

Brain Injury – Cerebral Circulation

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[Protective effect of low-level laser irradiation on acupuncture points combined with iontophoresis against focal cerebral ischemia-reperfusion injury in rats]

[Article in Chinese]

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OBJECTIVE: To investigate the effects of low-level laser irradiation on acupuncture points combined with iontophoresis against brain damage after middle cerebral artery occlusion (MCAO) in rats.

METHODS: Sixty-nine SD rats were randomly divided into five groups, including normal group, sham operation group, model group, electro-acupuncture group and low-level laser irradiation on acupuncture points combined with iontophoresis group (LLLI group). The cerebral ischemia-reperfusion (I/R) model was established by thread embolism of middle cerebral artery. The rats in the LLLI group, as well as the electro-acupuncture group were given treatment as soon as the occlusion finished (0 hour) and 12, 24 hours after the occlusion. We observed the changes of neurological deficit scores and the body weight of the rats at different time. The activity of superoxide dismutase (SOD) and the content of malondialdehyde (MDA) in the rats brain tissue were tested.

RESULTS: The neurological deficit score of the LLLI group was significantly lower than that of the model group. The body weight and the activity of SOD of the rats decreased slightly, and the content of MDA decreased significantly after the treatment.

CONCLUSION: The low-level laser irradiation on acupuncture points combined with iontophoresis can prevent focal cerebral ischemia-reperfusion injury. One of its mechanisms may be increasing the activity of SOD and decreasing the damage of the oxidation products to the body.

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Vascular Low Level Laser Irradiation Therapy in Treatment of Brain Injury

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Abstract: To evaluate the effect and mechanism of Vascular Low Level Laser Irradiation Therapy on brain injury. In this study thirty-eight SpragueDawley rats received Feeney's brain impact through a left lateral craniectomy under anesthesia. Control and treatment group are set up. According to the time exposed to laser and irradiating postinjury, the treatment group is divided in four subgroups by design. Semiconductor laser was used with a power of 5mW to irradiate straightly Rat's femur venous. The Y Water maze was used to assess cognitive performance. Superoxide dismutase(SOD) activity and the level of metabolic production of free radical MDA in Brain and erythrocyte were measured to determinate the level of free radical. We find Vascular Low Level Laser Irradiation Therapy can improve posttraumatic memory deficits. SOD activity is higher in treatment groups than the control group meanwhile the level of MDA is lower. These findings suggest that Vascular Low Level Laser Irradiation produced a significant reduction in free radical's damage to the brain postinjury.

INFRARED LASER RADIATION IN THE TREATMENT OF BRAIN INJURY CONSEQUENCES

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The examination of 198 patients aged 16-47 has revealed a high frequency of progressive pathologic states in a form of asthenia, vegeto-vascular dystonia, hypertensive, somato-vegetative, vestibular syndroms. Taking into account the changes in cortico-undercortical interrelations and expansion of pathologic process in hypothalamic area during the head trauma, we have developed effective treating methods by means of laseropuncture. Laser rays influence on acupuncture points (AP) leads to a convergence of the afferent messages upon the neurones of spinal cord, reticular formation, thalamus, hypothalamus and brain cortex. As a result of that a dynamic balance between the inhibition and excitation processes in the structures of central nervous system leading vegetative function and endocrine secretion recovers. Use of infrared laser radiation is the most perspective. It does not cause the direct photochemical reactions in biological tissues, but influences on physico-chemical structure of AP biomolecules. For laseropuncture we used an apparatus "BIOMED-01" with a wavelength of 0.89 nm. The work regime is impulsive-continuous with a modulation of frequency - from 0.1 to 1000 Hz. The middle power is up to 20 mW. The total time of the action for one sitting is till 20 min. The points selections was carried out on the grounds of the methods of acupuncture diagnosis, imagesking out the dominant clinical syndromes and including points of vascular, vegetotroimages, sedative orientation. Our clinical results, which were confirmed by paraclinical methods (EEG, dopplerography) and methods of acupuncture diagnosis have shown a high effectiveness of this therapy decreasing the drugs load and having no contradictions.

LASER-THERAPY AND ITS INFLUENCE ON HEMODYNAMICS WITH THE PATIENTS SUFFERED FROM GRAVE CRANIOCEREBRAL TRAUMA

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Despite the maximal dosage of different medications taken for curing of grave craniocerebral trauma the resistance to the treatment carried out was observed. This fact stimulated the search of new methods and ways of therapy. One of the possible methods is a non-medicamental treatment based on blood irradiation with low-active helium-neon laser. The present paper presents some data concerning the laser-therapy influence in hemodynamics in the case of craniocerebral trauma. The total number of patients examined is 45. Laser-therapy was carried out through the subclavian vein (37 cases) or cubital vein (8 cases). For primary irradiation the preferable access was the central one. It was used in the acute period of craniocerebral trauma. The periferal access was used for irradiation in the posthospital period. The course of laser therapy for in-hospital patients consisted of 3-5 everyday procedures of 30 minutes each. To define the hemodynamic changes with the patients suffered from craniocerebral trauma both clinical observation and ultrasonic transcranial dopplerography were used. The last one gave the possibility to identify the type of blood flow speed disorders.

Specific Effects of Laserpuncture on the Cerebral Circulation

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Abstract . Acupuncture is a form of traditional Chinese medicine that has developed over thousands of years. We studied the effects of laser puncture, needle acupuncture, and light stimulation on cerebral blood flow in 15 healthy volunteers (mean age 25.0 ± 1.9 years, 5 female, 10 male) with non-invasive transcranial Doppler sonography. In addition 40-Hz stimulus-induced brain oscillations, heart rate, blood pressure, peripheral and cerebral oxygen saturation, and the bispectral index of the EEG were recorded. Stimulation with light significantly increased blood flow velocity in the posterior cerebral artery ($p < 0.01$, ANOVA). Similar but less pronounced effects were seen after needle acupuncture ($p < 0.05$, ANOVA) and laserpuncture (n.s.) of vision-related acupuncture points. Furthermore both, laserpuncture and needle acupuncture, led to a significant increase in the amplitudes of 40-Hz cerebral oscillations. Stimulation of vision-related acupuncture points with laser light or needle acupuncture elicits specific effects in specific areas of the brain. The results indicate that the brain plays a key intermediate role in acupuncture. However, brain activity of itself does not explain anything about the healing power of acupuncture.