

ACUPUNCTURE — AN INVESTIGATION

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ABSTRACT

A survey has been made of some of the vast quantity of literature currently available, and an attempt is made to explain acupuncture in terms of anatomy, physiology, embryology and psychology. Conditions for which it is claimed to be effective are discussed, and the possible adoption of its practice by physiotherapists is advanced. Areas where investigation and research to this end might profitably be undertaken are indicated.

INTRODUCTION

In the last few years acupuncture has aroused a great deal of interest and controversy. Opinions range from outright debunking to medical confirmation of its efficacy (Dontigny, 1972; Elmendorf, 1972; Popkin, 1972; Taub, 1972; Fritsch, 1973; Kopelman, 1973). The name is derived from the Latin *acus* = needle, *punctura* = puncture. Armstrong (1972) has defined it as "a method of diagnosing and treating disease by inserting metal needles into the body at designated locations — acupuncture points — at various depths and angles." It is a very old science: the earliest known needles were made of flint in the neolithic age. Others, made of bronze, silver and gold, and dating back to \pm 7000 BC have been found (Veith, 1972). The modern injection is a development of acupuncture (Omura, 1975). Acupuncture was given new impetus in China after the Cultural Revolution of 1949, and is currently attracting much attention with increasingly more research being undertaken to establish the validity of its claims.

PHILOSOPHY

Western science and philosophy are based on a dualistic concept of the universe, first outlined by Aristotle, in which material and non-material (e.g. mind and body) are entirely separate. Only comparatively recently has it begun to tend towards the Eastern monistic concept. This is that there is no division, and that they are the two poles of an indivisible whole, e.g. light/dark; mind/body; positive/negative (Mann, 1973).

The philosophy behind acupuncture, briefly, is that the positive and negative elements Yin and Yang are in balance in the normal healthy body, and assist the vital element Qi to circulate via twelve paired meridians. These run the length of the body from head or upper thorax to toes or fingers, and are each associated with an organ. Imbalance of Yin and Yang causes disorder and disease. By needling points along the meridians according to several complex laws, the acupuncturist manipulates the imbalance in the meridian concerned, and thus influences the flow of Qi to the organ in question. If, for example, an over-active liver has been diagnosed, the flow of Qi in the liver meridian would be reduced, and the liver thus sedated. Similarly, an organ can be stimulated, or tonified (Mann, 1973, 1974).

ACUPUNCTURE POINTS AND MERIDIANS

Approximately 1 000 acupuncture points are described (Mann, 1974), distributed along the course of the meri-

OPSOMMING

'n Oorsig van 'n gedeelte van die groot hoeveelheid literatuur wat tans beskikbaar is, is gemaak en 'n poging aangewend om akupunktuur te verklaar in terme van anatomie, fisiologie, embriologie en psigologie. Toestande waar op effektiewe behandeling aanspraak gemaak word, word bespreek en die moontlike aanvaarding van die beginsels deur fisioterapie word geopper. Areas waar ondersoek en navorsing ten doel hiervan voordelig onderneem mag word, word aangedui.

dians. They are small areas, about 2,5 mm in diameter. In certain pathological conditions they become tender. Many correspond to neuromuscular junctions, or where vessels and nerves are superficial. They are often found between muscle and bone (Mann, 1973). They have been found to be electropermeable (Armstrong, 1972; Matsumoto, 1972) and have been photographed (Armstrong, 1972; Omura, 1975). They frequently correspond to "trigger points", and it has been found that the knock-out points of judo are acupuncture points, which, if stimulated too strongly, would cause the subject to faint (Mann, 1973). They have been found to contain a high density of pressure receptors (McLeod, *et al.*, 1974). Needling non-acupuncture points will not produce the same results as needling acupuncture points (Veith, 1972).

The meridians do not accurately follow any known nerve, blood or lymphatic channels, though it is stated that important bundles of autonomic fibres run along these lines (Matsumoto, 1972; Veith, 1972; Mann, 1973). There appears to be little evidence to support this claim. Current neuronal theories do not altogether explain the sensation of pain or hyperalgesia in areas of skin distant from the spinal segments innervating the affected organ (Melzack & Wall, 1965; Mann, 1972; Wall, 1972; Weinstein, 1974). Several experiments are described which suggest the existence of meridians (Mann, 1973; Weinstein, 1974), but it is felt that a lot more research is needed (Matsumoto, 1972; Veith, 1972). A very elaborate experiment is described in which radio isotopes were injected into acupuncture points and traced along the meridian to the organ concerned (Wheaton, 1972). No other reference to this experiment could be traced, however.

