at P6 on nausea and vomiting after laparoscopic operation. One hundred patients undergoing laparoscopic gastrointestinal operations were divided into an acupuncture group and a control group. The operation was carried out with the combined infusion and inhalation anaesthesia. The patients in the acupuncture group were treated before anaesthesia and during the operation. The needles were extracted after operation, and the acupoints were covered with opaque tape. In contrast, the patients in the control group had the tape applied without acupuncture. After the operation, all patients were given the self-controlled intravenous analgesia, and followed up for nausea, retching and vomiting. At 6 h, 12 h, 24 h, 48 h after the operation, in the acupuncture group, the incidence rates of the nausea were 12.0%, 6.0%, 6.0% and 2.0%, and the incidence rates of the retching were 0, 0, 2.0% and 2.0%, respectively; in the control group, the incidence rates of the nausea were 28.0%, 20.0%, 12.0% and 2.0%, and the incidence rates of the retching were 2.0%, 6.0%, 2.0% and 0, respectively. At 6 h, 12 h after operation, the incidence rates of the nausea and retching in the acupuncture group were lower than those of the control group ($p < 0.05$, $p < 0.001$). There was no vomiting in either group. The researchers concluded that acupuncture at P6 can reduce the incidence rates of the patients' nausea and retching after laparoscopic operation.

Frey UH et al. Effect of P6 acustimulation on post-operative nausea and vomiting in patients undergoing a laparoscopic cholecystectomy. *Acta Anaesthesiologica Scandinavica* 2009. 53; 1341-7.

A randomised controlled trial that investigated the effectiveness of acustimulation on attenuating PONV. A total of 200 patients undergoing a laparoscopic cholecystectomy with propofol (induction) and maintenance anaesthesia were included. In the acustimulation group, subdivided into groups with pre-induction and post-induction acustimulation, an active ReliefBand device was placed at the P6 acupoint. In the sham group, similarly subdivided, an inactive device was applied instead. The ReliefBand remained in place for 24 hours after surgery. Nausea and vomiting/retching were recorded at 2, 6, and 24 hours post-operatively. Results The incidence of early nausea (up to 2 hours) was significantly lower in the acustimulation than in the sham group (29% vs. 42%; $p=0.043$). No significant effect could be detected for retching/vomiting. Acustimulation showed no effect on PONV after 6 and 24 hours. The timing of (i.e. pre- vs. post-induction) acustimulation had no significant effect on PONV reduction. The researchers concluded that acustimulation at the P6 acupoint reduces early nausea, but not vomiting, after laparoscopic cholecystectomy, irrespective of its pre- or post-induction application.

Sahmeddini MA, Fazelzadeh A. Does auricular acupuncture reduce postoperative vomiting after cholecystectomy? *Journal of Alternative and Complementary Medicine* 2008; 14:

A randomised controlled trial that assessed the efficacy of auricular acupuncture for the prevention of postoperative nausea and vomiting after cholecystectomy. One hundred female patients undergoing transabdominal cholecystectomy were randomly allocated to two groups – an auricular

