

LASER ACUPUNCTURE

Pekka J. Pöntinen, M.D, Ph.D, F.I.C.A.E., Tampere University, Tampere, Kuopio University, Kuopio, Finland E-mail: pontinen@sci.fi

Traditionally acupuncture means stimulation of specific points on the surface of the body in order to produce mainly regulatory effects on the functions of the internal organs. The same points have been used to increase or decrease the functional state of different organs. In Traditional Chinese Medicine (TCM) the acupuncture points (AP) are connected by channels or meridians in and under the skin and have deep connections to the internal organs. The selection of the proper points has been as important as the correct type of stimulation, either reinforcement or sedation. In the traditional Chinese medicine the human model has been mainly energetic, physiological, not anatomical. The changes in the energy flow induced by the blocks in the channels or acceleration of the flow leading either to the deficit or excess of the vital energy, Chih, were believed to be the origin of diseases. The APs were the loci to balance the energy flow through needle stimulation. Modern acupuncture has a different nature. For the consensus conference arranged by the National Institutes of Health (NIH) and held in Bethesda, Maryland in November 1997 the term acupuncture was defined as stimulation, primarily by the use of solid needles, of traditionally and clinically defined points on and beneath the skin, in an organized fashion for therapeutic and/or preventive purposes. Application of stimulus to the reactive points (by needle, heat, massage, transcutaneous electric nerve stimulation/TENS, laser, etc.) according to TCM can influence the pathophysiological function of the affected organ-meridian systems.

In modern Chinese AP therapy, a combination of local tender points (AHSHI) and classical peripheral APs is common. Laseracupuncture (LAP) Today LAP provides a noninvasive and low risk alternative to needle stimulation. A combination of local reactive (tender) points or Ahshi points and active muscle TPs form a practical and effective basis for LAP in pain treatment. LAP can replace needles in the treatment of functional disorders and is then directed to classical APs. As a painless modality of acupuncture LAP is well accepted by children and other sensitive patients. LAP provides excellent possibilities for clinical studies on acupuncture. Recently Schlager and coworkers confirmed the efficacy of AP Neiguan (PC6) in the prevention of postoperative vomiting in children undergoing strabismus surgery. In another randomized, double-blind placebo-controlled study low-intensity laser therapy effectively prevented the recurrence of Herpes simplex infection.

Our study groups at the Universities of Kuopio and Tampere have studied the analgetic effect of peripheral stimulation (needle acupuncture, transcutaneous electrical stimulation/TENS, massage, electric stimulation, low energy laser) applied on APs or TPs using pressure algometry . We have conducted a series of experiments using different wavelengths (633-904 nm) and both coherent and noncoherent irradiation. LEPT was given directly to TPs (1-2 J/TP) or local tender spots.

In blind, cross-over studies both HeNe- and IR-diode (904 nm) lasers elevated pressure pain threshold (PTH). In a follow-up study on 54 MPS patients LEPT (820 nm, 1-2 J/TP) PTH increased from 2.94 ± 1.44 to 6.56 ± 0.96 kg/cm² ($p < 0.001$) and MGF from 0.60 ± 0.28 to 1.03 ± 0.29 bar ($p < 0.05$), whereas VAS decreased from 44.6 ± 11.3 to 9.3 ± 6.4 ($p < 0.001$). In this and other series we have found that the effect is greater on the side where PTH and MGF values are initially lower. As in our earlier studies with low and high frequency TENS one sided HeNe-laser irradiation elevated PTH of the corresponding, contralateral nontreated TPs in addition to the response on the treated side. More recently the main emphasis has been

turned to the central mechanisms and pathways. In a pilot study LED-light (880 nm, 1J/cm²) given to TPs in trapezius muscle (TE15) bilaterally and upon proc. spinosus of C7 (DU14) significantly altered regional cerebral blood flow e.g. in thalamus, caudate nucleus and prefrontal cortex.

In our experience less than 1 J/point or 100-200 J/cm² given in a contact mode is mainly ineffective in clinical practice when treating musculoskeletal disorders and myofascial pain through TPs. In many well controlled, blind and double-blind cross-over studies showing insignificant results the actual radiant exposure to the target site has been a mere fraction of the dose normally used in clinical practice. When treating APs of low resistance and high sensitivity the irradiation dose should be reduced to about 0.1-0.2 J/point (10 per cent of the normal dose [1-2 J/point] used at muscle TPs).