ANATOMY

Recent investigations by Mann (1977) indicate that acupuncture almost certainly works through the autonomic nervous system. Many of the effects can be explained via the cutaneo-visceral, viscerocutaneous, visceromotor and viscerovisceral reflexes. Intrasegmental effects can be explained by the short reflexes of Sherrington, while intersegmental reflexes can frequently be accounted for by his long reflexes, and possibly by the concept of convergence of neurones. A distance of up to ten dermatomes has been noted.

The concept of meridians is open to doubt as it has been noted that reflex tenderness associated with disorder of the lower six organs may appear anywhere on the legs, and may not necessarily follow their traditional meridional courses. However, connections between the organs and some of their known, effective acupuncture points, especially on the face, are still obscure, and the meridians illustrate, in an almost abstract manner, presumed neural pathways which are as yet unknown.

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Acupuncture points are now thought to be the small fibrositic nodules one frequently finds in the "rheumatic" back, neck and shoulders. When they are stimulated the response is normally greater than when the surrounding less tender tissues are needled.

It has been found that diseased organs react very readily to stimulus, and that the small stimulus of a needle via the cutaneo-visceral reflex is sufficient to elicit a response. Healthy organs require far greater stimulus.

Needling of any tissue layer anywhere within the segment has been found to be effective, thus throwing doubt on the traditional concept of acupuncture points.

Is there a connection between the points containing high densities of pressure receptors and "fibrositic nodules"? (McLeod *et al.*, 1974).

PHYSIOLOGY

It has been established that acupuncture raises the pain threshold, and that effects occur as high as the thalamus and reticular formation (McLeod, *et al.*, 1974). Experiments on rats have shown the dorso-lateral area of the midbrain central grey matter to be connected with pain. Under electrical stimulation of this area abdominal surgery could be performed without distress, although the animals were fully conscious and mobile, and reacted normally to all other stimuli (Reynolds, 1969). A similar effect was noted from stimulation of the brainstem (Mayer, *et al.*, 1971).

The principle of counter-irritation is well-known. Similar effects have been noted when the dorsal columns of the spinal cord are electrically stimulated (Mann, 1977).

EMBRYOLOGY

If an embryological basis for neural connections along the longitudinal course of the meridian exists, then they would most logically be established immediately after the development of the intraembryonic mesoderm, and prior to segmentation. At this stage all cells are pluripotent and could develop into any of their derivatives. Differentiation is dependent on complex biochemical interaction (Gray's Anatomy, 1973). It is only assumed that segmentation of the intermediate and lateral plates occurs (*ibid.*). Various experiments have been described which indicate that development along longitudinal lines is possible (*ibid.*; Cassiman, *et al.*, 1974; McMahan, 1974).

PSYCHOLOGY

As in all forms of treatment, acupuncture has varying success, tied up with the psychological make-up of the patient. It is less effective when he is apprehensive (Bonica, 1974; McLeod, *et al.*, 1974) and experiments on animals and children discount the possibility of hypnosis (Armstrong, 1972; Veith, 1972; McLeod, *et al.*, 1974). It is felt that Eastern patients respond more readily as it is part of their tradition and cultural background (Wall, 1972; Bonica, 1974), but notable results have been observed among Western-trained doctors who are less open to such suggestion (Brown, 1972; Elmen-dorf, 1972; Wall, 1972; Omura, 1975). Acupuncture anaesthesia in emergency surgery usually fails, possibly because thalamic units in a high state of excitability are less susceptible to the inhibitory effects of acupuncture (McLeod, *et al.*, 1974).

The concept of strong physiological reactors has been put forward by Mann (1977), such people being more likely to respond to treatment than their less reactive cousins.

CONDITIONS AFFECTED BY ACUPUNCTURE

Acupuncture has been claimed to be effective in a wide spectrum of conditions but investigation has revealed little statistical evidence to support these claims, and other forms of therapy which could themselves have produced the results claimed have often been combined with acupuncture (Bonica, 1974; McLeod, *et al.*, 1974).

Any disorder that is *anatomical in origin and irreversible* (e.g. paraplegia, hemiplegia, multiple sclerosis) cannot be affected (Mann, 1973; McLeod, *et al.*, 1974).

