

Deqi

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Abstract

This review of deqi, the needling sensations associated with 'grasping the qi', is largely based on contemporary literature covering both research studies and clinical practice. Different understandings of the term deqi are classified according to the relative emphasis placed on practitioner or patient sensations. Both sets of sensations are explored, using theoretical and research data. The factors that may influence deqi are considered, particularly the variation that has been observed between acupuncture points and sham points, and that between different kinds of needling. The existing evidence for the therapeutic value of deqi is described, together with the limitations in this respect of most clinical trials. Deqi has been modelled in physiological terms and various physiological processes have been linked to deqi sensations: heart rate, blood flow, circulating hormones and neurological activity. The results from recent brain imaging studies are discussed. Finally, there is consideration of how the research results interact with different styles of acupuncture and how they lead onto questions pertinent to our own practical performance in the clinic. Ideas are put forward for research suited to practitioner-researchers.

Introduction

I do not remember being even aware of the word 'deqi' during my initial acupuncture training (though it was a long time ago) but I do remember something that happened on the last day at college. It was a group exercise to feel the qi between us, the sort of thing that students now do routinely but which was a complete novelty for me at the time. While some of the others could apparently feel strong forces I was not sure that I felt anything at all, but hoped that I had, for this was obviously something that could be crucial to my success as a practitioner. Many years later it dawned on me that I did now fairly consistently feel a sensation in the vicinity of the needle tip when treating. But did that mean that I had become a better practitioner?

This article provides an overview of deqi from a practitioner/researcher perspective. It does not look in any depth at the historical origins and classical writings on the subject, nor the social and political forces that have shaped the evolution in meaning of the term 'deqi'.

What is deqi?

Deqi (to obtain or grasp the qi) is usually defined in relation to the needling sensations felt by the patient¹⁻⁷, or to the sensations experienced by the practitioner⁸⁻¹⁰, or both^{9,11-18}. Whilst both ancient and modern texts are largely in agreement about what the practitioner feels ("something like a fish biting on a line") this is not so for the patient's sensations. The ancient texts use metaphors indicative of a rather subtle phenomenon, quite unlike the modern notion of soreness, aching, numbness etc.^{9,10}: "walking on an open street", "mysterious, subtle and without

form". The term 'deqi' itself does not seem to feature in the *Ling Shu* (Spiritual Pivot) or *Su Wen* (Essential Questions), but is mentioned in the *Nan Jing* (Classic of Difficulties) with reference to what the practitioner feels with their left hand^{9,10}. What is emphasised in the *Ling Shu* is the importance of zhiqi (arrival of qi). It is "as if the wind blows away the clouds and leaves a clear blue sky"^{10,13}. So, the idea that the arrival of qi is synonymous with needle sensation, or is indicated particularly by patient sensations^{13,19} may be quite a recent one¹⁰. This is not to deny that the *Ling Shu* describes a range of techniques covering the full spectrum from superficial to bone-deep insertion, with corresponding strengths of stimulation²⁰.

Although most modern Chinese practitioners may use an approach with strong patient-defined deqi, there are certainly Chinese individuals and schools that follow a different line, neither expecting their patients to feel much in the way of needle sensation nor questioning them about this^{8,21}. The acupuncturist may sense the arrival of qi at a lower threshold of stimulation than the patient, who would subsequently feel deqi with stronger needling (for example, deeper insertion or some amount of manipulation). Tian⁸ has referred to this as the 'hidden arrival of qi'. He cites a study that found it present in 22.5% of 1000 stimulations given (but with no details about the intensity of the latter or how the presence of the hidden qi was determined). In a subsequent paper he and colleagues caution against confusing needle sensation with the arrival of qi²². Another contemporary Chinese author²³ draws a clear distinction between the patient's sensations and the 'objective signs of the arrival of qi' (muscle tension, trembling, twitching, spasm) that should be felt by the practitioner's (left

hand, though acknowledging that they are closely related. This is perhaps a similar view to that of the US researcher Helen Langevin, who defines deqi as a sensory component perceived by the patient together with a biomechanical component perceived by the practitioner¹⁷. Patients may be unreliable witnesses because they wish to avoid further probing with the needle¹⁴ and the idea that the practitioner's component is somehow more objective than the patient's has been suggested^{12,13}. However there is no evidence to substantiate this and of course the practitioner too has an investment in recognising deqi. Nevertheless, many practitioners believe that their sense of deqi is a more reliable indicator of therapeutic effect than the patient's reported sensations^{12,18}, though the requisite sensitivity may only reside in the experienced¹⁸ or the excellent^{24,25} amongst their number.

There are many acupuncture systems and techniques that either specifically aim to avoid deqi²⁶ or in which it just plays no part²⁷. In some Japanese traditions the patient is not required to feel much, or anything at all (especially where the needle is not even inserted), but it is essential that the practitioner feels the qi and its changes^{9,28}. Some consider this also to be a deqi experience, though obviously a very different one from the usual TCM version. It may involve a high degree of concentration, focusing particularly on the needle tip, in order to pick up subtle changes as the qi is mobilised²⁸. Matsumoto⁹ ascribes to the Ling Shu the idea that the qi can be contacted and moved only exactly in the centre of points, with the needle angled precisely. Hitting the target is entirely the responsibility of the practitioner.

