This chapter introduces different types of pain and their treatment with electroacupuncture (EA) and associated methods. General guidelines for treatment are given, with a focus on selecting which intervention parameters to use in the concluding sections of the chapter.

PAIN

Pain can be defined as ‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage’. We sense pain, we respond emotionally to it, we give it meaning. If we ‘kill’ the sensation of pain, or deal with our feelings about it, or conceptualise it differently, sometimes we can bear it more. Understanding can lead to a sense of control for both practitioner and patient.

Pain may be acute, or chronic, or even ‘acute on chronic’ (an acute episode of one pain on a background of another, chronic pain). It may originate in the body (somatogenic pain), or in the mind (psychogenic pain). Somatogenic pain may further be differentiated into nociceptive and neurogenic pain, as well as ‘idiopathic’ pain, or diffuse pain that does not conform to any of these categories.

Acute pain

Acute pain, by definition, is short lived and has a purpose, signalling actual or likely tissue damage. An initial inflammatory phase (lasting 1–3 days) is followed by a phase of ‘subacute’ pain that often lasts longer. Acute and subacute pain are usually characterised by clear, well-focused sensory characteristics. However, such pain is not a purely sensory experience. Sympathetic activation and generalised arousal are very much part of acute pain, so that it is frequently associated with anxiety. Sometimes the degree of anxiety experienced, or the patient’s conviction that acute pain is symptomatic of more disturbing underlying disease, can signal the likely transformation of acute into chronic pain.

Chronic pain

Arbitrarily, pain is usually considered chronic if it has lasted at least 3 months. However, the difference between acute and chronic pain is qualitative and not just one of duration. When pain becomes chronic, whatever its original cause, it very often has no ongoing known pathological basis in physiology, or anatomy, or nociceptive input. Thus, although some chronic pain may be maintained by myofascial trigger points, or by radiculopathy, it is often considered to be maintained primarily by central mechanisms, such as sensitisation or kindling, whereas acute pain has both peripheral and central components. Unlike acute pain, which warns of possible damage, chronic pain may well have no biological function.

Chronic pain itself may be periodic, sometimes with intermittent attacks of acute pain. It is not necessarily continuous. The sensory characteristics of chronic pain are often multifocal and vague, and sometimes inappropriate for the organic pathology evident. The affective dimension of pain is more evident than with acute pain, often leading to chronic pain being unfairly dismissed as psychogenic.

Chronic pain can be immensely difficult to treat – without apparent cause, without biological function, purpose or meaning, bewilderingly uncontrollable, and often totally disruptive of work, social and family life. Chronic pain patients may be demoralised, or frankly depressed, and can in turn demoralise even the most rational practitioner.

Sufferers from chronic pain often come to depend on medication for relief. Such reliance can in turn have iatrogenic consequences, such as gastric irritation, bronchospasm, increased bleeding time or skin reactions from non-steroidal anti-inflammatory drugs (NSAIDs). Reliance on medication can also distort the experience of pain, compounding problems of depression and sleep disturbance. It not infrequently leads to addiction, particularly to benzodiazepines and hypnotics, and more recently to opioids.

Given the multifactorial nature of chronic pain, therapeutic goals of management and rehabilitation may be as important as pain relief in some cases, especially in the elderly. Some authors, for instance, have suggested a three-fold approach, striving for a 50% decrease in pain (intensity or duration, or both), a 50% increase in function and mobility, and a 50% decrease in medication with the elimination of potentially addictive agents. Given the potential side-effects of many conventional treatments, acupuncture and related treatments may have benefits for chronic pain patients in all of these areas.

Nociceptive pain

‘Nociceptors’ are nerve terminals receptive to pain sensation. Nociceptive pain generally occurs as a result of damage to non-nervous tissue, occurring as a result of activation of specific peripheral nociceptors in musculoskeletal tissue, in supportive bony–cartilaginous tissue, or in the viscera. It is localised, may be present at rest, but typically increases with loading (e.g. weight bearing). If somatic in origin it is generally aching or throbbing, if visceral more a dull aching.
or cramping, the latter poorly localised. Even though nociceptive signals may not themselves reach consciousness, quite often motor or sympathetic spinal reflexes may become involved, with muscle splinting or blood vessel constriction around the actual site of injury.

Nociceptors are activated by peptides and prostaglandins released when tissue is damaged. Thus local inflammation is often evident, if not outright physical damage, with distinct and localised muscle tenderness or painful joint movement, but without other sensory disturbance. Nociceptive pain generally responds to analgesics.

**Neurogenic pain**

Neurogenic or neuropathic pain includes the neuralgias, pain due to peripheral nerve injury, and that resulting from neuropathy. It originates from trauma or injury to the nervous system itself, including the peripheral nerves, spinal roots, spinal cord and supraspinal structures. Nerve endings are not involved, although it may feel as if tissue damage is present. Neurogenic pain may continue long after the original injury is past, and can be very severe. It tends to occur in older age groups.

In contrast to the local signs usually found with nociceptive pain, neurogenic pain often radiates along the path of the damaged neuronal structure. Sensory, and sometimes motor, deficits will also occur in neuroanatomically related areas. However, it is not always easy to differentiate clinically between nociceptive and neurogenic pain, and they may occur together. Reversible pain resulting from nerve root entrapment, for example, may follow a 'neurogenic' distribution, but should be distinguished from established nerve damage.

**Myofascial pain**

Chronic myofascial pain has been defined as musculoskeletal pain without an obvious cause. It is almost always associated with muscle shortening (contracture rather than spasm), leading in turn to nerve entrapment and neuropathic (sensory, motor or autonomic) manifestations. These may be particularly evident if shortened paraspinal muscles lead to compression of nerve roots.

Within shortened muscle trigger points (TrPs) occur, small, localised and extremely tender points where sustained pressure reproduces chronic pain in areas where it occurs spontaneously. While chronic pain is generally considered centrally maintained, many who work with chronic myofascial pain believe it is sustained because of continuing nociceptive peripheral input from trigger points.

**Idiopathic and psychogenic pain**

Pain is considered idiopathic, or sometimes psychogenic, when it is neither clearly nociceptive nor neurogenic in origin. Like neurogenic pain, however, it tends not to respond to opioid medication.

Pschogenic pain has some characteristics in common with chronic pain. Thus it is not easy to differentiate between pains that stem primarily from the mind or from the body, although psychogenic pain may appear exaggerated, as well as spatially diffuse and variable in time – throbbing, as opposed to constant, in the case of headaches, for example. Those with psychogenic pain tend to complain more about it, with elaborate descriptions and an emphasis on affective discomfort rather than just sensation.

