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Title

Nature of regulatory effects of terahertz wave band at frequencies of nitric oxide in the circulatory system and mechanisms for their implementation

Source

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Abstract

Effect of irradiation of terahertz waves at the frequencies of molecular emission and absorption spectrum of nitric oxide 150.176 - 150.664 GHz in violation of various levels of hemodynamics in albino rats under stress is studied. In male rats with immobilisation stress the system and intraorganic hemodynamics and microcirculation are found to be changed under the effect of irradiation. The experiments show that exposure to the title terahertz waves has a pronounced normalising effect on the microcirculation, regional, and systemic hemodynamics in albino rats in a state of acute and prolonged stress. These data indicate that the effect of terahertz waves at the specified frequency is mediated through the activation of endogenous nitric oxide. Implementation of the normalising effect of different levels of hemodynamic changes associated with autocrine, paracrine, and neuroendocrine regulation mechanisms under the influence of the terahertz waves of the specified frequency range. As an example of autocrine regulation, the normalising effect of *in vitro* terahertz waves on blood cells is presented. Through this mechanism, the restoration of the intravascular component of the microcirculation is possible. It was established that terahertz waves have a significant impact on the paracrine regulatory mechanisms of endothelium. Thus, under the influence of terahertz waves, an increase in basal and induced production of nitric oxide formation and reduction of endothelin I occurs, which causes relaxation of vascular smooth muscle. Experimental data show that terahertz waves have a significant effect on the nervous and endocrine regulation; under the influence of terahertz waves changed activity of the major stress-realising systems is found: the sympathetic-adrenal, hypothalamic-pituitary-adrenal and thyroid. It affects all levels of hemodynamics. Thus, irradiation of electromagnetic waves at terahertz frequencies of molecular spectrum of emission

and absorption of nitric oxide is an effective method for correcting hemodynamic disorders, which exerts its effect at all levels of physiological regulation. (28 References).