However, not all practitioners using Japanese needles and shallow insertion are aiming to avoid strong (patient) deqi sensations⁹, nor do all Japanese practitioners follow a shallow/no insertion approach and many are reported to manipulate the needles to stimulate patient sensations²⁹. Nor is the sort of mental focus described by Birch²⁸ the sole preserve of that style of practice. Most standard traditional Chinese medicine (TCM) texts and acupuncture training courses emphasise concentration on the needle tip: "holding the needle fast should be like capturing a tiger"²⁴ does not refer to the physical effort involved. "The key to proper needling is first to attend to one's own spirit"²⁵.

When and where is deqi felt?

When

When the needle is inserted to the given depth^{1,11}.

When the needle is inserted and retained².

During manipulation^{4,5}.

After insertion and/or manipulation^{16,23}.

It may be only temporary and vanish quite quickly after insertion¹⁹.

15 seconds after insertion³⁰.

1-20 minutes after insertion³¹.

Where

At the site of stimulation⁷.

At (classical) acupuncture points^{3,6,18}.

Along the channels³¹. Deqi has been defined in relation to propagated sensations in the channels.

At the needle site and elsewhere in the channels^{9,18}.

Practitioner sensations

The metaphor of the fish on the hook is ubiquitous in describing practitioner sensation of deqi or 'arrival of qi'⁹. The pull of the fish describes a sinking feeling or resistance or tightening around the needle tip^{8,13,16,18,19,24,32}; the bobbing up and down of the hook describes the coming and going of qi²⁸. Tian also suggests feeling the needle quivering, seeing skin colour changes along the channel or detection by infra-red sensors or other instruments⁸. By contrast, when there is no deqi the practitioner's hand feels empty, as if needling into a void (and the patient feels as if nothing has happened)^{32,33}.

Seem provides descriptions of the individual needling practices of experienced acupuncturists with very different styles⁹. Similarly, though in much more detail, Birch goes step-by-step through his application of the Toyohari non-insertional style, and describes the needling sensations that he experiences³⁴. These include changes in his own body (deep relaxation in the diaphragm, opening of the chest region), in the patient (deeper, more rhythmic breathing) and at the interface between the two (tingling, pressure, a sense of gathering).

It is a common theme in descriptions of needling by master practitioners that they are continually looking for feedback and adjusting their input accordingly. This leads, ideally, to a state of synchronicity, resonance and close rapport with the patient. The feedback may involve explaining the nature of deqi and asking for the patient to report on it⁹, feeling the release of tight spots and movement in the tissues beneath the practitioner's hand⁹, using the hara reflexes⁹, concentrating on the qi sensation²⁸ and advising the patient to do likewise²⁴ and breathing synchronously³⁵. A sociologist observing needling demonstrations has described it as "a conversation between the body and the practitioner through the needle"³⁶.

What needling sensations do patients feel?

This section has limited relevance for acupuncture where the needle is not inserted, or is inserted shallowly and not manipulated. Even though patients may experience needle sensations under these circumstances there is no focus for the practitioner on inducing them or checking that they are present. Hence the following ideas and research results are largely TCM-based.

There are four standard needle sensations described in modern Chinese text books and much repeated throughout the literature: soreness, distension, heaviness and numbness^{1-4,7,9,11,15,16,19}. Additional sensations that

may be experienced include aching, pressure, fullness, tingling, warmth/coolness, itching, water/air flow, insect crawling and radiating versions of some or all of these^{5,23,31}. MacPherson gathered a group of 20 expert practitioners to tease out their descriptions of deqi. The most common terms (chosen from a list of 25 supplied) were: dull, aching, heavy, numb, radiating, spreading and tingling¹⁸. Here are two further descriptions, from Western medical acupuncturists:

- "Unusual and somewhat unpleasant"¹⁶.
- "A complex sensation of discomfort – weight - electrical discharge - deep adhesion. Difficult to explain in words but unmistakably identifiable"³⁷.

There is some debate as to whether pain features in the deqi group of sensations. According to the textbooks, deqi should be painful only on the palms, soles, finger/toe tips but otherwise pain should be largely avoided by a skilled practitioner¹. Electric shock may³² or may not²³ be deemed an acceptable form of deqi. Certainly there are circumstances where Chinese practitioners may use especially strong techniques that appear painful, bringing tears to the eyes or causing jerking or twitching movements in local muscles or whole limbs²³. Trigger point acupuncture can sometimes evoke deqi as well as muscle-release or twitch sensations³⁸.

Park⁶ separates needle sensations into two types: deqi-related (from stimulating structures in deeper tissue) and pain-related (from skin piercing and tissue damage). Others have come to a similar conclusion, both from practitioner¹⁸ and patient³ experiences. A refinement of this is to discriminate sharp pain ('tong' in Chinese) from dull pain/aching/soreness^{5,13,14}: only the latter has a place in deqi.

What do patients feel in practice?

Of 19,544 cases recorded in China, 29% felt primarily numbness, 17% soreness, 11% distension, 11% heaviness and 11% electric shock (and 20% no deqi)³². It is not known whether this merely confirmed a pre-ordained list or whether they had other options to choose from. In the West the landmark work was done by Vincent and colleagues³. One hundred and twenty five patients at an acupuncture centre rated the sensations they experienced at their last treatment, from a list of 20 terms deemed relevant by a group of practitioners. (Note that here, and in virtually all subsequent deqi-describing research, the words used on the questionnaire are all derived from the list of 78 pain qualities put together for the McGill Pain Questionnaire³⁹: there is nothing innately pleasant, such as a warm current of water). The highest scoring group of related sensations comprised pulling, numbness, heavy, dull and aching: fairly identical to the standard deqi list. The next highest group contained intense, hurting, penetrating and aching, i.e. more obviously painful sensations. The third group included spreading, radiating and pulsing – which could

relate to deqi or pain. Park⁶ also found the most commonly rated sensations after vigorous needling of Hegu L.I.-4 to be a mix of deqi-type and pain-type. Nevertheless, the subjects' actual experiences were of more deqi and less pain than they had been expecting beforehand, even amongst those with prior experience of acupuncture.