**PAIN AND ACUPUNCTURE**

Acupuncture, and EA in particular, is generally considered as a treatment for both pain and functional disorders. However, although traditionally the prevention of disease was considered a priority, with disease treatment secondary and dealing with pain a subsidiary objective, there are now more acupuncture consultations for pain, particularly musculoskeletal pain, than for any other problem.

There is a vast literature on acupuncture for pain. Sun Peilin’s magnificent tome is the single most useful reference work on the traditional Chinese medicine (TCM) treatment of pain, analysing many sorts of pain in traditional terms. There are also several reviews of acupuncture for pain from various Western perspectives, although unfortunately none of these link TCM syndrome differentiation to Western labels for differentiating pain, such as acute/chronic or nociceptive/neurogenic.

Box 9.10.1 details the causes of pain in TCM terms.

<table>
<thead>
<tr>
<th>Causes of pain in TCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>In TCM terms pain can be due to stagnation of qi and/or xue (Blood), or deficiency of either or both. It can result from invasion of external factors such as Wind, Cold, Heat or Damp, or from internal causes.</td>
</tr>
<tr>
<td>Excess conditions associated with invasion of external factors are more likely to be acute (short-lived, fixed in location, constant and strong), and deficient pain conditions are more likely to be chronic (gradual in onset, moving, intermittent).</td>
</tr>
<tr>
<td>Blood stagnation pain tends to be fixed and stabbing, associated with hardness of the affected area and to occur at night. Qi stagnation pain is more moving, spreading, associated with softness of the painful area and occurring more in the day.</td>
</tr>
<tr>
<td>Pain due to predominance of Wind can be severe, coming and going, and paroxysmal. Cold pain, on the other hand, is more likely to be fixed, with restriction of movement and improvement with warmth. Heat pain may resemble that due to inflammation in Western medicine (WM), with heat, redness and swelling. Damp pain is deep, heavy, dull, fixed, difficult to move and often accompanied by numbness or swelling.</td>
</tr>
</tbody>
</table>
In Chinese clinical studies of EA, treatment effects are often explained only in vague and general TCM terms. EA is considered, for example, to ‘regulate qi and ying, dredge the channels, create analgesia and promote body resistance’. Little attention is paid to syndrome differentiation, or whether different forms of treatment might be appropriate when conditions are analysed according to a traditional approach. TCM is also virtually ignored in almost all Western studies of EA for pain, in keeping with the perception of acupuncture, historically, as an easy-to-learn method of *locus dolendi* stimulation.

However, as stated earlier, acupuncture is a treatment for both pain and functional disorders. For best results, these two aspects of acupuncture, as ‘local treatment’ for pain (segmental ‘reflexotherapy’) and root cause therapy (homeodynamic regulation) should both be taken into account. The focus will vary between treating the pain itself, what are considered its underlying causes, or both of these, depending on the severity of pain experienced.

In this context, it is as well to remember that acupuncture, and EA in particular, appears to have more effect on the affective than the sensory dimension of pain. This can be important when considering how to assess responses to treatment. Effects of electrostimulation on general mood may also occur independently of changes in pain intensity. If pain is relieved, then muscles will tend to relax, movement will become more possible and circulation will improve, with benefits for local tissue repair, as well as on other levels as well.

EA was developed originally in the 1950s as a means of treating pain, first postoperative and intraoperative, and then other forms of acute and chronic pain. It was reintroduced to the West in the early 1970s just as transcutaneous electrical nerve stimulation (TENS) was being explored for its effects on pain following the 1965 publication of the Gate Control Theory of pain (GCT) by Ronald Melzack and Patrick Wall. The focus on pain and EA intensified during the 1990s, as EA became a standard tool of research into the mechanisms of pain and pain control. However, one should always remember that responses to clinical and experimental pain can be very different.

Clinically, EA is indicated for pain that is unresponsive to MA, or for severe and chronic pain conditions, particularly those involving nerve damage. TENS has been considered suitable for many types of pain, and according to one authority, ‘an important axiom is that no pain should be considered untreatable by TENS unless proved otherwise’. However, high-frequency (HF) TENS may be more effective for chronic pain in the extremities than midline pain.

Most Chinese traditional acupuncture practitioners consider EA more likely to be successful if the sensation of *deqi* can be obtained, and the *qi* directed towards the affected area. Correspondingly, the paraesthesiae elicited by TENS should be ‘directed into the painful area’ for best results.

Auricular acupuncture, generally with ear ‘pellets’ or seeds, is commonly used for pain. Pain is also one of the main indications for microcurrent treatment.

**Comparisons and combinations** In many experimental studies on pain, the effect of EA is superior to that of MA. However, if stimulation intensity is strong in both instances, effects may be comparable, and the combination of EA with periodic needle manipulation may be more effective than EA alone. There are few clinical trials that compare EA and MA, and the choice between them is often a matter of personal preference and experience.

Experimentally, there is little difference between EA and TENS in terms of their antinociceptive effects or the neural mechanisms involved. The same is very possibly the case with clinical pain, although some individuals may respond better to one or the other.

From experimental studies, it seems that probe TENS (pTENS) may be slightly less effective than EA for pain, although there are too few comparative clinical reports to be able to generalise this to patients. Acupuncture and related techniques should never be employed in isolation. Adjunctive methods such as cold or hot packs, massage, exercise and diet may all be usefully combined with EA, TENS and the other approaches described here.

**Painful conditions commonly treated with acupuncture**

A glance through the clinical studies database shows that EA and related methods have been used for a wide variety of painful conditions.

A survey of pain clinics in the USA found that cervical and low back pain were the commonest conditions treated, whether with TENS or with other methods, and in a survey of pain clinics in Scotland and the North of England, lower back and buttock or leg pains were those most frequently reported. However, in a corresponding Japanese survey, herpes zoster and postherpetic neuralgia presented for treatment more frequently than lumbar and neck–shoulder pain.

Leading indications for TENS in the elderly are probably chronic neuropathy and postfracture recovery.

**Acupuncture and acute pain**

Of four systematic reviews of acupuncture for acute pain published by early 2001, only one, on acute dental pain, was positive in its findings. However, a less formal review concluded that EA is of great value in both acute and subacute pain. Some authors clearly consider EA to be more useful for acute than chronic pain, although in one such study the acute pain was predominantly nociceptive in origin, and the chronic pain neurogenic, which complicates the comparison.

In one retrospective (uncontrolled) review, pTENS was found beneficial for two-thirds of patients with acute pain. As for TENS, the authors of one review of its use for musculoskeletal pain concluded that, although there was little evidence that TENS could be useful if such pain were chronic, it could be helpful for acute pain. Other authors...
too have considered TENS more effective for acute than chronic pain. Although outcomes for acute pain are not infrequently positive in non-randomised studies, there are more negative randomised controlled trials (RCTs) than positive acute pain. In one RCT, however, high-frequency, low-intensity TENS (conventional TENS or CTENS) was found about as effective as acetaminophen (paracetamol) with codeine for acute traumatic pain, but without the side-effects of medication.

