

Modulating effects of acupuncture on kinase 1/2 (ERK1/2) and p38 mitogen-activated protein kinase (p38 MAPK) signaling pathways in subcutaneous fascia

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Background: Subcutaneous fascia is the site directly stimulated by an acupuncture needle. It has been shown that the needle can grasp the fiber of the connective tissue and then transfer mechanical signals during needling (1).

Aim: The aim was to study possible changes of expressions of ERK1/2 and p38 after acupuncture treatments in order to investigate biological effects of acupuncture on signaling pathways.

Methods: 20 Sprague-Dawley rats were randomly divided into 4 groups. The rats in the control group received no treatment. The rats in the other 3 groups received (i) hand acupuncture at ST36 acupoint, (ii) electro-acupuncture at ST36 acupoint, and (iii) hand acupuncture at a non-acupoint separately. 10 days after treatments, the rats were killed. The tissues including fascia and muscles at the acupuncture sites were collected. Immunohistochemical (IHC) staining and western blotting methods were used to evaluate the expression of ERK1/2, phosphorylated-ERK1/2 (p-ERK1/2), p38 and phosphorylated-p38 (p-p38). One-way analysis of variance (ANOVA) was applied, followed by least-significant Difference (LSD) comparisons. $p < 0.05$

Results: IHC staining showed that positive ERK1/2 signals increased in all 3 acupuncture groups, among which the signals in the non-acupoint acupuncture group ranked first. While p38 positive signals increased obviously only in the non-acupoint group. On the other hand, western blotting results showed that intensities of ERK1/2, p-ERK1/2 and p-p38 increased significantly in all 3 acupuncture groups; the most in the non-acupoint acupuncture group, and the least in the ST36 acupoint hand acupuncture group.

Conclusion: Acupuncture results in up-regulation of ERK1/2 and p38 in the acupunctured subcutaneous fascia. This indicates that effects of acupuncture may rely on an additional regulating system, the fascia connective tissue network, besides the common nerve-hormonal regulating mechanisms.

REFERENCE

(1) Langevin HM, Churchill DL, Cipolia MJ.: *FASEB J* 2001, **15**:2275-2282.