In a US experiment the list of terms provided to describe the needle sensations was reduced to nine and excluded all but one of the particularly unpleasant ones that had featured commonly in previous studies⁷. Not surprisingly they found that deqi-type feelings predominated: numbness, soreness, aching and tingling scored highest. A similar outcome was achieved by adjusting the needle technique so as to minimise pain (unlike most experimental needling, which tends to be rather forceful)⁵. Of 15 subjects needled in this way 11 experienced deqi and four experienced deqi plus sharp pain. Dull pain, which often persisted throughout the manipulation, was taken to be a part of normal deqi. Brain imaging techniques (further details below) showed indeed that dull pain was associated with a similar response pattern to deqi whereas sharp pain produced a very different picture, similar to that observed before with noxious stimuli. In the deqi-only group 88% experienced pressure, 45-55% aching, heaviness, fullness, numbness and tingling, and 27% dull pain, soreness, warmth and coolness.

The 'whimpification' of acupuncture in the West?

Mark Seem coined the term 'whimpification'⁹ to describe a possible watering-down of the acupuncture experience in North America, with shorter and finer needles, reduced manipulation and less emphasis on generating needling sensation. Partly this is due to different patient sensibilities: Chinese-trained practitioners apparently perceive that Western patients react faster, to less stimulation. Also, clean needle requirements may restrict the use of particular techniques and equipment.

There are linguistic influences too: in English, soreness is a quality of pain but in Chinese the word for soreness is not associated with pain³². Most Western patients can be taught quite easily to recognise the distinction between deqi and pain, in the same way that the Chinese do (though this is harder for frail patients and those in severe pain)³²; indeed, such a dialogue with patients can be seen as an essential part of practice⁹.

However, this cosy picture of patient education is perhaps not the whole truth. From practical experience we know that patients vary enormously in their propensity to feel both deqi and pain. Some get deqi easily, feel it course through the channels and never find it painful. Others find every insertion an ordeal. It should be noted that Vincent's 125 patients associated 'sharp' with their acupuncture needling much more often than any other descriptor³. Seem lamented that Western trained acupuncturists may aim to needle without provoking any discomfort at all⁹.

If so, in this they seem to be singularly unsuccessful. In practice, needle sensation is a complex sensory experience in which the painful and less/non-painful, the intense and the subtle, are often mixed together, and separating one portion into deqi and another into pain is not always possible.

How often do patients experience deqi?

- From 19,544 cases in China: 80%³².
- From a selection of experimental and clinical trials (with healthy and ill subjects): 70-100%⁴⁰⁻⁴⁴.
- Propagated qi along the channels: approximately 10% of the population⁴⁵.

Factors affecting the incidence, intensity and nature of deqi

Patient constitution

Elderly, weak and chronically diseased patients may have no or weak deqi, though this could change as they get better with treatment³².

Intangible individual characteristics

Some patients prove rather immune to deqi for no obvious reason.

Area of the body

Different areas/tissue types are prone to different types of sensations, for example, soreness in muscular areas but electric and radiating at the extremities^{1,12,23}.

Needles

Thicker needles more readily produce stronger sensations^{9,46}.

Needling and allied techniques

Standard acupuncture texts describe how to induce deqi, or to accelerate or intensify the effect by using different needle manipulations, finger pressure/pinching, moxa, mental factors and others^{11,19,32}. Specific needle techniques may also be associated with particular components of deqi – soreness, distension, numbness, coolness and heat²³, and different propagated deqi sensations³¹.

Individual practitioner effects

It is evident (e.g. from treating other people's patients) that some practitioners routinely generate more deqi than others. Whether this results from different equipment and technique, or from an inherently greater capacity to motivate qi, remains to be determined. (There has been very little research to compare any aspect of the clinical capabilities of different acupuncturists). Training and experience are no guarantee of strong deqi (felt by patients): an anaesthetist shown basic needling techniques for an experiment on deqi managed to achieve a higher rating than a qualified acupuncturist³.

Deqi with sham points and/or sham needling

In normal practice we do not purposely miss the points in order to see whether we can still obtain deqi; nevertheless, it does occasionally happen that a perfectly respectable needling response is achieved at what is later realised to be an incorrect location. In the experimental world of the sham-controlled clinical trial, real and non-points are routinely compared. The most common sham interventions nowadays are either minimal needling (inserted just below the skin, with no manipulation) or non-invasive sham needling (no insertion, usually using a dummy retractable needling device).