Comparisons For acute sprains, EA gave better results than MA in one RCT.

Points used for acute pain In TCM, the luo (junction, connecting) and xi cleft points are considered appropriate for acute pain, as well as ‘corresponding’ points (for instance, a shoulder point such as SJ-14 for a hip problem at around GB-30).

For acute pain using electrostimulation, Heydenreich suggested that the front mu points, huatuojiaji points and auricular points could be particularly useful. Strong stimulation at local points may be too uncomfortable for the patient, or even aggravate their pain, since local segmental circuits are already fully activated by the pain. Thus distal or contralateral treatment may be called for, and at fewer points.

**Acupuncture and chronic pain**

Chronic pain is not a simple thing, and to do battle with it a familiarity with different approaches is a necessity. EA can be a useful addition for those who only use manual needling, but acupuncture alone is often not enough, particularly when the pain has proved resistant to other forms of treatment. The multifactorial nature of pain and the need for a correspondingly multidisciplinary treatment programme are emphasised repeatedly throughout the pain literature. In the West, this has led to a movement to set up specialist chronic pain clinics. Acupuncture treatment, like TENS, has become more and more an accepted part of what they have to offer.

Although short-term pain relief is achieved with acupuncture for around 50–70% of sufferers, long-term results are less promising, with some reviewers questioning whether they are in fact due more to psychological factors than to needling. Thus, although acupuncture was considered as ‘possibly beneficial’ for chronic low-back or head and neck pain in one 1989 meta-analysis, other reviewers have not been so sanguine, commenting that even the better studies were of poor quality. It is tempting to speculate whether the 1989 review was more positive because it included quite a high proportion of EA RCTs (6/14, or 42.9%). However, whereas EA in other early reviews of acupuncture was considered of great value for acute and subacute pain, its usefulness for chronic pain was not so clear.

As so often in clinical research, the poor quality of studies available for analysis precludes definite conclusions. Thus the authors of one systematic review of acupuncture for chronic pain could conclude only that there is insufficient evidence to compare the effectiveness of acupuncture with that of placebo, sham acupuncture or standard care. However, trials in which patients received six or more acupuncture treatment sessions were found to be significantly associated with positive outcomes.

In one retrospective (uncontrolled) review, pTENS was found to be effective in around 63–66% of chronic pain (amputation pain, neuralgia and degenerative joint disorders), but only in 50% of a further, heterogeneous group of conditions. Ronald Melzack and Joel Katz, in contrast, in a controlled crossover study of auricular pTENS for chronic pain, did not find it reduced pain scores at all.

TENS has often been used for chronic pain. Donlin Long, an early protagonist of TENS, wrote in one standard electrotherapy textbook: ‘It is probable that transcutaneous electrical stimulation represents the single most effective physical entity yet produced in the management of chronic pain.’ While it is true that TENS has more frequently been investigated for its effects on chronic than acute pain, results of recent reviews of TENS for chronic pain are still inconclusive. As with acupuncture, short-term benefits of TENS tend not to last, dropping off rapidly over the first year, particularly during the first month. Even so, clinicians still claim that TENS can be of significant long-term benefit to around 40% of chronic pain sufferers. It is worth noting, however, that caffeine, sometimes used in pain treatment, reduces the effectiveness of HF TENS.

Cranial electrotherapy stimulation (CES) has been used to treat chronic pain, although benefits in at least some instances may well be due to a placebo effect.

LA has been used for chronic pain. TrP infrared LA, for example, was found in one small double-blind study to accelerate chronic pain rehabilitation in professional athletes. LILT has also been used for chronic pain in a number of larger, retrospective (uncontrolled) studies, with an overall reduction in pain levels of some 60–70%. It has been argued that the long-term effects evident here would indicate that benefits are unlikely to be due to placebo. Some clinicians have even found LILT comparable, if not actually superior, to interferential therapy or shortwave diathermy in treating pain. However, despite some positive results in LILT controlled trials from Japan, the authors of one 1997 review of physical therapy modalities for chronic musculoskeletal pain concluded that there was little evidence that LILT, TENS or ultrasound had any long-term efficacy.

Box 9.10.2 details some other factors in the treatment of chronic pain.

Comparisons Adrian White, reviewing the clinical applications of EA, has concluded that it results in long-term benefits in around 25% of chronic pain patients, including those with musculoskeletal pain. Hyodo Masayoshi, in a retrospective review of ryodoraku for chronic pain, found that this form of EA was more effective for musculoskeletal conditions than for neurogenic pain, which was more responsive to nerve block. Other authors have also found EA in general to be more suitable for musculoskeletal pain.
EA was found to be more effective than MA for both pain reduction and restoration of autonomic and trophic functions in patients with chronic post-traumatic pain. EA also appears to be more effective than simple retained needling for chronic pain, and gave more effective short-term pain relief than MA in one study of mixed chronic pain types.

Richard Cheng and Bruce Pomeranz, comparing EA and acupuncture-like TENS (ALTENS) applied at acupoints for chronic musculoskeletal pain, found little difference between them. Stephen Abram and colleagues, in a small crossover study on chronic pain, concluded that LF EA, TENS and placebo EA all had comparable effects on mean pain ratings. However, in a large retrospective study of pain clinic patients, whereas MA, HF EA and TENS gave similar results in the short term, long-term benefits were greater with TENS. Comparable results were obtained in TEAS (transcutaneous electrical acupoint stimulation) studies with the Codetron device.

Ronald Melzack’s group found little difference between MA and TENS in the treatment of chronic pain. In contrast, Gabriel Stux has suggested that LA is less effective than MA for acute pain, and a number of studies appear to support this.

Points used for chronic pain In TCM terms chronic pain is likely to be associated with underlying deficiency. Treatment will therefore need to be directed at that, in addition to local stimulation for the pain itself. An elaborate discussion of constitutional treatment for pain is included in Sun Peilin’s book. He suggests that the yuan and xi cleft points may be used together for chronic pain, and that fewer needles should be used for a deficient patient, but more for a chronic, complicated pain picture.

When using electrostimulation methods (as well as LA or moxibustion), Alf Heydenreich suggested that the back shu points, yuan and luo points, as well as entry–exit points, may be particularly useful for chronic pain, whereas Sun favours the luo points for acute pain. At least one review of acupuncture for chronic pain found that studies where the acupoints used varied from treatment to treatment produced more positive outcomes than ‘formula acupuncture’ applied at fixed points. However, in one briefly reported study of MA for chronic pain, there was no difference in either short- or long-term benefit between patients treated with TCM and those treated with modern ‘Western acupuncture’ protocols. Similar results were reported in one RCT of EA for chronic pain, distal meridian points being compared with local tender points, in this case.

