Tohoku University Micro System Integration Center

Acupoint stimulation device using focused ultrasound

Acupuncture is used widely in oriental medicine. However it is difficult to stimulate continuously or intermittently in daily life with conventional acupuncture. Thus, an acupoint stimulation device using focused ultrasound has been developed (Fig. 1, 2). Because the device size is about 6 mm in diameter, it can be easily put on the skin during daily life. Appropriate stimulation intensity and pattern can be chosen by changing driving voltage and pattern. We stimulated acupoints placed on top of foots with this device and measured the blood flow volume of brachial artery (Fig. 3). As a result, the blood flow volume increased significantly as well as acupuncture (Fig. 4). Because the device stimulate acupoints with intactness of skin, advantages of this device is free from infection, fear and pain by insertion of acupuncture needles.

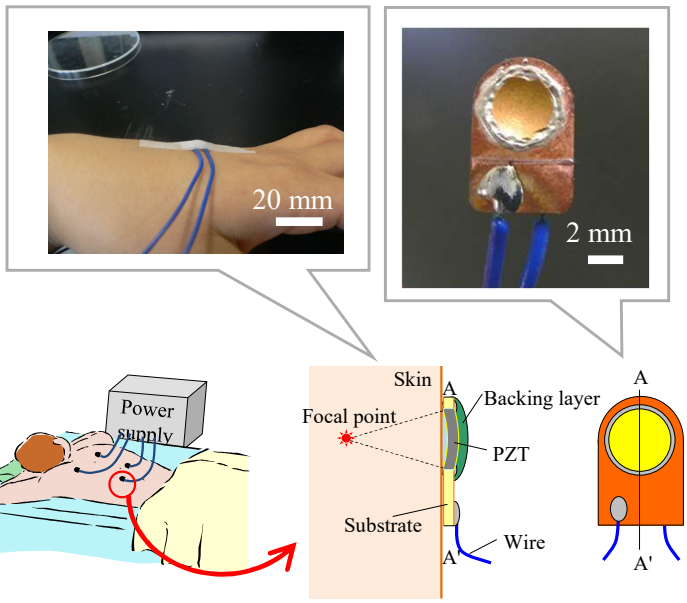
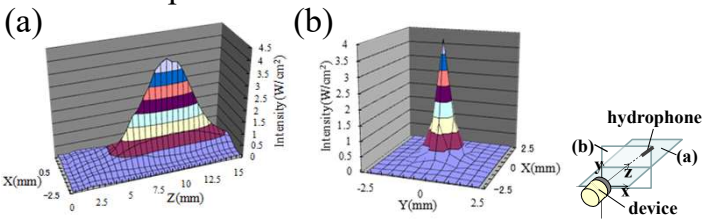


Fig. 1 Schematic view of focused ultrasound acupuncture



(a) X-Z Plane(Y=0mm), (b)X-Y Plane(Z=9 mm)

Fig. 2 Acoustic field of Fabricated device.

<Reference>
N. Tsuruoka *et al.*, "Brief Effect of Acupoint Stimulation Using Focused Ultrasound," The Journal of Alternative and Complementary Medicine, Mary Ann Liebert, Inc., Vol. 19, No. 5, 2013, pp.416-419.

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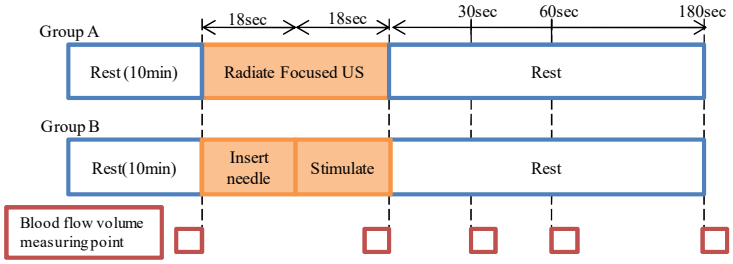
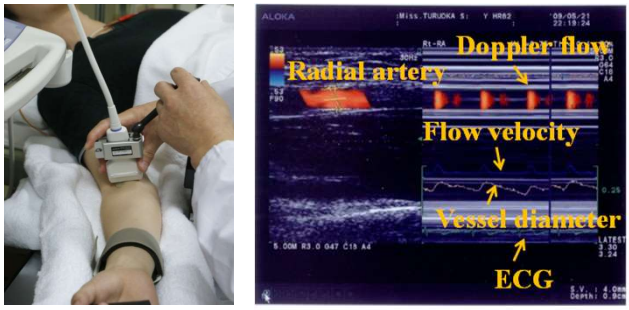


(a) Protocol of the experiment

Group A	Stimulated by focused ultrasound Focal point: 5 mm depth from the skin surface Ultrasound intensity: 1.24 W/cm^2 (sine wave)
Group B	Stimulated by conventional acupuncture Stimulation: Rotating the needles manually Needle diameter: 0.16 mm

(b) Stimulation procedure



(c) Ultrasound measurement of brachial artery

Fig. 3 Protocol and experimental setup.

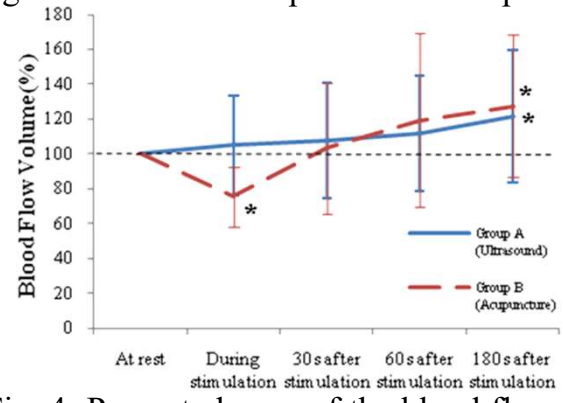


Fig. 4 Percent change of the blood flow volume of brachial artery. *p<0.05.

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