In the studies described below deqi was always assessed according to patient sensations.

a) Different needling and points

As part of a trial for osteoarthritis of the knee the Canadian researchers⁴⁰ needled five local points deeply, aiming for deqi, and five non-points superficially, with no manipulation. Deqi was experienced by 14 out of 20 in the acupuncture group and 11 out of 20 in the control. In contrast, a Taiwanese study⁴ found that subjects rated real acupuncture much more deqi-intense (5.8 out of 10) than minimal needling at non-points (1.8).

b) Different points, same needling

The evidence is divided on the direct comparison of classical acupuncture points and non-points needled in the same manner. Vincent achieved somewhat higher deqi scores with points but still a substantial degree at non-points³. Pain sensations showed a similar pattern. Roth found no differences in pain but significantly more deqi at real points⁶⁹. In Fang's experiment a sham point (on top of the foot) elicited deqi much less frequently than Taichong LIV-3, but scarcely less than Qiuxu GB-40⁴². (In other studies^{3,7} different classical points have performed similarly, though very few of them have been investigated so far: largely Hegu L.I.-4 and Zusanli ST-36. Much larger trials have been done in China. For example Chen³¹ reports on 12,451 insertions with 623 subjects: the non-points induced mostly local sensations while acupuncture points also produced a high level of propagated sensation along the channels (however, some researchers report that non-points too can transmit qi over long distances)³¹).

c) Different needling, same points

In a study to assess the credibility of a new non-penetrating sham needle (that touched the skin, pricked it and was rotated) 68 headache patients were asked about deqi after a few treatments⁴¹. Eighty four per cent of the acupuncture group and 34% of the sham reported experiencing deqi. This had been the experience too of the team that developed the original 'placebo' needle⁴⁷ and those who tested out a later model⁴⁸. So, it is quite clear that (as one would expect) non-invasive needling (regardless

of accompanying manipulation) elicits much less deqi (but not a negligible amount) than normal insertion, with subcutaneous needling being intermediate. If the patient is blinded to the fact of having non-penetrating sham needling and believes (s)he is experiencing real acupuncture, then the expectation alone increases deqi, but not by much⁴⁹. Physical skin penetration appears to be by far the most important factor.

The value of deqi: therapeutic effect

Given that acupuncture is a qi-based therapy it would be surprising if there was not general agreement among (traditionally-based) scholars and practitioners that clinical effect depends upon the arrival of qi at the sites needed. References to this are found in the *Ling Shu* and other classics and equally in modern texts^{9,28}. Most of the TCM literature, and most traditionally-based practitioners, also believe that patient deqi sensations are important, or even essential, for therapeutic effect^{1,4,12,14,17,18,33,42}. Some, while not downplaying its importance, concede that deqi does not always have to be present for patients to do well^{32,50}, though no explanation is offered for this variation.

Of course, there are those who routinely find therapeutic effect in the absence of patient sensations^{9,28}. Tian recounts the approach of the late Professor Zheng Yu-gui: 'Most of the patients under his care did not have the needling sensation, yet all of them felt much relieved after his treatment'⁸. Research into some Japanese styles has demonstrated consistent and objective physiological changes, particularly involving heart beat and breathing²⁸, in addition to the usual reports of clinical benefits.

Dose

Is deqi an all-or-none phenomenon or is there a dose-dependent response? This has been addressed experimentally but without convincing conclusions (see section on physiology below)³⁷. There is no consensus on how strong the stimulation should be for therapeutic effect^{18,46}. Practitioners certainly vary in technique and in the strength of sensation produced, but there are so many variables involved in treatment response that it would be impossible to ascribe a practitioner's clinical prowess to the intensity of their needling. (Forceful needling may go with a forceful personality, which could have its own influence on treatment outcomes). It is likely that patients are much more variable in their reaction than are practitioners in their input. Hence individual patient characteristics are the most critical factor^{1,51}, and the challenge is to adjust the approach to best suit this³³. For instance, strong stimulation may be more effective in cases of severe neurological damage; lighter needling may prove better for children, and frail and elderly patients.

Treatments usually involve more than one point, so the overall package of deqi delivered is a complex entity, probably comprised of differing qualities and intensities

of sensation. There is some agreement that deqi is not required at all the points needed⁹. This is a practical reality but offers no specific information about how many, and which, points should be targeted for eliciting deqi in any given situation.

Propagated qi sensations

Some practitioners go beyond deqi and suggest that treatment efficacy is closely related to the extent to which the qi sensations are conducted along the channel(s) towards the focus of the illness^{1,13,31}. Published Chinese studies have reported the effect of such propagation on ECGs in coronary heart patients⁵²⁻⁵³, stomach electrical activity in healthy subjects⁵⁴, myopia⁵⁵ and peripheral nerve injury⁵⁶. Better results were always obtained when a propagated sensation was present, when it travelled a long distance in the right direction and especially if it reached the target area. You⁵² also found that a compound propagated sensation such as soreness-distension worked better than single types of sensation, while patients with painful deqi did not feel propagated sensations nor respond well. However, not all the Chinese experiments have produced such positive results⁵³.

Experimental evidence on the therapeutic value of deqi

Notwithstanding the Chinese studies on propagated sensation there still appears to be very little evidence for or against the value of deqi^{15,46}. One indication of a relationship between deqi and treatment effect came in a Taiwanese study on a group of patients with pain symptoms where the average depth at which deqi was experienced decreased progressively as they improved with treatment¹⁵. Direct evidence of the need for deqi in acupuncture analgesia comes from Chiang's 1973 experiment reported by Pomeranz⁴⁵ where injection of a local anaesthetic such as procaine obliterated the needling sensation and also halted the analgesia. In a very recent study⁷ on 11 normal subjects given an experimental pain stimulus, real acupuncture produced significant analgesia in five cases but none for the non-invasive sham (which provoked very low levels of needling sensation compared with the real acupuncture). Two sensations in particular were found to be correlated with analgesia: numbness and soreness.