George Lewith and Charles Vincent have suggested that, particularly in chronic pain, both endorphinergic and autonomic mechanisms are involved, so that both general and specific points may need to be used. In contrast, practitioners from such different backgrounds as Boris Sommer and Alexander Macdonald consider that local points should be used preferentially for chronic pain, a view supported by Thomas Lundeberg, who adds that more points may be stimulated than when treating acute pain. Trigger points are frequently mentioned, as indeed are auricular points.

LILT has been applied over the stellate ganglion for chronic musculoskeletal pain.

When to use what – parameters for chronic and acute pain Scanning through the studies in the electronic database, it seems that DD modulation is far less common than simple continuous stimulation in the treatment of chronic pain, that HF tends to be used more than LF stimulation, with a number of studies making use of a middle range, around 8–16 Hz, and that strong treatment is less common than comfortable or gentle treatment. From the little information available on acute pain it seems that low frequencies (< 10 Hz) appear to be used less commonly than those above 10 Hz, while intensity may be ‘to tolerance’ or at motor level.

However, given the variety and complexity of painful disorders, it is difficult to make useful generalisations, and this is reflected in the literature. Thomas Lundeberg and Tim Watson have suggested, partly on theoretical grounds, that stronger stimulation can be used for chronic pain and milder stimulation for acute pain. From reviewing clinical studies, Adrian White has concluded that LF EA appears to be more effective than HF EA for patients with chronic pain. Together, these would indicate that LF, high-intensity acupuncture-like stimulation (ALS) is more suited to chronic pain treatment, and HF, low-intensity TENS-like stimulation (TLS) to acute pain – an approach considered standard by many physical therapists. Taking the opposite view, however, Clifford Woolf and John Thompson have proposed that TLS is more appropriate for chronic pain than ALS – a position also taken by John Low and Ann Reed in their textbook on electrotherapy.

Conventionally in electrotherapy, electrical or ultrasound treatment is given at lower intensity in ‘irritable’ acute conditions, and higher in chronic ones, where, for example,
muscle may be lacking in tone or subject to fatigue. However, chronic pain can sometimes be exacerbated by strong electrostimulation, which is therefore best avoided at least initially if the pain is severe. Thus several authors have recommended sensory level LF for chronic pain, but motor level HF for acute pain. In ryodoraku, strong but brief EA tends to be used for acute pain, and mild but longer stimulation for chronic pain.

When using microcurrent therapy for acute conditions, it has been suggested by one author that high-voltage steep incident ‘waveslope’ stimulation should be avoided. However, the author of a different microcurrent textbook states that a rapid rise time and relatively ‘high’ current (100–200 µA) at 30 Hz may well be used for acute pain, but that a slow rise time, lower current (40 µA) and lower frequency (0.3 Hz) should be used for chronic pain.

One British advocate of LA has found that pulsing a 10 mW 660 nm diode laser at lower frequencies (5–20 Hz) is effective for many acute disorders, whereas 150 Hz is better for chronic conditions. In general, LILT pulsed at low frequencies may be more appropriate for acute or subacute conditions, and at higher frequencies for chronic ones. As for dosage, some authors have recommended lower doses for the former, and higher for the latter.

**Acupuncture and nociceptive pain**

General points on nociceptive pain and its treatment can be found elsewhere in this chapter. For information on treating specific conditions, see Subchapter 9.12, by Pekka Pöntinen.

**Acupuncture and neurogenic pain**

Since there are many types of neurogenic pain, and many methods of treatment, only a brief overview is given here. The treatment of specific conditions is covered in more detail in the next subchapter.

Pains due to nerve injury, neuritis or neuralgia are often considered as indications for LF electrotherapy, neuritis and the neuralgias for galvanotherapy, and an even wider spectrum of neurogenic pains for TENS, including stump and phantom pain, pain arising from a neurinoma (nerve fibroma) or neuroma, and complex regional pain disorder (CRPD). From a Western medical point of view, methods of peripheral stimulation (MA, EA or TENS), or of central stimulation (spinal cord or brain stimulation) all depend on the targeted neurological structures being able to respond. If they have been compromised, peripheral LA and LILT are quite often used for neurogenic pain.

Combinations

There is some agreement that TENS or EA is more effective than manual needling in the management of chronic neurogenic pain.

**Points used for nociceptive and neurogenic pain**

Nociceptive pain is generally treated with segmental stimulation. Combination with extrasegmental stimulation may well prolong the duration of pain relief, and also enhance it, particularly if the extrasegmental TENS or EA is at a high intensity.

An interesting hint on points to use for neurogenic pain is given by Sun Pelin, who observes that the luo points may be used when superficial pain is accompanied by paraesthesiae and loss of sensation. Alexander Macdonald cautions against needling areas where there is marked alldynia, as this may be exacerbated. He suggests that it is better to treat such regions with TLS, in the same segment but well proximal to the abnormal region. Keith Tippey similarly cautions against using TENS directly over a region of nerve compression, preferring to stimulate within the segment in which referred pain is perceived. However, he is also an advocate of stimulation over the spinal nerve roots for neurogenic pain, and employs motor points (MPs) and TrPs too. In the event that segmental stimulation exacerbates neurogenic pain, extrasegmental stimulation (in non-hyperalgesic areas) should be used. In particular, contralateral treatment may be appropriate.

CTENS requires intact cutaneous afferent nerves to be effective, whereas ALS depends on properly functioning muscle afferents. If there is ‘denervation’ of muscle, with cutaneous sensory nerves affected as well, progress will be difficult. On the other hand, if afferents are affected only...
on the dermatome level, for instance, stimulation can still be directed to points in the involved myotome.

When using LILT for chronic neurogenic pain within a Western model, David Baxter has recommended stimulating all relevant nerve roots, plexuses and trunks, as well as TrPs.

When to use what – parameters for nociceptive and neurogenic pain Neurogenic pain is very often chronic. Thus when Luther Kloth recommends ALTENS for chronic pain, he includes not only the chronic pain associated with degenerative joint disease and chronic inflammatory disorders, but also neurogenic pain. In keeping with this, when using TENS or EA, a number of authorities have suggested that nociceptive pain responds better to TLS, and neurogenic pain, especially with hyperaesthesia, to ALS, or to interrupted TENS/EA, although this recommendation is by no means universally accepted. Although strong stimulation has been shown experimentally to be appropriate for nociceptive pain, it may well exacerbate neurogenic pain.

Keith Tippey differentiates neuropathic pain (for which he recommends CTENS) and radiating or referred neurogenic pain, as in sciatica or cervical rhizopathy, for which he finds interrupted TENS more helpful. Thus he will use a combination of CTENS and interrupted TENS paraspinally for neurogenic pain. Mark Johnson suggests that ALTENS may be appropriate for radiating neurogenic pain, and similarly uses CTENS over the nerve root, with ALTENS over the main muscle mass through which pain appears to radiate. In neurogenic pain, where there is frequently cutaneous sensory deficit or hyperaesthesia, it clearly makes sense to use ALTENS rather than CTENS over the affected area.

