Nanochemistry and biotechnology

Experimental model of the training instrument for real time visualization of optic disk of the retina

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The indirect illumination of eye fundus through the sclera and skin covers the sclera (sclera consists from the nano-tubes) in infrared spectral range will allow to expand opportunities of visualization of optical disk for practical illustration of structure of retina. The developed model of the instrument can be used for practical using of students in the course of Physics (Optical systems). The aim of investigations is to develop technology for visualization in natural (usually used) conditions of illumination. The method of indirect illumination of eye fundus through the sclera and skin covers the sclera (not through a pupil). The given method is realized with use of a set of original devices: ring and cylindrical light sources (LED or halogen lamp) of a visible and infra-red range up to 1200 nm. The fundus system for eye observation FS 11 is the hand-held non-invasive video fundus camera for eye observation which can be used for for eye observation on the base of transscleral illumination technology. The absorption coefficient in the range of 400-1200 nm varieties from 10 % up to 70 % according to the various experimental and theoretical data). Calculations of the transmission spectra of the sclera in the visible and near-infrared (0.6-1.1 μm) without interference effects caused by the short-range order scattering particles within the model of Hart-Farrell taken into account (the sclera is modeled as a monodisperse system of ordered and oriented along the surface long non-absorbing dielectric nano-cylinders). The experimental model of the system is based on the fundus systems for eye observation FS 11 and IRIS. The experimental system consists of the video camera (IRIS), monitor and led transilluminator (fundus system FS11). Radiation of LED transilluminator (visible and NIR range) is directed at the edge of the lower or upper eyelid with the temporal side and diffusely illuminates the fundus through the tissue and the medium adjacent to the sclera. Even and diffuse illumination of the eye tissue occurs due to

the effects of multiple scattering and reflection of internal biological tissues (retrobulbar tissue, sclera, etc.) from the posterior pole of the eye, and in part due to the electromagnetic radiation passing through the sclera and vitreous body and falling on fundus at different angles (front side light). From the scattered and reflected radiation on the fundus structures the optical system builds an actual image in the matrix of a receiver and displays the resulting image on the monitor in real time.

The developed instrument can be used in a future in the course of Physics (Optical systems) for practical using by students.