Evidence from clinical trials

Deqi has become a serious consideration in the technicalities of clinical trials. On the one hand it has been used as a criterion for determining the adequacy of the acupuncture delivered¹⁷. On the other hand, different levels of deqi in real and sham acupuncture groups may complicate the results¹⁸. However, as yet, there has been little attempt within clinical trials to distinguish patients, or groups of patients, on the basis of their experience

of deqi, and to relate this to the treatment outcomes. In a small study on knee arthritis, in which 20 patients received acupuncture (local points, normal depth, rotation of needles) and 20 sham acupuncture (nearby non-points, superficial insertion, no rotation) there was a significantly better treatment response from those who experienced deqi (14 in the acupuncture group and 11 in the sham)⁴⁰. For a trial to investigate the efficacy of acupuncture this was something of a disaster (for the control group now shared some of the real acupuncture characteristics, thus diluting the difference between them and rendering it useless as a control), but it remains one of the few attempts to correlate individual outcome with deqi experience.

A few controlled trials for pain conditions have specifically compared deep and shallow needling and they consistently showed that deeper needling gave better results^{46,57,58}. This may be essentially a deqi effect but as it was not specifically recorded we cannot be sure.

Some recent examples of deqi in sham controlled trials

I shall take three more knee arthritis studies as examples, all published in the last two years. Two were large, well-publicised studies from the US⁴³ and Germany⁵⁹, and the third a medium-sized one from Spain (where the acupuncture treatments were adjunctive to diclofenac medication)⁴⁴.

Acupuncture treatments

All used primarily local and distal points purportedly chosen on the basis of TCM principles, but in a formulaic or semi-formulaic manner and with no 'root' treatment. They were needled to conventionally appropriate depths. They were needled to conventionally appropriate depths. All three emphasised deqi, i.e. appropriate needling sensations experienced by the patients. In two of the trials deqi was apparently achieved at every point for all the patients. In the third the practitioners were instructed to achieve deqi if possible, but with no record of how successful this was. In two trials some of the points were also stimulated electrically.

Sham treatments

In two trials the same points were used as in the real acupuncture group, but with a device that didn't penetrate the skin. There was also some mock electrical stimulation and some actual needle insertion into distant non-points; all designed to fool patients into thinking that they were having the real thing. The other study employed a minimal sham; distant non-points were needled subcutaneously, with no manipulation and with the intention of avoiding deqi. Most patients in the sham groups believed that they were receiving real acupuncture.

Results

All three trials found acupuncture to be significantly

superior to sham, but such results provide no evidence of the value of deqi, any more than the various neutral or negative sham trials have done. In Germany parallel trials were run for migraine and for back pain. The former⁶⁰ in particular produced very different results to the osteoarthritis study (acupuncture and sham groups were almost the same), despite an identical protocol, so it is hard to make the case for deqi being better than no deqi. We have no information about the incidence or strength of deqi in the sham groups, and we have already seen that various non-points, minimal insertions and even non-insertions have on occasion delivered deqi. Of course, these experiments were set up to assess the efficacy of TCM-type acupuncture as a whole, not specifically deqi. It is reasonable to stipulate that patient-focused deqi should be part of the intervention if TCM-style acupuncture is being investigated, for it is commonly held to be an important component of that approach. If deqi is not obtained then we can legitimately cast doubt on the validity of the trial. But we are still far from establishing the strength of the relationship between deqi and clinical outcome.

The vast majority of clinical trials have employed a TCM style of needling and their findings cannot be extrapolated to other markedly different approaches. The idea of using a minimal insertion or skin-pricking needling as a sham control for some of the Japanese styles is patently absurd, for the latter can be even less invasive. Their deqi effects (if such they are called) are less obvious and less well-defined, making it even harder to investigate their therapeutic influence (see footnote).

What is deqi in physiological terms?

Electromagnetic theories

Although by no means universally accepted, there is considerable evidence that the electrical properties of acupuncture channels and points differ from those of surrounding tissues, that qi transmission depends on these properties and that they can be changed when points are needled²⁸. In a series of recent theoretical papers Yung proposes that deqi provides the force for propagating qi, that otherwise exists as a non-motive 'standing wave' of electromagnetic energy⁶². He equates obtaining deqi to charging up an electrical capacitor and claims that deqi is not required with electroacupuncture, as the DC current makes such charging unnecessary. However, many other authors emphasise obtaining deqi before applying electroacupuncture³⁸.

Mechanical theories

There have been a number of variations on the theme that

Footnote: There is as yet no guarantee that any of the non-invasive sham devices are inert⁶¹. They may produce non-placebo physiological effects that make it harder to establish the true superiority of acupuncture. This would also further muddy the waters for assessing the role of deqi in treatment response.

the channel system is a part of the connective tissue matrix, with qi transmission depending on the particular properties of some components of this matrix^{63,64}. Although electrical signalling and other mechanisms may be involved in this, there is experimental evidence suggesting that simple mechanical forces could be the first link in the chain^{65,66}. A US researcher^{9,17,66} has instrumentally measured needle pull-out force with different manipulations and she equates this, at least in part, to the needle grab that acupuncturists identify with deqi. Rotation, especially uni-directional, strengthens the mechanical bond between needle and connective tissue, leading to increased pull on the tissue in any subsequent lifting/thrusting. She surmises that this pull is then transmitted somehow through the matrix. The pull-out forces were somewhat greater for real than sham points (perhaps because the former lie in connective tissue tracts and therefore have more to wind round the needle) but this is nowhere near as significant as the type of manipulation.