When using LILT or LA for neurogenic pain, a low dose has been recommended initially, in case pain is exacerbated, although David Baxter proposes a mid-range dosage of around 10–12 J/cm² at first.

**Acupuncture and myofascial pain**

For myofascial pain, the literature is enormous on MA and ‘dry needling’, as well as interventions such as TrP injection or cryotherapy. TENS is also used for myofascial pain, EA less so. See Subchapter 9.12 for further details, and Case study 9.10.1 on EA in the treatment of chronic myofascial pain in athletes.

Because of the association of muscle shortening with myofascial pain, stretching can be a very important part of any treatment. In Chinese acupuncture literature, the patient’s movement during needling is repeatedly emphasised.

**When to use what – parameters for myofascial pain**

Interrupted TENS has been recommended for deep myofascial pain, and modulated TENS to exercise shortened muscle, as well as to improve circulation within and around it.

Gad Alon has suggested that TrP motor level stimulation may be helpful for chronic musculoskeletal pain (15–200 Hz, 20–100 µs, 1–5 min/pt). Another interesting approach to treating myofascial TrPs transcutaneously is to use frequencies of 1–5 kHz and very short pulses in either continuous or interrupted mode. Stimulation should not be too intense, as this can aggravate myofascial pain, and treatment may need to be continued for long periods for maximum benefits.

**Acupuncture and psychogenic pain**

Although acupuncture has been used in the treatment of psychogenic pain, particularly by Italian medical acupuncturists with a psychoanalytic background, it is sometimes considered that this form of pain is less amenable than other forms to peripheral stimulation techniques. In particular, after only one course of treatment, long-term benefits are less likely for psychogenic than nociceptive pain. Some authors consider that psychogenic pain responds better to EA than MA, although psychogenic pain is frequently exacerbated by electrical stimulation methods.

**Some conclusions on which intervention to use**

MA, EA and TENS may all be appropriate interventions for pain, in different circumstances. When comparing acupuncture and TENS, for example, one important difference is the practitioner–patient relationship: whereas this is central to acupuncture, TENS can be used more independently. Economic factors, intelligence and dependency issues may determine whether one modality or a combination is optimal for a particular patient. When treating chronic pain, for example, the depression and weakening of inner resourcefulness often associated with it may contribute significantly to a decline in home use and effectiveness of TENS.

TENS is frequently used for pain in the elderly, its leading indications probably being chronic neuropathy and postfracture recovery.

LA (and LILT) may be particularly suited to treating children, the elderly or those for whom electrical or invasive stimulation may not be appropriate.

**Points for pain**

Traditionally, *bi* (painful obstruction) syndrome, which roughly corresponds to the Western category of musculoskeletal pain, is treated using points local or adjacent to the painful area, together with distal points along the involved meridians (e.g. SI-3, SJ-5, LI-4 or LI-11 on the arm, or BL-40, BL-60, GB-34 or ST-44 on the leg). Treatment is also directed at expelling the external factors held to be responsible, using combinations of points spatially unrelated to where the pain is.

In TCM, the *luo* (junction or connecting) points and *shu* stream points are also important, the former for superficial (acute) muscle pain, perhaps diffuse and accompanied by paraesthesiae and sensory loss, and the latter for joint pain. Furthermore, the *yuan* (source) points may be helpful for deeper pain more clearly located along a meridian pathway. Other points such as the *xi* Cleft and eight *hui* meeting...
Like many Western-trained medical acupuncturists, my use of acupuncture or dry needling targets the treatment of myofascial pain and dysfunction (Fig. 9.10.1). In most subjects my preference is for direct needling of the primary MTrP, and in the majority of cases the condition resolves after one to three sessions of brief direct needling. In chronic cases the pain may have been present for years at varying degrees of severity, or may have followed a relapsing course, and under these circumstances I often introduce EA early in the treatment course. In painful conditions where complete resolution is unlikely I use EA because it appears to have a more prolonged effect than manual needling alone.

The following cases are representative of my use of EA in the treatment of chronic myofascial pain from a single primary myofascial trigger point (MTrP). The cases are very similar, and in many ways commonplace, but they are unusual in that the subjects are elite athletes.

Initial assessment and diagnosis

Both subjects presented to my private clinic in 1997. The first was a 45-year-old marathon canoeist preparing for a gruelling 125-mile race in which the serious competitors paddle non-stop, day and night to complete the distance in around 24 hours. She complained of a 10- to 12-year history of right shoulder girdle pain that came on after 1 to 5 miles of paddling or 3 miles of running. She described the pain as sharp and burning in nature, and commented that it was constant whilst she was paddling. The pain was exacerbated by carrying heavy bags and relieved by massaging with a rubefacient.

On physical examination I noted that she was a particularly muscular athlete with a normal range of movement of the shoulder girdles and cervical spine. Soft tissue palpation revealed a firm band of skeletal muscle within the right rhomboid minor, which was tender near its insertion into the scapula. Pressure over this tender point mimicked the subject’s symptoms. This was clearly a chronic, primary MTrP of the right rhomboid minor. The major aetiological factor appears to have been overuse, as

Figure 9.10.1 Mike Cummings with patient and CEFAR Acus II electroacupuncture stimulator. Patient is being treated for chronic myofascial pain in the neck and shoulder girdle muscles.
therefore the most biomechanical stress. The major that is subject to the greatest dynamic range and thoracic rotation, so it is the lower border of rhomboid circumduction of the shoulder, which includes full scapulothoracic rotation. In contrast, the butterfly stroke involves reach, thus the rhomboid minor is more stressed in this less than 45% of scapulothoracic rotation at maximum mechanics of the two different disciplines. The power contention can be derived from analysis of the biomechanics, which equates to repetitive microtrauma. Support for this rhomboid major.

In both cases I felt the problems arose from overuse, which equates to repetitive microtrauma. Support for this contention can be derived from analysis of the biomechanics of the two different disciplines. The power stroke of the lower arm in forward paddling involves retraction and elevation of the scapula from a position of less than 45% of scapulothoracic rotation at maximum reach, thus the rhomboid minor is more stressed in this manoeuvre. In contrast, the butterfly stroke involves circumduction of the shoulder, which includes full scapulothoracic rotation, so it is the lower border of rhomboid major that is subject to the greatest dynamic range and therefore the most biomechanical stress.

Treatment

The two subjects were seeking an understanding of their respective complaints, and hoping for sufficient symptom relief to allow optimal performance. It is important to recognise that athletes have considerable psychological investment in their physical abilities, and a thorough explanation of the nature and aetiology of the problem is an essential part of therapy. Furthermore, it is naive to expect to entreat an athlete to rest, especially in the run-up to an event.