1275-9.	acupuncture treatment group and a non treatment group. There was a significant difference between the control and auricular acupuncture treatment groups in the incidence of vomiting 24 hours after surgery (66% and 0%, respectively, $p < 0.01$). No noteworthy side effects from treatment were observed. <u>The researchers concluded that auricular acupuncture is effective in reducing vomiting following transabdominal cholecystectomy in female patients.</u>
Chemotherapy-induced nausea and vomiting	
Yang Y et al. Electroacupuncture at Zusanli (ST 36) for treatment of nausea and vomiting caused by the chemotherapy of the malignant tumor: a multicentral randomized controlled trial. <i>Chinese acupuncture & moxibustion</i> 2009; 29: 955-8.	A randomised controlled trial that compared the clinical effects between electroacupuncture at St 36 plus an intravenous granisetron and intravenous granisetron alone for treatment of nausea and vomiting caused by the chemotherapy in 246 patients with malignancy. The total effective rate was 90.5% in the electroacupuncture plus granisetron group (vs. 84.0% in control group; $p < 0.01$). Nausea and vomiting scores were decreased in both groups (both $p < 0.001$), but was greater in the electroacupuncture group ($p < 0.001$). <u>The researchers concluded that electroacupuncture at St 36 can significantly alleviate the symptoms of nausea and vomiting caused by chemotherapy.</u>
You Q et al. Vitamin B6 points PC6 injection during acupuncture can relieve nausea and vomiting in patients with ovarian cancer. <i>International Journal of Gynecological Cancer</i> 2009; 19: 567-71.	A randomised controlled trial that compared the effectiveness of acupuncture plus vitamin B ₆ at acupuncture point P6 with acupuncture or vitamin B ₆ alone in controlling vomiting in 142 patients having a highly emetogenic chemotherapy regimen. All patients received the same concurrent antiemetic pharmacotherapy and high-dose chemotherapy. The acupuncture plus vitamin B ₆ group had significantly fewer vomiting episodes and a greater proportion of emesis-free days than the acupuncture or the vitamin B ₆ alone groups. <u>The researchers concluded that acupuncture plus vitamin B₆ at the P6 acupuncture point injection is quite useful against emesis in cancer patients undergoing chemotherapy.</u>
Sima L, Wang X. Therapeutic effect of acupuncture on cisplatin-induced nausea and vomiting. <i>Chinese acupuncture & moxibustion</i> 2009; 29: 3-6.	A randomised sham-controlled trial that assessed the therapeutic effect of acupuncture combined with an antiemetic on cisplatin-induced nausea and vomiting in 66 patients. Acupuncture treatment or sham-acupuncture was given for 6 consecutive days, once each day, plus the antiemetic tropisetron. The effective rates for nausea in the 2nd day and the 4th day were 87.1% and 79.0%, respectively, in acupuncture group, which were superior to 59.4% and 57.8%, respectively, in the sham-acupuncture group (both $p < 0.05$). The therapeutic effects on vomiting in the 3rd-6th day in the acupuncture group were also better than those in the sham-acupuncture group ($p < 0.05$). <u>The researchers concluded that acupuncture combined with antiemetic can effectively decrease the incidence and degree of cisplatin-induced delayed nausea and vomiting, and that the effect of acupuncture is better than that of sham acupuncture.</u>
Jones E et al. Acupressure for chemotherapy-associated nausea and	A randomised controlled trial that looked at the feasibility and effectiveness of acupressure therapy in preventing

vomiting in children. *Journal of the Society for Integrative Oncology* 2008; 6: 141-5.

chemotherapy-associated nausea in 21 children with cancer. Acupressure wrist bands and placebo bands were compared. All patients also received standard antiemetic therapy for each treatment. Expectations and outcomes of nausea and vomiting were assessed by questionnaires. In general, patients expressed moderate expectations that acupressure would prevent nausea and vomiting. Following the session with an acupressure band, a third of all patients reported better than expected nausea prevention. There was no significant difference in nausea or vomiting between the treatment groups, and there were no significant side effects from the bands. The researchers concluded that acupressure using a band is feasible and well tolerated by children having chemotherapy, but was not more effective than placebo in this sample of patients.

Gottschling S et al. Acupuncture to alleviate chemotherapy-induced nausea and vomiting in pediatric oncology - A randomized multicenter crossover pilot trial. *Klinische Padiatrie* 2008; 220: 365-70.

A randomised controlled trial that investigated whether acupuncture as a supportive antiemetic approach reduces the need for antiemetic rescue medication during highly emetogenic chemotherapy in paediatric oncology. Twenty-three children receiving highly emetogenic chemotherapy for treatment of solid malignant tumours were allocated to receive acupuncture treatment during either the second or third identical chemotherapy course together with standard antiemetic medication. The main outcome measure was the amount of additional antiemetic medication during chemotherapy. Secondary outcome measure was the number of episodes of vomiting per course. Forty-six chemotherapy courses with or without acupuncture were compared. The need for rescue antiemetic medication was significantly lower in acupuncture courses compared to control courses ($p=0.001$) Episodes of vomiting per course were also significantly lower in courses with acupuncture ($p=0.01$). Except for pain from needling (4/ 23), no side effects occurred and patient acceptance of acupuncture was high. The researchers concluded that acupuncture seems to be effective in preventing nausea and vomiting in paediatric cancer patients.

Molassiotis A et al. The effects of P6 acupressure in the prophylaxis of chemotherapy-related nausea and vomiting in breast cancer patients. *Complementary Therapies in Medicine* 2007; 15: 3-12.

