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ABSTRACT BOOK

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THE VALUE OF FRACTAL ANALYSIS OF RETINAL VESSELS IN MEDICINE

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Introduction. Fractal retinal analysis is a mathematical method that allows you to assess the degree of vascular network branching. It was obtained that the branched vascular network of the normal retina is statistically self-similar and exhibits fractal properties and fractal analysis can be used for automated diagnosis of vascular diseases of the retina (Masters B. R., 2004).

Aim. To explore possible options and methods of studying of central retinal artery (CRA) using fractal analysis. Knowing the range of variability of the fractal dimension of the CRA, it is possible to make a new objective classification that will reproduce the variants of the CRA branching.

Materials and methods. The technique of photographing the fundus without dilating the pupil using a digital camera is the most relevant. A technician can perform this non-invasive method in a short period. This allows you to take digital photos that are been sent to a database for testing.

For data processing (retinal images), one of the methods using fractal analysis is a mathematical method that allows to estimate the complexity of the geometry of vascular networks. According to many studies, it is the most consistent and gives results that are more accurate.

Fractal measurement is one of the parameters used to characterize the complexity of blood networks. Since the retina of the human eye has a complex vascular network having a fractal structure, it provides a more accurate method of modeling the vascular network.

Results. With the disease development in retina, fractal anatomical structures, as well as other fractal structures in the human body, change the degree of their complexity. (Cherkasova M.S., 2019). The eye fundus is the only area in the body where the vascular system is fully accessible to direct non-invasive observation and is regarded as a window into the cerebral microcirculation, therefore, the development of methods for quantitative assessment of pathological changes in the retinal vessels is an urgent task. (Soifer V.A., 2001).

Conclusions. Fractal analysis of the vascular network formed on human retinal images can be used as a non-invasive method to detect vascular diseases, including diabetic retinopathy, and to facilitate the timely detection and treatment of diseases in the early stages (Cherkasova M.S., 2019).

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