

# Acupuncture: neurophysiological perspectives

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The paper presents a review of studies about the effects of acupuncture, electrostimulation and transcutaneous electric stimulation therapies on peripheral haemodynamic functioning, for the purpose of investigating the possibility of electrically stimulating acupuncture points to treat peripheral vascular disease. If the technique proves clinically effective, electric stimulation with surface electrodes will represent a valuable contribution to the field of rehabilitation, because the therapy can be easily applied, and the equipment is both economical and portable. To help prove its effectiveness, scientific data on acupuncture's effects and the mechanism by which they are achieved should be compared with those of electric stimulation.

To support the notion that transcutaneous stimulation is clinically effective, a neurological approach to the study of acupuncture would seem to be crucial for insight into its physiological mechanisms. A lack of sound, supportive scientific data to prove or disprove the claimed effects of acupuncture treatment has created controversy for years, and caused the Western medical community to avoid using it. In recent years, however, numerous descriptive reports have been published concerning the efficacy of acupuncture: over 250 acupuncture programmes in diverse treatment settings have been established world wide. Many scientists are now investigating the possible physiological mechanisms underlying acupuncture's effects and are trying to find neurobiological or neurophysiological evidence to prove that acupuncture is effective.

Despite the apparent need for neurobiological data on the effects of acupuncture, the authors have not included such studies in their review. They state that the analgesic and anaesthetic effects of acupuncture are outside the scope of their study. Furthermore, the authors have disregarded recent well documented studies on the acupuncture mechanism. Of the 28 studies cited, slightly more than half are dated from 1990, and only eight are dated on or after 1993. Yet for the years between 1993 and December 1997 MEDLINE lists 162 studies in association with the key word 'acupuncture'. Many of them are non-English publications which should be of

interest from not only a clinical but also a scientific point of view. Journals such as the *American Journal of Chinese Medicine*, *Acupuncture & Electro-Therapeutics Research* and *Neuroscience Research* have published papers dealing with acupuncture therapy and its mechanisms, yet none of the articles or studies in these publications were cited or discussed.

According to the recent studies, in addition to the direct affect acupuncture has on responsive discharges from deep receptors, it also appears to have an indirect effect on the central nervous system. This indirect relationship is not yet fully understood, but it may be the reason acupuncture is effective. It has been found that acupuncture stimulation modifies the somesthetic afferent to different extents, depending on the special quality of the acupuncture point stimulated and not on the mere repetitive stimulation on the skin. It has been hypothesized that during acupuncture treatment, some type of process occurs along a channel called a meridian. Investigation of the mechanism underlying the occurrence of the propagated sensation along the meridians is an important problem because the meridians are different from anatomical nerve routes. Recently, a confocal laser scan microscope system has been applied for researching the effect of acupuncture on the meridians. Concerning the effects of acupuncture on peripheral haemodynamic functioning, few have chosen to study the direct relationship between acupuncture and haemodynamics. There are at least two important studies on this subject which the authors have not cited.<sup>1,2</sup> These studies conclude that acupuncture treatment can effect a decrease in the heart rate by stimulating sympathetic nerve activities so as to expedite arterial pulse wave propagation by arterial contraction. Increased activity in both sympathetic and vagal nerves can occur simultaneously during acupuncture. Without detailed knowledge about the neurophysiological mechanisms of acupuncture, there is little to connect this traditional method with the possible therapeutic value of transcutaneous electric stimulation.

The authors should avoid making remarks about the possible link between the use of acupuncture needles and

HIV infections unless they have studies to support their assertion. If their statement is not accompanied by statistics but is rather the subjective perception of people in the West, then the authors should say so.

For the years from 1992 to the present, MEDLINE lists 53 studies associated with 'haemodynamic' and 'electric stimulation'. As the authors have mentioned, the physiological mechanism responsible for the increased blood flow associated with neuromuscular electric stimulation has been attributed to various factors. However, electric stimulation therapy cannot be an 'empirical' treatment as long as the physiological mechanism responsible for the increased blood flow remains unclarified. Further research is necessary to determine what effects electric stimulation and micro-current stimulation may have on haemodynamic functioning and the mechanism by which they are achieved. The authors have not cited the most recent literature that might provide an insight into what that mechanism might be.

According to the authors' survey, traditional acupuncture therapy (one paper) and the more recent electroneedling (three papers) were able to effect an increase in peripheral haemodynamic functions, while modern western techniques such as neuromuscular (eight papers) and transcutaneous (two papers) electric stimulation showed inconclusive results. The inconsistency between the two groups may hold the key to the success of the electric stimulation therapy. The inconsistency might be explained as follows. The experimenter is responsible for choosing which acupuncture points to use in order to achieve the desired result. Exact knowledge of acupuncture points is a decisive factor in making acupuncture treatment successful. Therefore, the positive results from the acupuncture experiments cited may have been due to the skill of the acupuncturists who manually manipulated the needles within the tissue to induce the effects on haemodynamic functioning during experiment. On the other hand, in the electric stimulation studies, it is not clear whether the stimulation conditions, which had to have been kept constant for all subjects during each experiment, were optimal for inducing changes in blood flow. The physiological mechanism connecting blood flow and electric stimulation has not yet been clarified. In view of this situation, a feedback channel should be established between a haemodynamic detector and a stimulation generator in the system, in order for stimulation to give direct play to its effect on haemodynamics.

The studies in the review do not establish the authors' claim that electric stimulation of acupuncture points with surface electrodes produces the same effects as

acupuncture and electroneedling. The physiological responses elicited by electric stimulation with surface electrodes are different from those induced with needle electrodes. Application of electric current with surface electrodes inevitably induces cross-talk phenomena. When writing of recent studies, the authors distinguish between acupuncture and electroneedling by taking into account the differences between the stimulation mechanisms, and carefully calling them 'conventional' and 'acupuncture-like stimulation'. If electric stimulation of acupuncture points with surface electrodes has the same effects as acupuncture itself, then the only key is the selection of the acupuncture points themselves, and not any skill in manipulating the needles or in setting stimulation parameters. Furthermore, studies cited by the authors do not show that both techniques produce similar or identical effects. If this notion is generally accepted by many rehabilitation specialists based on scientifically and clinically confirmed working principles, then the authors should have cited studies to prove their assertion.

Rather than disregarding traditional acupuncture on the basis of its history, efforts should be made to understand it on a scientific basis. Despite the array of studies they have reviewed, the authors have not addressed the most recent literature as thoroughly as they might have; they have not included studies on acupuncture's neurophysiological effects, and they have not really proved their contention that studies about traditional acupuncture are useful for supporting the notion that electrostimulation of acupuncture points has the same therapeutic effect as acupuncture itself. Select papers which also present reviews of acupuncture might usefully have been referred to.<sup>3-6</sup>

## References

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