A randomised controlled trial that evaluated the effectiveness of acupressure using a wristband on the P6 acu-point for chemotherapy-induced nausea and vomiting in 36 patients with breast cancer. Patients were allocated to wear the wristband for the 5 days following the chemotherapy administration. Assessments of nausea, retching and vomiting were obtained from all patients daily for 5 days. Nausea and retching experience, and nausea, vomiting and retching occurrence and distress were all significantly lower in the experimental group compared to the control group ($p<0.05$). The researchers concluded that their results highlight the important role of safe and convenient non-pharmacological complementary therapies, such as acupressure, in the management of the complex symptoms of chemotherapy-related nausea and vomiting.

Melchart D et al. Acupuncture and

A randomised sham-controlled trial that investigated whether

acupressure for the prevention of chemotherapy-induced nausea - A randomised cross-over pilot study. *Supportive Care in Cancer* 2006; 14: 878-82.

a combination of acupuncture and acupressure on the P6 acupoint is effective for reducing chemotherapy-induced nausea and vomiting in 28 patients receiving moderately or highly emetogenic chemotherapy and conventional standard antiemesis. There was no difference between combined acupuncture and acupressure treatment at P6 and at the sham point for the nausea score, but the level of nausea was very low in both groups. The researchers concluded that a significant difference between treatment at P6 and a close sham point could not be detected, but that it could not be ruled out that an existing difference was missed due to the small sample size.

Shin YH et al. Effect of acupressure on nausea and vomiting during chemotherapy cycle for Korean postoperative stomach cancer patients. *Cancer Nursing* 2004; 27: 267-74.

A controlled study that examined the effect of acupressure on emesis control in 40 postoperative gastric cancer patients undergoing chemotherapy (cisplatin and 5-Fluorouracil). Both groups received regular antiemesis medication. The intervention group received acupressure training and was instructed to perform the finger acupressure manoeuvre for 5 minutes on P6 point at least 3 times a day before chemotherapy and mealtimes or based on their needs. Both groups received equally frequent nursing visits and consultations, and reported nausea and vomiting using Rhode's Index of Nausea, Vomiting and Retching. We found significant differences between the acupuncture and control groups in the severity of nausea and vomiting, the duration of nausea, and frequency of vomiting. The researchers concluded that the results suggest that acupressure on P6 point appears to be an effective adjunct manoeuvre in the course of emesis control.

Nausea and vomiting in pregnancy

Aghadam SKZ, Mahfoozi B. Evaluation of the effects of acupressure by sea band on nausea and vomiting of pregnancy. *Iranian Journal of Obstetrics, Gynecology and Infertility* 2010; 13: 39-44.

A randomised placebo-controlled trial that evaluated the effects of acupressure in reducing the severity of nausea and the episodes of vomiting in 100 primigravida women (in weeks 10-16 of pregnancy). Treatment lasted for 4 days in both groups. In the acupressure group, Sea bands were placed on the P6 point, in the placebo group Sea bands were placed on points other than the P6 point. The severity of nausea and frequency of vomiting decreased significantly after treatment in the acupressure group. ($p=0.60$ and $p=0.55$, respectively) compared to the placebo group. The researchers concluded that acupressure (using Sea-bands) is free from side effects, economical and effective in reducing the severity of nausea and frequency of vomiting in pregnancy.

Shin HS et al. Effect of Nei-Guan point (P6) acupressure on ketonuria levels, nausea and vomiting in women with hyperemesis gravidarum. *Journal of Advanced Nursing* 2007; 59: 510-9.

A randomised placebo-controlled trial that examined the effect of P6 point acupressure on nausea, vomiting and ketonuria levels in 66 women diagnosed with hyperemesis gravidarum. The women were allocated to an acupressure group, a placebo group and a control group (which received only conventional intravenous treatment). The degree of nausea and vomiting was statistically significantly lower in the acupressure group compared with the placebo and control groups. Ketonuria levels were reduced over time and, on days 3 and 4 of hospitalisation, levels in the treatment group were

statistically significantly lower than in the placebo or control groups ($p < 0.05$). The researchers concluded that P6 acupressure is a useful treatment for relieving symptoms experienced by women with hyperemesis gravidarum.

Heazell A et al. Acupressure for the in-patient treatment of nausea and vomiting in early pregnancy: A randomized control trial. *American Journal of Obstetrics and Gynecology* 2006; 194: 815-20.

A randomised placebo-controlled trial that evaluated the efficacy of acupressure at the P6 point for the in-patient treatment of severe nausea and vomiting in early pregnancy. In all, 80 patients with nausea and vomiting plus ketonuria before 14 weeks of gestation were included. Acupressure was well tolerated and not associated with an increase in perinatal morbidity or death, but did not reduce the amount of antiemetic medication used, the requirement for intravenous fluid, and median duration of in-patient stay compared with placebo. The researchers concluded that the use of acupressure at the P6 point does not reduce the amount of antiemetic medication or intravenous fluid used, or median duration of in-patient stay.

Other types of nausea and vomiting

Zheng H et al. Effect of transcutaneous electrical acupoint stimulation on nausea and vomiting induced by patient controlled intravenous analgesia with tramadol. *Chinese Journal of Integrative Medicine* 2008; 14: 61-4.

A randomised controlled trial that looked at the effect of transcutaneous electrical acupoint stimulation (TEAS) on nausea and vomiting induced by patient-controlled intravenous analgesia (PCIA) with tramadol. Sixty patients were allocated either to TEAS on LI 4 and P6 acupuncture points intermittently from 30 min before analgesia induction to 24 h after surgery or operation into two groups or to sham TEAS. The pre-operation medication, induction of analgesia and continuous anesthesia used in the two groups were the same. The incidence and degree of nausea and vomiting, as well as the number of patients who needed remedial antiemetic in the acupuncture group were less than those in the sham group. The VAS score and PCIA pressing time were lower with acupuncture than in the sham group. The researchers concluded that transcutaneous electrical acupoint stimulation could prevent nausea and vomiting induced by patient-controlled intravenous analgesia with tramadol.

Bridge P et al. Pilot study investigating efficacy of acupressure wristbands for reduction of radiotherapy-induced nausea. *Journal of Radiotherapy in Practice* 2003; 3: 205-12.

A pilot prospective, paired, cross-over study that aimed to determine if acupressure wristbands could help reduce radiotherapy-induced nausea. A total of 30 patients were recruited via radiotherapists. Their daily nausea levels were assessed for a fortnight using a simple questionnaire and an anti-emetic tablet count. Comparing the 2 weeks data for these patients showed that there was a dramatic drop in their scores when the acupressure wristbands were used. There was a mean score drop of 61% for the combined nausea and vomiting frequency and severity. The researchers concluded that their study suggested that acupressure wristbands might have a role to play in the treatment of radiotherapy-induced nausea.

Dent HE et al. Continuous PC6 wristband acupressure for relief of nausea and vomiting associated with acute myocardial infarction: A partially

A partially randomised placebo-controlled trial that assessed the effectiveness of continuous P6 acupressure as an adjunct to antiemetic drug therapy in the prevention and control of nausea and vomiting in the first 24 hours after myocardial

randomised, placebo-controlled trial. *Complementary Therapies in Medicine* 2003; 11: 72-7.

infarction (MI). A total of 301 consecutive patients admitted following acute MI were included. The first 125 patients recruited received no additional intervention. Subsequent patients were randomised to receive either continuous P6 acupressure or placebo acupressure. There were no significant differences between the groups for the whole 24-hour treatment period. However, the P6 acupressure group experienced significantly lower incidences of nausea and/or vomiting during the last 20 hours (18%), compared with the placebo (32%) or control (43%) groups ($p < 0.05$). The severity of symptoms and the need for antiemetic drugs were also reduced in the acupressure group, but these differences were not statistically significant. The researchers concluded that continuous 24-hour P6 acupressure therapy as an adjunct to standard antiemetic medication for post-myocardial infarction nausea and vomiting is feasible and is well accepted and tolerated by patients.

Roscoe JA et al. Acupressure bands are effective in reducing radiation therapy-related nausea. *Journal of Pain & Symptom Management* 2009; 38: 381-9.

A randomised controlled trial that investigated the effectiveness of acupressure bands in controlling radiation therapy-induced nausea. A total of 88 patients who experienced nausea at prior treatments were allocated to standard care alone, or standard care plus acupressure bands. Patients reported nausea for 2 days prior to randomisation and for 5 days following using a seven-point semantic rating scale (1=not nauseated to 7=extremely nauseated). Patients in the acupressure group reported greater reduction in average nausea than patients in the standard care alone group ($p = 0.01$; mean(bands)=0.70, mean(no bands)=0.10). This equates to a 23.8% decrease in nausea with acupressure compared to a 4.8% decrease in the control group, a difference of 19 percentage points. The researchers concluded that acupressure bands are an effective, low-cost, noninvasive, well-accepted, and safe adjunct to standard antiemetic medication.

Physiological studies

Huang ST et al. Increase in the vagal modulation by acupuncture at Neiguan point in the healthy subjects. *American Journal of Chinese Medicine* 2005; 33: 157-64.