Further backing comes from a Japanese study where minute pieces of fascial tissue attached to the needle tip after manipulation at Shenshu BL-23, Qihaihu BL-24 or Dachangshu BL-25 were viewed under the microscope²⁹. Most commonly present were elastic fibres, fibroblasts, fat cells and mast cells. Physical stimulation of the mast cells could trigger a neurogenic response that equates to deqi²⁹, though the thin, non-myelinated nerve fibres that are particularly associated with these cells are not the type usually identified with deqi³⁸.

Both Eastern and Western scientists believe that deqi involves the stimulation of sensory receptors in the skin, below the skin or (particularly) in the muscles^{16,35,38}. It appears that mechanical deformation of these receptors is largely responsible for their stimulation by acupuncture, but this does not necessarily equate to winding fibres around the needle³⁸.

It is usually deemed good practice to avoid the sort of manipulation that is likely to entangle tissue fibres, but perhaps some degree of this could be beneficial. However, pull-out force has not yet been linked to any therapeutic effect.

Nerve fibres associated with deqi

By means of microelectrode recordings from single nerve fibres, Wang⁴⁵ was able to show that different types of fibres were responsible for different deqi sensations:

Type II	numbness
Type III	heaviness, distension, aching
Type IV	soreness

Subsequent research has largely concurred with this^{5,16,45}. So, deqi involves mostly myelinated fibres with fast conduction speeds (types II and III). Heat and cold, soreness and pain are carried by the slower of the type III fibres and the type IV. Sharp pain and other noxious stimuli usually travel along the smallest, slowest of the

type IV fibres while dull pain may use the larger, faster ones. On reaching the brain these different messages may stimulate different neurochemical responses.

While this model of local nerve stimulation may fit deep deqi needling, it does not necessarily work for shallow 'Japanese'-style practice⁶⁷. A Chinese proponent of needling without patient sensation has argued that it operates through the channel system, whilst stimuli above the conscious deqi threshold are mediated via the nervous system⁸. There are certainly plausible neurophysiological models for acupuncture with strong deqi, especially in respect of analgesia⁴⁵.

The influence of deqi on some physiological effects of acupuncture

Neurological activity

To provide evidence for his belief that acupuncture follows 'normal biological laws' Abad-Alegria measured several neurophysiological parameters under different needling conditions³⁷. The conclusion that there is a direct relationship between the response and the intensity of the stimulus, i.e. deqi is not an all-or-none phenomenon, did not appear to be entirely proven by the results presented. At least one parameter changed most markedly with deqi needling and responded no further to extra stimulation. Chan noted that acupuncture reduced excitation levels in motor nerves regardless of deqi⁶⁸.

Cortisol

Based on patient assessment of needling sensation Roth found deqi to be moderately associated with cortisol levels (correlation 0.30), though this was a fairly small study with no statistical significance⁶⁹.

Heart rate

According to Wu⁴ many authors have reported that the calming effect of acupuncture on heart rate depends on obtaining deqi. In his own experiment real acupuncture (at Hegu L.I.-4 or Zusanli ST-36) produced a significant reduction (approximately 6%) in heart rate, while light acupuncture (at a non-point) gave a slight effect and superficial pricking (at Zusanli ST-36) no effect. Real acupuncture had a high deqi rating and the others low, but as usual there are confounding factors that do not allow us to draw categorical conclusions.

In a discourse on Toyohari acupuncture Birch²⁸ describes research results demonstrating that this style of practice can reduce heart rate, alter heart rhythm and change the rate and rhythm of respiration. To these autonomic nervous system responses he adds local electromagnetic effects and non-local effects due to concentrated mental focusing. For TCM-type acupuncture with strong deqi there could also be analgesic and physical mechanisms, as already discussed. However, Manaka has suggested that more intense needling may block or obscure some of the

more subtle electrical effects seen with low / no-sensation acupuncture²⁸.

Local blood flow

Sandberg has reported two studies^{70,71} on the effects of acupuncture on blood flow in and above a local muscle. For the tibialis muscle, deep acupuncture with deqi (the standard patient sensations) gave a greater effect than either superficial (no manipulation) or deep needling without deqi. For the trapezius, deep needling (at Jianjing GB-21) was again more effective in healthy subjects but this was not so for fibromyalgia patients. One could draw the conclusion that the needling method (and the value of deqi) needs to vary according to individual circumstances. We should also be wary of reading too much into the results of experiments carried out on healthy volunteers (i.e. most laboratory and physiological studies).

Kuo^{30,72} has also reported two studies in this area. In one, 52 healthy subjects were needled at Hegu L.I.-4, with gradual insertion leading up to deqi. Blood flow at Hegu L.I.-4 and Quchi L.I.-11 (on the same arm), but not at nearby non-points, increased suddenly when deqi arrived (after about 15 seconds). It then continued to rise for some minutes at Hegu L.I.-4 but soon subsided at Quchi L.I.-11, and could be resurrected with repeated manipulation and deqi. Similar results were experienced with Yanglao SI-6 and Xiaohai SI-8. Kuo also discovered that some types of deqi were more effective than others: heat plus numbness was most strongly associated with increased blood flow.

Changes in blood flow (and also muscular contraction and leucocyte movement) have also been recorded with low stimulation needling⁸.

Brain imaging

Functional Magnetic Resonance Imaging (fMRI) is used to record changes in neuronal activity in different areas of the brain. Studies have compared the activation patterns of different points and also different needling actions. Both in Taiwan⁴ and the US⁵ researchers have found that Hegu L.I.-4 and Zusanli ST-36, needled so as to elicit 'patient deqi', produce a mixture of decreased activity in some areas of the brain (particularly in the limbic system which comprises areas that are involved in the modulation of emotional responses to pain and other stimuli and in much of the self-regulatory processes in the body) and increased activity in others. Hui was able to separate out those subjects who experienced only deqi from those with a mixture of deqi and sharp pain. She observed that the deactivation response was predominant in the deqi-only group, while for the mixed group, increased activity patterns were to the fore. Both authors suggest that the deqi pattern may be the basis for many of the therapeutic effects of acupuncture, though as yet there is no evidence linking these immediate neurophysiological responses to actual health benefits.

Both of these studies had similar control groups: pricking or tapping on the skin at Zusanli ST-36. This caused widespread activation throughout the brain with no, or very little, deactivation. Such a response is equivalent to that seen in previous pain studies and indeed, superficial pricking rates highly for pain and low for deqi⁴. Wu used a second control too, shallow insertion and gentle manipulation at a non-point. This elicited a low level of deqi and none of the deactivation in the midbrain.

Other brain scanning research has not always produced this mixed activation/deactivation pattern. This may be for technical reasons associated with the scanning method, because of differences in needle technique or due to using different points⁵. A Chinese-German fMRI study⁴² found that brain activation patterns were very similar for real and sham points after needle insertion. However, when the needles were rotated, only the real points showed further activation in somato-sensory areas. Whether this resulted from increased deqi at the real points, a capability not shared by non-points, is a possibility, but speculative at this stage. The deqi explanation does not accord with a Taiwanese study⁷³ that noted that only Hegu L.I.-4 activated the hypothalamus when it and a nearby non-point were needled to the same level of deqi. This used a different scanning procedure, PET (Positron Emission Tomography).

One of the first imaging experiments to use non-healthy patients (with hand osteoarthritic pain), rather than healthy subjects, was much publicised as providing convincing evidence that acupuncture had specific effects over and above placebo⁴⁹. This did not refer to an improvement in the patients' complaint (for that did not happen after the one treatment provided) but to the fact that real acupuncture switched on a particular area in the mid-brain not activated by either of the control treatments. One of these, a retractable sham needle, was rated by patients as almost as credible as the real thing. However, real acupuncture produced substantially more needle sensation, which may be the basis of the different responses seen in the brain. Overall needle sensation (including combined deqi and pain) was significantly correlated with the posterior parts of the thalamus whilst the pain component alone was related to different areas of the brain (the insula on the non-needed side and the left orbito-frontal cortex).

Discussion

In his seminal work on the subject Vincent³ sought to investigate three propositions that seemed to him to arise from traditional acupuncture principles:

- i. There is a constellation of sensations (including deqi) that patients experience when having acupuncture.
- ii. Deqi only occurs, or more strongly so, at classical acupuncture points.
- iii. Deqi is necessary for effective treatment.

His studies addressed the first two but not the third.

There is evidence of a reasonably consistent set of sensations that patients may feel from needling (at the commonly used depths), that corresponds to the description of deqi in TCM texts. However, these sensation pictures have largely been derived from prescribed lists of pain qualities with no scope for the patients to provide their own descriptions. Some combined qualitative/quantitative studies could usefully address this. The degree to which different sorts of pain or unpleasantness are, or should be, a part of the patient experience is also worthy of research.

The question of classical versus sham points has also been answered to some extent, with the indication being that the former may provide stronger deqi but that it is also perfectly feasible to elicit it from sham points. Most of the studies have used sham points that are close to acupuncture points, which may reduce the difference between them. Also, very few different classical points have been tested (mainly Hegu L.I.-4 or Zusanli ST-36). The comparison between real needling and sham needling is more clear-cut, though it is possible to generate some degree of deqi from even non-invasive dummy needles.

In the last 20 years there has been little work to shed light on Vincent's third point, that deqi is necessary for acupuncture to work well. There are many successful practitioners whose style does not involve generating deqi, or not 'patient deqi', which would appear to make this hypothesis untenable. But if we set such styles aside for now, and consider the value of deqi within a TCM setting, it is legitimate to look further at the evidence. There are indications from a few experiments that deqi is positively associated with a number of physiological effects: slowed heart rate, improved local blood flow and turning on or off the activity in various areas of the brain. It may also be correlated with analgesic effects. There has been a little research on experimental pain and at least one clinical trial where the presence of deqi was strongly linked to clinical outcomes (which again were pain-related: knee osteoarthritis).

Most other clinical trials have not recorded individual deqi ratings and hence can be of little help. The fact that real acupuncture needling with plentiful deqi produces a better effect than sham needling with little deqi is indicative, but hardly conclusive. There are too many confounding factors. Also, there have been many trials in which the sham control group has done as well as the acupuncture group. It may be more productive simply to record the presence/absence, intensity and quality of deqi in groups of patients needled in the same way, and then to correlate this with treatment outcome. This sort of research could quite easily be done by practitioners within their own clinics. It would be useful to be able to predict good responders on the basis of the nature/level of their deqi, but there may be too much individual variation for this to be reliable⁷. For

practitioners who rely on their own, not patient, assessment of deqi a similar sort of research approach could be followed, by scoring one's own needle sensations.

From the perspective of clinical practice there are many more questions to add to Vincent's list, most of which we struggle to answer.

i. Does it matter if the practitioner cannot feel deqi?

