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ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В ОФТАЛЬМОЛОГИИ

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В настоящее время искусственный интеллект значительно развивается и активно применяется в офтальмологии. Технологии машинного обучения и глубокого обучения позволяют создавать программные решения, способные обрабатывать и анализировать изображения глазных структур с высокой точностью и скоростью.

Ключевые слова: офтальмология, искусственный интеллект, макулярная дегенерация, диабетическая ретинопатия, глаукома, ретинопатия недоношенных.

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ARTIFICIAL INTELLIGENCE IN OPHTHALMOLOGY

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Artificial intelligence is currently developing significantly and is actively used in ophthalmology. Machine learning and deep learning technologies allow us to create software solutions capable of processing and analyzing images of eye structures with high accuracy and speed.

Keywords: ophthalmology, artificial intelligence, macular degeneration, diabetic retinopathy, glaucoma, retinopathy of prematurity.

The aim

Reveal the potential of artificial intelligence in the treatment of eye diseases.

Material and methods

Original and review articles were found and analyzed in foreign scientific databases.

Results and discussions

Currently, artificial intelligence is successfully used to treat a wide range of eye diseases, including:

1. Macular degeneration.

Age-related macular degeneration is a chronic and irreversible eye disease that can occur in humans with age. This disease is one of the main causes of loss of central vision and is characterized by hemorrhages, retinal changes, drusen, etc.

The main sign of age-related macular degeneration is the appearance of drusen. With the help of deep and machine learning, artificial intelligence is able to diagnose age-related macular degeneration at an early stage, determining the presence of drusen in fluids automatically. Artificial intelligence-based programs have demonstrated increased specificity and sensitivity, which has improved diagnosis and treatment through early diagnosis. Certain algorithms predict visual acuity in age-related macular degeneration and determine the need for treatment with anti-VEGF treatment. Other ways to establish the condition are using OCT images or color images of the fundus [2].

2. Diabetic retinopathy.

Diabetic retinopathy is an ischemic eye disease, which is the most common complication and the main cause of vision loss in patients with type 1 diabetes mellitus [2].

Screening for DR, timely referral to a doctor and treatment is a strategy for preventing blindness. Screening methods include direct ophthalmoscopy, retinal video recording and teleretinal screening, biomicroscopy with an extended slit lamp and a hand-held lens, as well as mydriatic or non-mydriatic retinal photography [1].

3. Glaucoma.

Glaucoma is a disease in which intraocular pressure increases due to impaired fluid outflow, resulting in damage to the optic nerve [2]. Due to the importance of early diagnosis and treatment, glaucoma, being one of the leading causes of vision loss worldwide, has also attracted the attention of researchers in the field of artificial intelligence [3].

At present, Optical coherence tomography is used to assess glaucoma, which measures the thickness of the ganglion cell layer (GCL) and the retinal nerve fiber layer (RNFL) using the artificial intelligence automatic segmentation method. According to the latest research, deep learning methods can successfully detect glaucoma and all its changes with greater speed and accuracy [2].

4. Retinopathy of Prematurity.

ROP is the main cause of childhood vision loss worldwide. Various studies have reported that the prevalence of this disease is 6-18% [3].

Screening for retinopathy of prematurity is based on the use of artificial intelligence, and is able to detect early signs of severe retinopathy of prematurity and also prevent blindness with proper treatment. A company called "Brown" has developed the i-ROP DL system to diagnose this disease at an early stage. This may lead to an assessment of the severity of ROP to demonstrate progression or regression of the disease and response to treatment [2].

Conclusion

Modern ophthalmology is rapidly developing, and the use of artificial intelligence opens up new prospects in the diagnosis, treatment and prognosis of eye diseases.

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