There appears to be some evidence that it may be of value in the treatment of disease caused by *infection* in that the blood chemistry is significantly altered for up to two weeks after needling (Winstein, 1974; Omura, 1975).

It has been claimed to be particularly efficacious for pain caused by rheumatoid arthritis (Levitt & Walker, 1975), although other investigations are inconclusive (Winstein, 1974).

Acupuncture has been noted to work on *physiologically reversible conditions*, and people presenting with vague symptoms may well have early dysfunction of an organ. People do not normally invent disease and pain, or complain of unusual lack of energy. Needling painful reflex areas may well rectify the condition on the principle of an affected organ responding easily to stimulus. In this case acupuncture is *prophylactic* in effect, and may well prevent a condition from becoming "chronic" with irreversible anatomical changes (Mann, 1977).

The most common effect seems to be that of raising the pain threshold (Armstrong, 1972; Mann, 1972; Mann, *et al.*, 1973; Bonica, 1974; McLeod, *et al.*, 1974; Winstein, 1974; Levitt, *et al.*, 1975), although cancer pain was not observed to be notably affected (Bonica, 1974).

An interesting observation was noted in Mann's (1974) description of needling the coracoid process for relief of the pain of a frozen shoulder and he stated that if it does not have an immediate effect, needling the transverse process of a tender cervical vertebra may help, for there often seems to be an association. "Tennis elbow" is thought to be helped by needling the lateral epicondyle, but if the neck is implicated, the transverse process of a tender cervical vertebra should be needled. Cortisone is sometimes more effective. In 1977 Mann stated that stimulation of the transverse process of C6 is effective in patients who have the so-called cervical disc syndrome and allied conditions. He also thought that due to activation of a local reflex, the effect is greater if the periosteum is stimulated in the region of a joint, than if the overlying skin is needled. The connection with Maitland's mobilising techniques immediately comes to mind. Does he achieve his results by stimulating the periosteum, by mobilising, or both? From the author's observations, painless range of movement increases over a period of about 20 minutes after pressure on the coracoid process of the painful shoulder associated with the early stages of tetraplegia.

APPLICATION TO PHYSIOTHERAPY

There seems to be some indication that acupuncture principles could be "married" to some physiotherapy techniques for the relief of pain. Winstein, (1974) made the following suggestions:

- The application of various forms of electrotherapy to known acupuncture points.
- Massage and pressure to the Hoku point of the hand has been shown to be effective in the treatment of head and neck pain (Runnals, 1976).
- Suitably trained physiotherapists could use acupunc-

ture prior to mobilising stiff joints, and as a straight treatment for the relief of pain.

- It was also suggested that it be used in the treatment of the brain-damaged patient, either facilitating or inhibiting movement. The specific techniques of Rood are cited — the factors on which they are based apparently correlate well with the mechanisms of acupuncture.

The medico-legal position of physiotherapists using acupuncture would need to be clarified.

A more acceptable application of these principles would be by the use of Shiatzu, or acupressure (Vega, 1975), which involves pressure on relevant points for a short period (Bonica, 1974). Mann (1977) has stated that the nature of the stimulus is unimportant so long as it is in the right place, since nerves respond to the stimulus according to the "all or none" law.

Apart from the coracoid process mentioned above, other points that have been described (Runnals, 1976) are:

- The thumb web (Hoku point) for headache (Winstein, 1974);
- A point 3.75 cm proximal to the radial styloid for shoulder and neck pain;
- The posterior fibular head for backache;
- The tendo achilles (pinching) for backache;
- The calcaneal spur for constipation;
- The right transverse process L3 for menstrual pain.

In all these cases the left-hand side of the body is treated in a male subject, and the right-hand side in a female, although there appears to be little anatomical or physiological reason for this. Are there any other bony points that could be similarly used for the relief of pain? It would be interesting to find out.

CONCLUSION

There is a great deal about the human body and the way it functions still to be learned. To the Western way of thinking acupuncture is bizarre and illogical, but it works in a significant number of cases. Why? How? We are only now beginning to find out. There seems to be overlap of acupuncture principles and some physiotherapy techniques, and acupressure in particular might be found to be a valuable item in the physiotherapist's repertoire for the relief of musculo-skeletal pain. The field is wide open for investigation and research. The need is for physiotherapists working in this field who are interested enough to initiate their own individual programmes and provide statistical evidence however small the programme may be. Their findings can only be of value to all.

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