On ears and Head

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The original empirical conjecture of auricular acupuncture (AA) consists of a claim that the entire human body is represented in a certain way on the auricle (eg, in the form of an inverted fetus, see figure 1A), and that the pathology of human organs leads to specific changes at these respective areas on the auricle. It is claimed that these changes can be identified as the areas with skin discoulourations, which are tender on palpation. Moreover, the stimulation of these auricular areas, which are supposed to somehow be connected to the organ with 'pathology', is believed to improve the functioning of the impaired organ or relieve the related pain. The improvement of the functioning of the impaired organ with 'pathology', is believed to be connected to the 'diseased' organ or relieve the related pain.1 The representation of the human body on the auricle is often called 'somatotopic', analogous to motor and sensory somatotops of precentral and postcentral gyri of the cortex, as described by Penfield and Rasmussen on the basis of experimental research.2 Interestingly, randomised clinical trials on the efficacy of AA have demonstrated that stimulation of the areas of auricle according to the AA empirical conjecture was effective as complementary treatment for a variety of pain syndromes and preoperative anxiety.3–5 However, no neuroanatomical pathways are known to connect the ‘diseased’ organs with the external auricle so that the observed phenomena cannot be explained by the underlying anatomy.

A diagnostic approach has been frequently used for testing the hypothesis of the ‘somatotopic’ representation of the human body on the external auricle. Within this diagnostic approach, the correlation between known ‘loci morbi/dolendi’ on patients’ bodies and the zones on the external auricle, which were identified using inspection, palpation and electrodermal measurements, has been established in several studies. Oleson et al performed the first scientific double-blind evaluation of auricular diagnosis in 40 patients with painful musculoskeletal disorders.6 The doctors, without prior knowledge of the patients’ medical conditions, examined the tenderness and electrodermal characteristics of the patients’ auricles, while the patients were draped to conceal any visible information. The concordance between the established medical diagnosis and the potentially corresponding auricular areas was 75%. Saku et al studied the electrical skin resistance (ESR) on the external auricles in patients with coronary artery disease and in healthy subjects. The areas of low ESR were frequently found in the centre of concha auriculae, the zone representing the heart and lungs systems in the empirical model of AA. The frequency of detection of low ESR points in the centre of concha was highest among patients with acute myocardial infarction; patients with old myocardial infarction and angina pectoris also had a higher incidence of low ESR points in comparison with the healthy subjects.7 Cheing et al examined auricles of 20 patients with liver disease and 25 control subjects using physical inspection, ESR measurement and tenderness testing. Significant differences between the two groups were found in visual inspection and ESR on the AA liver-related zones, according to the empirical map of AA.8

In this issue Romoli et al report a clinical diagnostic approach for clarifying the empirical ‘somatotopy’ of the auricle acupuncture (see article on page 169). The authors mapped the areas with a lower pressure–pain threshold (PPT) and reduced ESR on the auricles of 78 patients before and after elective hysteroscopy. They found an increase in the number of lower PPTs and reduced ESR points in the triangular fossa and on the helix of the auricle after a hysterectomy.9 The areas, rich in points with lower PPT and ESR, overlapped with historical, empirically defined, Chinese and French ‘somatotopic’ maps of the auricle.

The methodological advantage of this clinical investigation is the combination of two methods to detect presumed AA points in perioperative conditions. A perioperative setting is an excellent model for evaluating the influence of pain (noxious surgical procedure) on presumed changes in the corresponding areas of the external auricle, occurring even in patients studied under deep general anaesthesia.10 This approach was also used in experimental animal research on ‘somatotopic’ auricular representation of somatic and visceral lesions. Kawakita et al measured the ESR of the auricular skin in rats with experimental peritonitis and observed the increase of the areas with low resistance immediately following surgery, which persisted for 7–14 days and then returned to the control level.11 Ceccherelli et al induced neurogenic inflammation by injecting capsaicin into the hind paw of the rats and observed the appearance of the area with a lower ESR on the external auricle. The percutaneous electrical stimulation, applied to these points bilaterally, but not the manual acupuncture or the stimulation of sham points, led to a reduction of inflammatory oedema of the paw and to analgesia.12

In their study Romoli et al applied temporally and spatially standardised noxious stimulation (introduction of hysteroscope) in a homogeneous group of patients, thus approximating the design to classic conditions of experimental investigation. The sequential application of both PPT and ESR detection methods enhanced the validity of the results obtained. However, the design of the investigation did not allow a ‘blinding’ of the people performing the evaluation of the main outcome parameters (PPT and ESR), thus introducing a potential bias. Moreover, the electrodermal measurements were performed using point-probe electrodes, intermittently applied to the skin of the auricle without standardised pressure.

Electrodermal skin measurements depend heavily on shape, pressure, angle and time of the probe’s application to the skin, integrity of the stratum corneum and the activity of the sympathetic system.13 14 To overcome these problems in future investigations, we suggest that continuous electrodermal measurements be performed throughout the period of surgical intervention, using a multichannel computerised device equipped with electrodes. Such a system has already been used to test the electrodermal characteristics of skin sites anatomically associated with acupuncture points on the bodies of healthy volunteers.15 How can the appearances of such locally different painful areas, with reduced ESR on the surface of the external auricle, be explained by anatomy and physiology?

Changes of the ESR/conductance are known to be controlled by the

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Acupunct Med December 2010 Vol 28 No 4

Commentary
sympathetic part of autonomous nervous system, whereas the activation of sympathetic nerves, innervating the skin’s sweat glands, leads to the shift of ions, which are the main charge carriers of electric current in human tissue.18 Ancient and modern anatomical investigations are in agreement that the concha and triangular fossa of the pinna are innervated by branches of trигeminal and vagal nerves, whereas the peripheral regions of the auricle—helix and scapha—are innervated by spinal C1–C3 nerves. The innervation is considerably overlapping.19

In conclusion, the data from experimental and clinical research seem to support the main diagnostic findings of Romoli et al who made one further step towards clarifying the question of functional non-homogeneities on the surface of the auricle as a response to somatovisceral noxious stimulation. We believe that a clear definite answer can be obtained in a clinical diagnostic investigation, such as this study, using an appropriate, objective technique of measurement in perioperative conditions.

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