

8th Global Ophthalmology Meeting

July 18-19, 2016 Chicago, USA

Experimental study of transmitting information through the optic nerve

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The human optic nerve consists of over one million fibers which transfer electric impulses from the retina to the brain. For over thirty years the author has been investigating the efficacy of the low intensity coherent laser radiation in the treatment of optic nerve atrophy. To check the propagation of a laser beam along the optic nerve fibers, a cadaver study was conducted 40 minutes after the death was confirmed. The eye balls, the optic nerves and the chiasms were dissected. Projecting a 1mW power helium-neon laser beam in the pupil caused visible luminescence with holographic effect of the eyeballs and optic nerves up to the chiasms. After transecting one of the optic nerves at the beginning of the chiasm, the laser beam was directed at the butt end of the optic nerve which led to visible luminescence of the optic nerve with holographic effect. Then the laser beam was projected in the pupil; no luminescence of the chiasm or the optic tract behind the chiasm was observed. 3.5 hours later irreversible changes in the optic nerve fibers gradually occurred that started in the distal portion of the optic nerve. The study showed that visual information is transmitted to the brain through the afferent fibers of the optic nerve, and through the efferent fibers from the brain to the retina. The therapeutic effect of low intensity coherent laser radiation, when treating optic nerve atrophy is explained by the holographic effects. The optic nerve fibers may be presented as Hopfield dynamic neural networks, their recovery occurring in accordance with the Discrete Hopfield Model as associative memory. The exposure of the optic nerve fibers to the helium-neon laser radiation causes an effect similar to viewing a hologram, which can be explained by the fact that the matrix of potential interactions receives a contrasting signal from the laser radiation. In case the matrix normal structure is distorted due to a superposition of electrical signals, correction of the signals of the damaged fibers occurs in the 'normal' part of the matrix, which results in the restructuring potential fields, changing molecular cell systems, and thus changing pathological processes development. The findings of the experimental study served as a basis for developing and further use in the clinical practice of 1mW power helium-neon laser for treating optic nerve atrophy.

Biography

Victor V Sevastyanov is the Head of the Center for Speech Pathology and Neuro-Rehabilitation of Neuro-sensory and Motor disorders and is a Professor of the Department of Radio-Technical and Biomedical Systems at Volga State University of Technology, Russia. He holds an MD degree from I.M. Sechenov First Moscow State Medical University and MSc degree in Radio Engineering from Ryazan State Radio Engineering University. He conducts research into the issues of the optic nerve regeneration and investigates the processes of neurorestoration of the optic and auditory nerves. His research interests also include electro-stimulation of neuro-muscular tissues with multi-channel portable electrical stimulators, prevention of oxygen deficiency and hypokinesia in astronauts during long-term space flights. He has 10 international patents to his credit.

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