Perhaps the main goal is to receive some kind of feedback, to indicate the arrival of qi: it could be direct sensations experienced by the practitioner or it could be sensations reported by patients. This gives reassurance that something is happening (without which the practitioner may struggle) and also tends to draw patient and practitioner together in closer harmony.

ii. What proportion of practitioners actually aim to realise deqi?

Of 574 members of the British Acupuncture Council (surveyed primarily in respect of adverse events) 87% aimed to attain deqi⁷⁴. (This figure would include most of the Five Element-style, as well as TCM, practitioners surveyed.) It is likely that the respondents took deqi to mean patient sensations of soreness, numbness etc. though it is by no means certain that the 87% would all aim for deqi on every occasion (with all patients and all points needled).

iii. Are patient deqi sensations only an indication of nerve stimulation or local tissue injury/distortion rather than of subtle energy effects?

There have been suggestions to this effect. Strong deqi lends well to neurophysiological models but this should not preclude other (more subtle) mechanisms.

iv. If needling a point produces sharp pain rather than classic deqi signs, will it be effective? Can sharp pain or strong nerve stimulation swamp the deqi effects from other points in the same session?

Brain scanning experiments have shown that sharp acupuncture pain provokes a flooding of the brain with stimulation, which we would guess is too indiscriminate to be therapeutically useful under most circumstances. There is no evidence as to whether, or to what extent, this can negate the potential benefits of other needling.

v. What is the relation between patient and practitioner sensations?

Some practitioners rely more on one, some more on the other. Those who usually ask for patient feedback may or may not themselves also feel deqi. Those who don't ask for feedback may or may not know whether the patient is (also) feeling deqi. It is always a gratifying experience to hear the patient remark, unprompted, that they feel something, just as you, the practitioner, also start to get deqi: but does this combined awareness improve the clinical effect? Also, how important is it that the two

experiences match in intensity, or in the nature of the feelings? Again, there is much scope for research in this uncharted area.

vi. Should practitioners expect to obtain deqi at every point needed?

The Chinese survey results quoted by Deadman³² returned a rate of 80%, whereas most contemporary clinical trials that aim to include deqi in the acupuncture intervention claim 100% success (even on hundreds of patients and thousands of points⁴³). There must be some doubt about the validity of such figures: there are usually no details given on the exact procedures used. Patients can vary enormously, as can individual points on the same person in the same session. It is probably good enough to achieve deqi with a proportion of the points⁹.

vii. What dose of deqi is required for therapeutic effect?

We don't know whether deqi, and 'arrival of qi', operate in an all-or-none manner or whether the more intense the sensation the stronger the effect. If the latter, then we should expect some practitioners, and some styles of acupuncture, to have better clinical results by virtue of their stronger deqi output. However, different types and levels of deqi are likely to suit different patients and situations.

It has been argued⁹ that much of the traditionally-based acupuncture in the West is a pale shadow of that in China, in respect of needling intensity and patient sensations. This may be so but it does not automatically follow that the milder deqi version is any less appropriate to its situation (including the nature of the patients and the range of conditions normally encountered), nor any less successful. There are a multitude of other reasons why acupuncture as a whole may show more spectacular results in China, not least the number and frequency of treatment sessions. A number of clinical trials in the West have employed Chinese acupuncturists but this has been no guarantee of success in the sham controlled ones.

The 'dose' of deqi delivered also depends on the number of points with deqi used per session. This, and various other treatment parameters (for example, duration of needling, needle size) are often a matter of convention and individual preference.

viii. How valuable is it to achieve propagated qi sensations along the channels, over and above deqi at the points?

Most of the published Chinese research on this points to an association between clinical effect and the presence and extent of propagated sensation.

ix. If deqi is important then why do 'deqi-less' styles continue to flourish?

The image of vital brain centres being switched on and off by acupuncture with (patient-defined) deqi is a beguiling one. It is unlikely that shallow and non-insertional

approaches would evoke similar response patterns and some proponents of strong deqi may dismiss these styles as largely placebos. As we have seen, it is very difficult to separate out the effect of a specific needling action from all kinds of other confounding factors, and the same physiological processes may play a part in all of them, including placebo. Acupuncture aims to stimulate the body's own healing mechanism; placebo does likewise. One style may seem more like spiritual healing, another more like electrical nerve stimulation, but in fact most (traditional) practitioners adopt an approach that happily mixes both physical and spiritual aspects.

There is no evidence as yet that any given type of acupuncture is better or worse than any other. Indeed, there are virtually no data at all comparing the clinical effects of different approaches. Acupuncture probably works through a variety of different mechanisms, and different styles could use differing components to differing degrees, but as yet this says nothing about the clinical effectiveness of each. If differing mechanisms are involved then it may well be that different needling styles are better suited to particular situations: patients, illnesses, practitioners. For example, strong deqi styles may work better for strong physical symptoms. There is little available evidence.

Perhaps we can conclude by saying that deqi, as commonly understood, is an important part of the TCM style of acupuncture (amongst others) and probably has therapeutic value within that framework. Within some other frameworks it does not have that same value. For each style there is the challenge of investigating and validating its own particular procedures, including its own version of deqi. Many of the questions of most interest to practitioners are unlikely to be addressed by medical researchers but do lend themselves to study by practitioners, local groups, professional bodies and acupuncture colleges. The concept of deqi lies at the heart of acupuncture: it is a worthy and fascinating subject for extensive further research. ■

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