My treatment goals were similar in both cases: to facilitate the subjects’ understanding of the problem, to encourage appropriate rehabilitative activity, and to reduce the symptom load from their MTrPs in order to allow continued training.

I generally start acupuncture treatment of MTrPs with direct manual needling. However, I occasionally use EA at the first session if the subject has had acupuncture previously with no adverse effects or signs of great sensitivity, as in the case of the swimmer here. In treating chronic MTrPs with EA, I directly needle the primary MTrP and place a second needle a short distance (2 to 4 cm) along the associated taut band. If there is a second MTrP or simply a tender spot nearby in the same muscle, I would choose this site for the second needle in preference to the taut band of the primary MTrP.

I use a DD pattern of LF and HF stimulation, from 2 to 4 Hz at the lower end to approximately 100 Hz at the upper end. I encourage the individual under treatment to adjust the power of the stimulus so that the sensation is strong but just below the threshold of aversive pain, and in most cases visible muscle contraction is apparent at the sites of needle insertion. The EA is generally applied for 10 to 20 minutes, but occasionally for up to half an hour.

In both cases the EA was applied at weekly intervals, and between sessions the subjects performed specific stretching manoeuvres with or without prior ischaemic compression. Stretching and ischaemic compression can be safely taught to subjects for the treatment of MTrPs at home.

After two sessions, one manual needling and one EA, the canoeist paddled 42 miles over a training weekend. She reported some stiffness after 17 miles but suffered no significant pain. The symptoms from her MTrP reduced considerably in spite of her continued training, and after four further sessions of EA the MTrP in her right rhomboid minor was no longer palpable, and she was symptom free.

The butterfly swimmer improved considerably after a single session of EA. She began performing specific stretching exercises enthusiastically, having understood the importance of this activity in countering the muscleshortening effect of an active MTrP and maintaining the healthy functioning of the muscles. After three sessions she had her right rhomboid pain under control, and has continued to manage the problem herself without requiring further treatment. Unfortunately, her training schedule had been sufficiently disturbed that she could not attain peak form in time to defend her title; however, she subsequently went on to beat her own national record.

Discussion

EA is a very useful therapy in the management of chronic or relapsing myofascial pain. Unfortunately there is no research evidence as yet to support this contention. In my opinion the principal advantage of EA over manual TrP needling is that the maximum tolerable stimulus can be given with a minimum of needle-induced tissue damage, although tissue damage from acupuncture needles is rarely a significant factor. However, in the above cases there would have been a considerably higher risk of pneumothorax if manual needling had been applied with sufficient vigour to produce a similar level of sensory stimulus to that produced by the EA.
points may also play a role, depending on how an individual practitioner likes to design a treatment.

From the numerous studies on EA for experimental pain, segmental stimulation based predominantly on spinal rather than supraspinal pathways seems clearly important (‘local treatment’), but general points such as LI-4 and ST-36 may also be effective through their activation of supraspinal mechanisms. Many authors argue that, for endorphin-mediated analgesia, usually associated with stronger stimulation, it really does not matter too much which points are used. Combining segmental and extrasegmental stimulation, with their involvement of different and complementary pathways, may thus prolong pain relief.

Clinically too, EA at points like LI-4 has been found to reduce pain throughout the body. George Ulett, for example, simply recommended electrostimulation at LI-4 for upper body pain, and at ST-36 for the lower body. There are also points such as luoding on the back of the hand, or the region of the philtrum, which have been singled out as being particularly useful for pain.

When treating the root cause of the problem, whether you are more comfortable with TCM syndrome differentiation or think in terms of the autonomic system and particular patterns of innervation, carefully selecting combinations of specific AcPs becomes far more important. From a Western perspective, George Lewith and Charles Vincent have suggested that, particularly in chronic pain, both endorphinergic and autonomic mechanisms are involved, so that both general and specific points may need to be used.

Nerve block is commonly used for pain, and parallels have been drawn between the sites used for this and acupoints, with some authors emphasising proximal stimulation as a result. The use of the paraspinal huatuojiaji points, for the most part located close to the sympathetic ganglia, could also be viewed in this light, although stimulation here in cases of sympathetically maintained pain may sometimes exacerbate it. An alternative approach, used by Saul Liss with his HF stimulator, would be to position one electrode over the spine at or above the level of pain and the other directly over the pain site.

Other authors emphasise peripheral stimulation. Thus, using the ‘Bicom’ device described in Chapter 10, an electrode at the site of pain could be paired with one at the terminal point on the digit of the corresponding meridian. In particular, distal points within the segment could be used if treatment local to the complaint is too painful, or increases the risk of infection. In general, for severe (or acute) pain, it may well be better to use distal rather than local points, although gentle stimulation may still be appropriate locally. However, repeated strong local stimulation may exacerbate pain, possibly through some of the same mechanisms that lead to chronic pain.

Thomas Lundeberg, in a review of electrical stimulation for pain relief, states that, when using CTENS, electrodes should be applied directly over the painful area (locus dolendi), or either side of it. Lundeberg’s research group has also pointed out that analgesia will be greatest if both electrodes are positioned within the same segment or along the same meridian, as nerve fibres are excited by lower currents when these are longitudinal rather than transverse to the nerve. This could be taken to indicate that low-intensity stimulation, whatever the frequency, may best be applied segmentally. Thus, for EA, points along meridians or nerves from the affected area have been used, sometimes proximal and distal to it, or across (straddling) it. In contrast, for systemic or underlying conditions, it has been proposed that linked bilateral acupoints should be stimulated with EA.

In line with Lundeberg’s comments, Richard Sternbach, another very experienced clinician, has recommended that TENS electrodes are best applied at local points of low electrical skin resistance (SR). Sternberg’s recommendation may be a clue to why in one study of EA for experimental pain, pain threshold (PT) increased more when true acupoints (LI-4, ST-36) were stimulated than non-acupoints in the same dermatomes. However, in the presence of inflammation, regions of low SR may be areas rather than points, so that precise electrode location may be less of an issue.