A study that investigated whether acupuncture at the P6 point could improve vagal modulation by using heart rate variability analysis. In all, 39 subjects received acupuncture at the P6 point, 38 subjects received sham acupuncture, and 34 subjects received no treatment. The normalised high-frequency power was used as the index of vagal modulation, and the low-/high-frequency power ratio was used as the index of sympathovagal balance. The normalised high-frequency power after acupuncture increased significantly from the P6 acupuncture group, but not in the sham acupuncture or no-treatment group. In both the P6 and sham acupuncture groups, the mean RR interval (the intervals between consecutive R waves in the electrocardiogram) increased significantly after acupuncture. In the no-treatment group, there was no statistical difference in all heart rate variability measures in the initial and later sessions. The researchers concluded that acupuncture at the P6 point can increase vagal modulation of the subjects. This result may be helpful in the understanding of the mechanism underlying the effect of acupuncture or acupressure at P6 on the lessening of

nausea and vomiting in clinic.

Tatewaki M et al. Effects of acupuncture on vasopressin-induced emesis in conscious dogs. *American Journal of Physiology - Regulatory Integrative and Comparative Physiology* 2005. 288: 57-2.

Vasopressin, a posterior pituitary hormone, is involved in nausea and vomiting in humans and dogs. To investigate the antiemetic effects of acupuncture on vasopressin-induced emesis, gastroduodenal motor activity and the frequency of retching and vomiting were simultaneously recorded in conscious dogs. Gastroduodenal motility was continuously monitored throughout the experiment. Electroacupuncture (EA) was performed before, during, and after the vasopressin infusion. To investigate whether the opioid pathway is involved in EA-induced antiemetic effects, naloxone (a central and peripheral opioid receptor antagonist) or naloxone methiodide (a peripheral opioid receptor antagonist) was administered before, during, and after EA and vasopressin infusion. EA at P6 significantly reduced the number of episodes of retching and vomiting induced by vasopressin. EA at P6 also suppressed retrograde peristaltic contractions. In contrast, EA at two other acupoints had no antiemetic effects. The antiemetic effect of EA was abolished by pretreatment with naloxone but not naloxone methiodide, suggesting that the antiemetic effect of acupuncture is mediated via the central opioid pathway.

General research on mechanisms for acupuncture

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

A paper that discusses research showing 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. The research used functional magnetic resonance imaging studies of healthy subjects to show that acupuncture stimulation evokes deactivation of a limbic-paralimbic-neocortical network, which encompasses the limbic system, as well as activation of somatosensory brain regions. It has also been shown that the effect of acupuncture on the brain is integrated at multiple levels, down to the brainstem and cerebellum.

Cheng KJ. Neuroanatomical basis of acupuncture treatment for some common illnesses. *Acupunct Med* 2009;27: 61-4.

A review that looked at acupuncture treatment for some common conditions. It is found that, in many cases, the acupuncture points traditionally used have a neuroanatomical significance from the viewpoint of biomedicine. From this, the reviewers hypothesize that plausible mechanisms of action include intramuscular stimulation for treating muscular pain and nerve stimulation for treating neuropathies.

Lee B et al. Effects of acupuncture on chronic corticosterone-induced depression-like behavior and expression of neuropeptide Y in the rats. *Neuroscience Letters* 2009; 453: 151-6.

In animal studies, acupuncture has been found to significantly reduce anxiety-like behaviour, and increase brain levels of neuropeptide Y, the brain levels of which appear to correlate with reported anxiety.

Samuels N et al. Acupuncture for psychiatric illness: a literature review. *Behav Med* 2008; 34: 55-64

A literature review of acupuncture for psychiatric illness, which presents research that found acupuncture to increase central nervous system hormones, including ACTH, beta-endorphins,

	serotonin, and noradrenaline. It concludes that acupuncture can have positive effects on depression and anxiety.
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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. <i>Int J Clin Acupunct</i> 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.
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Zhao ZQ. Neural mechanism underlying acupuncture analgesia. <i>Prog Neurobiol</i> 2008; 85: 355-75.	Review article that discusses the various peripheral and central nervous system components of acupuncture anaesthesia in detail.
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Han JS. Acupuncture and endorphins. <i>Neurosci Lett</i> 2004; 361: 258-61.	A literature review of studies relating to the release of endorphins by acupuncture.
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Pomeranz B. Scientific basis of acupuncture. In: Stux G, Pomeranz B, eds. <i>Acupuncture Textbook and Atlas</i> . 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 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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