Which stimulation parameters to use at which points should also be taken into account (Fig. 9.10.2). As a general rule of thumb, the effects of TLS are primarily segmental, whereas those of ALS are both segmental and non-segmental, allowing for greater flexibility in its use. In particular, extrasegmental ALTEAS may extend the duration of segmentally induced analgesia. Some devices allow for

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Figure 9.10.2 Some strategies when using different parameters.
(a) DD at all points. (b) TL locally, AL distally (simultaneous). (c) TL locally, AL distally (alternating). (d) TL (5 min) preceding AL (30–40 min)
(DD = dense-disperse; TL = TENS-like, or high frequency, low intensity; AL = acupuncture-like, or low frequency, high intensity)
become more electrically active in emotionally stressed for example, sensitivity may vary in different phases of the different parts of the body and over time. In the short term, ever, remember that they may vary in sensitivity, both in

Trigger points and ashi points Palpating for tender points and along meridians is very much a part of traditional acupuncture. When locating points in this manner, however, remember that they may vary in sensitivity, both in different parts of the body and over time. In the short term, for example, sensitivity may vary in different phases of the menstrual cycle, while the incidence of tender points increases with age, at least in women. Points may also become more electrically active in emotionally stressed patients, or more tender with the patient in one position than in another. Thus, in ryodoraku, ashi points are deliberately sought when the patient is in the most painful position for them rather than when they are relaxed.

Precision is a key to successful TrP treatment for myofascial pain. However, if treatment is directed solely at tender points, although these may become less tender to pressure, other ashi points may then appear. It is important to treat both at root and branch levels, or at least to check for other tender points once those initially found have been inactivated. The more very tender points there are, the more likely it becomes that the condition will be difficult to treat. An abnormally low tolerance to pressure pain in muscle tissue, as often found in fibromyalgia for example, may signal a poor prognosis for physical therapies. In contrast, a large difference between pain threshold and pain tolerance may indicate that treatments such as needle acupuncture or LA/LILT could be helpful.

The microacupuncture systems Auricular acupuncture is frequently used for painful conditions. There are many anecdotal reports that the combination of auricular and body points may be more effective than either alone. Another less well-known approach is to use points in the philtrum region below the nose, which are reported as having a rapid analgesic effect.

A note on laterality Stimulation on one side of the body affects both sides of the body, particularly with ALS (via supraspinal descending pain inhibitory pathways) rather than TLS. Thus pain may be treated ipsilaterally, contralaterally, or bilaterally. For experimental pain, bilateral EA/TENS may be more effective than ipsilateral EA/TENS, and contralateral stimulation the least effective. Clinically, ipsilateral and contralateral EA (HF, followed by LF) may sometimes be similar in effect. However, what is appropriate for clinical pain may depend on the severity of the pain and the sensitivity of the patient, as well as the stimulation parameters used and the location of the pain.

There are also systems of acupuncture where not only contralateral points but points in opposite ‘quadrants’ of the body are used, and sometimes points on the back of the body are used to treat pain more towards the front (EA at Governor Vessel points for abdominal pain, for example).

Contralateral stimulation can be used if skin conditions (e.g. irritation, infection or injury) preclude local treatment. It may be more relevant if there is impaired motor function rather than just pain per se.

Parameters used It is important to remember that there is no one right way of using EA or TENS for pain. Different approaches have developed in different cultures: lighter treatment techniques are used in urbanised countries, whereas strong stimulation is more common in Chinese treatments. It may also be important to consider a person’s condition in TCM terms. Excess and Deficiency conditions will need to be treated differently. For example, Chinese researchers compared HF, LF, increasing and decreasing frequencies in one RCT on painful conditions. They found that changing the frequency gave better results than fixed HF or LF, increasing frequency better for Deficiency, decreasing frequency for Excess.

To recapitulate what has been covered in previous chapters, EA/TENS may be applied at high frequency and low intensity (TLS, conventional TENS, CTENS, or TENS-like EA, TLEA), or low frequency and high intensity (ALS, conventional EA, CEA, or acupuncture-like TENS, ALTENS). A higher frequency may also be interrupted regularly at a low frequency, resulting in trains of stimuli (interrupted EA or TENS), or high and low frequencies may alternate (DD). Various other forms of modulation of a basic constant frequency output are also possible.

In China continuous or DD stimulation tends to be used for pain, and interrupted (or LF) stimulation for muscular conditions (e.g. paralysis, muscle weakness). In the West, CTENS has been recommended for arthritis, back and neck pain, postoperative pain, neuralgia and pain due to CNS injury, whereas intermittent TENS has been recommended for radiculopathy (with radiating limb pain), deep muscle pain, or when tactile sensitivity is altered or reduced. An alternative view is that high-intensity HF TENS may increase tolerance and endurance of moderate pain, with low-intensity interrupted TENS more appropriate for low-level pain.

The general consensus appears to be that, when treating pain, the sensation elicited by electrostimulation should be ‘strong but comfortable’, although the intensity a patient considers comfortable may vary, increasing with familiarity but sometimes decreasing with changes in the condition being treated. ALS should evoke visible muscle twitching, whereas TLS should not. Intermittent EA/TENS may or may not.

Pulse duration should be adjusted (or preset) so that motor fibres, but not nociceptive C fibres, are stimulated. This is not always straightforward in practice, however. The general consensus is that, for HF, shorter pulse durations should be used, around 80–100 µs, and longer pulse durations, around 200–250 µs, at LF. In the end, however, it may be more important to adjust pulse duration for comfort rather than on theoretical grounds.
Issues of comfort can also be a problem with DD. The low frequency used may not be strong enough to evoke a motor response if the higher frequency at the same amplitude is already painful.

There are, in fact, a number of reports of continuous HF TENS aggravating pain, although whether this was because it was applied locally at high intensity and was uncomfortable because it induced muscle spasm, or was inappropriate to the type of pain being treated, is not always clear. It may be as well to avoid strong stimulation local to the source of pain or if pain is chronic and severe, at least in initial treatments. Overly strong stimulation may temporarily aggravate pain, although whether this was because it induced muscle spasm, or was inappropriate if applied around head and neck), may also lead to ‘DOMS’ (delayed onset muscular soreness), and can have other adverse effects. Localised brief intense stimulation, however, in the form of a few rapidly repeated short bursts of tetanic HF TENS, may have a useful analgesic effect.

At the other end of the spectrum, low-intensity stimulation may also have analgesic effects, as is often claimed by proponents of minimal needling or microcurrent techniques. Reviewers, however, have found little evidence that microcurrent has any useful effects in pain management, and experimental research into TENS and EA for nociceptive pain seems to indicate that strong stimulation is necessary for best results.

An alternative to varying output intensity can be to vary electrode size. With SSP, for example, larger-diameter (13 mm) electrodes may be more effective for pain, and smaller ones (10 mm) for other conditions.

In general, lasting after-effects are found with more intense EA/TENS stimulation, particularly at low frequencies and with longer pulse durations. The duration of analgesia may be increased by extrasegmental ALTEAS. In contrast, the effects of TLS are usually coincident with the stimulation itself, with a rapid onset and only a brief after-effect.

Surprisingly, in one study of experimental pain, LILT pulsed at a higher frequency (70 Hz) resulted in a slower onset and longer-lasting hypoalgesia than LILT pulsed at 16 Hz. In Paul Nogier’s system, frequency ‘E’ (4672 Hz) is supposedly indicated for pain control.

When using LILT or LA, it has been suggested that stronger stimulation (6–8 J/point) be used in the first three sessions to inhibit pain, followed by a lower dosage (3–4 J/point) in subsequent sessions to enhance tissue repair, in line with the Arndt–Schulz law.

**Treatment duration** Most researchers consider that, to achieve widespread pain relief involving supraspinal opioid pathways, longer stimulation (30–40 minutes) is required than for local, segmental analgesia (short-term local analgesia may result even from 5–10 minutes of CTENS). In general, 20–30 minutes of EA is recommended, with little advantage if the treatment is prolonged to 40 minutes. TENS, too, is often used for just 30 minutes, although 40 minutes, or even 60, may give a better response. With SSP, treatment may also need to be longer than with EA to obtain similar effects. Results from experimental research with handheld pTENS are not altogether consistent. In some studies, best results were obtained with stimulation for about 10 minutes, which is clearly not very practical.

Although pain relief is likely to occur during a treatment of the appropriate duration, one that is too long may become stressful. With overlong CTENS treatment, for example (more than 30 minutes if used several times daily, or more than 60 minutes if just once daily), tolerance can develop. Modulating the output was originally introduced to counter this, but really has little significant benefit for a treatment lasting only 30–60 minutes. Nor, as a general rule, does it suppress pain to any greater extent than CTENS or intermittent TENS. However, it may well be experienced as more comfortable (and comforting) than LF stimulation.

For auricular stimulation, Terrence Oleson recommends stimulating for around 8–24 seconds per point in general, but up to 2 minutes for chronic conditions.

**How often to treat** Traditionally, acute painful conditions are treated more frequently (even more than once daily) than chronic pain. In modern TCM, the standard recommendation is to give a course of daily treatments, generally 7–10, followed by a break of a few days to rest the body, and then further courses as required. In the West, where chronic pain is more common, it may be more difficult to balance what is best for patients with what they can afford to pay, as well as dealing with the practicalities of attending for frequent treatments. Also, tolerance can develop if treatment is repeated too often.

TENS is generally used on a daily basis, if not several times daily, sometimes for extended periods. Single treatments are unlikely to give any indication as to whether it will be helpful in the long term, at least for chronic pain. Again, tolerance can develop if treatment is repeated too often.

For acute conditions, it has been suggested that microcurrent therapy be used daily, reducing treatment frequency to every 2–3 days when subacute.

**How many treatments** According to one large-scale survey of acupuncture for pain, about 51% of patients experienced some relief within four treatments, although a small proportion needed more than 10 sessions before feeling relief. A good initial response, however, may not be maintained unless patients received booster treatments at intervals.

Studies of chronic pain patients treated with EA have demonstrated that evoked potentials in the brain change little with a single treatment, but show a tendency to normalisation by the fifth, and more so by the tenth. Acute painful conditions, on the other hand, will generally respond more rapidly, sometimes even during the initial treatment. If a condition is going to respond, it will generally start to do so within 6–8 sessions. If there is no change within 8–10 sessions, the condition is unlikely to respond to the modality used.
With TENS, a single treatment is less effective than longer-term use. Acute conditions should begin to respond within the first 1–2 days of regular treatment; if they do not, alternative parameters should be utilised. With chronic pain, on the other hand, it may take as long as a month of daily treatment before any improvement is noticed, and there may be little purpose in testing alternative treatment parameters before then.

**What to use where** As a general rule, TLS results in rapid if short-lived pain relief, and is more appropriately applied segmentally, with less effect if used extrasegmentally, whereas ALS requires a longer induction period, but also has a longer-lasting effect, and may be used segmentally or extrasegmentally. So, for example, John Low and Ann Read recommend using CTENS at the site of pain and ALTENS in the related dermatome, myotome or sclerotome (with DD or interrupted CTENS at acupoints, MPs or TrPs, and DD or modulated output over peripheral nerves).

Thus CTENS might be used initially, and then the potentially more uncomfortable LF, high intensity EA (conventional EA, CEA) could be added. Alternatively, if the equipment used allows it, TLEA can be applied locally, with simultaneous CEA on distal meridian points or points with general effect (Fig. 9.10.2). In contrast, several groups of researchers have started with LF EA, than progressing to higher frequencies (sometimes increasing intensity concurrently) during the treatment session.

With all these various findings and recommendations, whether based on theoretical considerations, personal experience or literature review, it is salutary that the final conclusion has to be that there are no patterns of treatment parameters that emerge as universally helpful for specific conditions or types of pain. A certain amount of trial and error cannot be avoided when trying to decide what are the optimal parameters to use for a particular patient, starting with the best indicated, and then switching to different ones only if there is no benefit with these after two to three sessions. It is always advisable to err on the side of caution, especially early on in treatment, so it is probably best not to use strong stimulation initially, until you have a feel for how a particular patient is likely to respond. A failure to improve may signal the need to use stronger or longer treatments. When it comes to home use of TENS or other forms of self-treatment, it seems that patients do tend to stick with those parameters they find comfortable, and these may have little relationship to the cause or site of pain.

### SUMMARY

Some key points in this chapter are:
- Pain can be considered as acute or chronic, nociceptive or neurogenic
- EA and related techniques are useful for many types of pain when used within a comprehensive treatment programme
- Long-term relief of chronic nociceptive pain with EA may be more likely than for neurogenic pain
- Strong local stimulation is best avoided in cases of neurogenic pain
- General guidelines can be given, but the final conclusion has to be that there are no patterns of treatment parameters that emerge as universally helpful for specific conditions or types of pain.

### Additional material in the CD-ROM resource

In the CD-ROM resource, in addition to a much more detailed discussion on many of the topics presented here, the following are also mentioned:
- Pain in young and old
- Visceral pain
- Procedural pain (burn debridement)
- Parameters used: polarity.

Charts summarising the icon database studies on localised nociceptive (musculoskeletal) and neurogenic pain can be found in the chapters on these topics. Studies on the many other painful conditions for which EA is used are listed in other chapters too. Those remaining are summarised here.

#### 9.10 Summary of relevant studies in the electronic clinical studies database (number of studies)

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<tr>
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<tr>
<td>Mixed conditions (pain)</td>
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<td>Arthritis – ankylosing spondylysis – gout (bi zheng)</td>
<td>14</td>
<td>35</td>
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<tr>
<td>Fibromyalgia and myofascial pain</td>
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RECOMMENDED READING

An overview of chronic pain:

Three textbooks on the acupuncture treatment of pain, with very different approaches:


A book with much useful information on EA and TENS, for both practitioners and patients:
Berger P 2003 The Journey to Pain Relief. P Berger, Sandton, South Africa

A useful review of acupuncture for pain in general:

The effects of acupuncture on different pain types: