EYE OPTICS, PROPERTIES OF LIGHT, EYE REFRACTION AND ITS EXAMINATION METHODS

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Abstract: *This article analyzes the basic concepts of the optical system of the eye and the physical properties of light for medical students. The main properties of light, such as reflection, refraction and scattering, as well as the optical structure of the eye, as well as physiological and optical phenomena in the process of vision, are considered in detail. This study serves to enrich medical students' knowledge of ophthalmology and optics.*

Keywords: *Optics, properties of light, optical system of the eye, refraction, vision process, reflection, ophthalmology.*

Introduction. Optics and properties of light Understanding human vision is one of the main topics for. Physics of Light and Optical Structure of the Eye Vision

plays an important role in determining the process. In medicine, especially ophthalmology, this knowledge plays an important role in the treatment and diagnosis of eye diseases.This article analyzes the basic properties of light and the optical system of the eye, the goal is to clarify these concepts for medical students. Light and its role in the process of vision through the eyes is one of the basic concepts of ophthalmology. Eye of light rays passing through structures, their fracture and alteration ensures. Deep knowledge of eye optics is not only about the health of the eye, as well as in the diagnosis and treatment of ophthalmological

diseases necessary. This article covers the physical properties of light and the optical structure of the eye efforts are made to cover the problems in a wide range.

Literature analysis and methodology. Numerous scientific studies on the properties of light and optical phenomena conducted. How Snell's Law violates light during diffraction, which explains how the eye refracts light through lenses. In understanding the optical system of the eye, special attention is paid to the works of Hermann von Helmholtz attention is paid. Helmholtz on the optics and physiology of vision conducted research. There are many theories and scientific studies about the properties of light among which Snellius's law and reflection-refraction processes occupy the main place stays. According to the Snellius law, the penetration and refraction of light into the eye the direction and speed of the light beam change. Helmholtz eye optics laid the foundation for in-depth study of the optical structure of the eye. His heories of lens, refraction, and vision are related to physiological processes. made a significant contribution to conducting the analysis. Hecht and Born's studies of the optical properties of light using mathematical and physical models Explains in depth. Optical structures and light play a significant role in the treatment of eye diseases is of great importance. For example, myopia, hyperopia, and astigmatism associated with improper refraction of lenses. Contact lenses and glasses are used, which is important from an ophthalmological point of view is one of the issues. Methodologically, the article is based on theoretical and analytical approaches. Properties of light, physical laws, including reflection and refraction are studied through the processes. To see the scientific basis of optical processes mathematical models, calculation of the motion of light in lenses and prisms Methods were used. In addition, scientific sources in the field of ophthalmology and research is the basis for conducting analyses related to eye optics and its diseases served as. The article is more in-depth on ophthalmology for medical students intended as a guide for learning. The methodological approach used in this article contributes to theoretical research

based on. In the analysis of the properties of light in the field of physics patterns, including Snellius's law, concepts of reflection and refraction will be used. Optical models for explaining the optical system of the eye used. Article within ophthalmology courses for medical students intended for use.

Results. Analysis shows that such properties of light as reflection and refraction is closely related to the optical system of the eye. Structure of the eye and its optical is important for the correct execution of the visual process. Lighting how it passes through the lenses and fracture is carried out through the structure of the eye, which and ensures vision. Analysis and research show that the reflection and refraction of light play an important role in the optical system of the eye. Light rays in various parts of the eye, in particular, the eyelid, cornea, lens, and suborbital is broken and processed through nerves. In the genesis of eye diseases improper functioning of lenses or improper refraction of light is the main cause. will be. Interference and diffraction of light also affect vision shows that these processes are especially noticeable in cases of uncertainty and opacity. Direct refraction of light through the optical system of the eye, good vision ensures the ability. The use of straight lenses, as research has shown contributes to the successful treatment of diseases such as myopia and astigmatism. Also, laser technologies are used in the treatment of eye diseases. is recognized as one of the effective methods. The structure of the eye is easy to remember and understand for medical students The following approaches can be effective for teaching:

1. Simple analogies and comparisons

Apply easy-to-understand analogies about eye structure, each makes memorization easier for students by comparing the part with everyday things:

- Comparing the eye to the camera: Comparing the eye to a regular camera can be explained through. The pupil resembles the diaphragm of a camera lens. Controls the amount of light.

- Lens (lens) - the ability to see light by directing it correctly like a camera lens

controls accuracy.

- Retina - receiving and seeing light signals, such as a camera matrix converts to a signal.

2. Mnemonic devices

Creating short, funny, or memorable sentences for students' eyes helps you remember the parts. For example:

- Pupil, lens, vitreous body, retina - I'm coming to see you!" These phrases remind you of the main parts of the eye in some rhythmic way. can be used to save.

3. Diagrams and color images of parts of the eye Using color charts and simple images of parts of the eye, each Indicating the location and function of the part will be effective. For example, of the eye by dividing sections by color, students can visually remember parts of the eye more easily. will stay:

- Pupil - black,
- Lens - blue,
- Retina - red.

4. . Brief reminder of the functions of the parts of the eye Briefly and clearly teach students the purpose of each part:

- Pupil - The entrance door of light,
- Lens - A focusing tool,
- Glass body - Eye filling
- Retina - Image receiver.

5. Role-playing and interactive methods Mini-role about each part of the eye to actively involve students can be used. Each student represents a part of the eye, its will explain the purpose. For example:

- One is "I am the pupil, I bring light," the other is "I am the retina, I receive the light and turn it into a signal."

6. Card games or tests for eye parts Interactive game methods are also memorable when studying eye parts. For example, students play a question-and-answer game about each part of the eye and remember the parts can save.

These methods help students memorize the structure of the eye and its parts makes it easier. If interactive and visual approaches are applied in this way, students They reinforce their knowledge more. Selection of correct lenses for myopia, hyperopia, and astigmatism to make it easier for medical students to remember, the following simple, understandable method and approaches can be applied:

1. Simple visual analogies (Comprehensible comparison) Students remember to explain each disease by comparing it to ordinary things simplifies storage. For example:

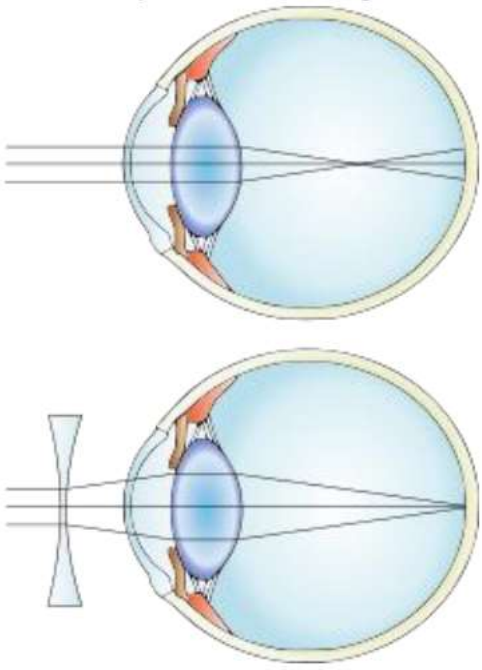
- Myopia (close-sighted) can be visualized as follows: Imagine a flashlight. If you direct the beam far away, light will be scattered, dim, and if you illuminate something nearby, it will be clearly visible. The ability of the eye to refract in myopia is the same - nearby objects are clear, distant and he sees things dimly.
- Comparison of hyperopia with a camera lens is possible. When shooting closer, the focus becomes very blurry, but when shooting farther focusing gives a very good result.
- Astigmatism is like looking through uneven or crooked glass. The image lines bend and look incorrect.

2. A simple formula for remembering the choice of lenses To remember how to choose the right lens, remember these simple principles. can be saved:

- Concave with negative (-) diopters for myopia (nearsightedness) a lens (concave lens) is selected. Concave lenses scatter rays and make the distance clear. helps to see.
- Positive (+) diopters for hyperopia (farsighted) a convex lens is used. Convex lenses collect rays and close helps to see things clearly.
- For astigmatism, a cylindrical lens is used. Straightening the lines by directing the rays along.

3. Use of color images and graphics. A diagram or a simple one to make it easier to remember concepts using a drawing will be effective for students. The following visuals makes it easier to remember:

- How rays refract in myopia and hyperopia and what kind of lens is needed is clearly demonstrated using images.



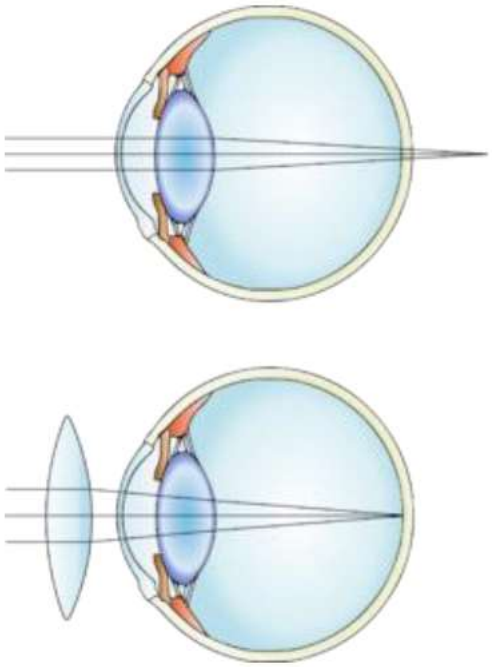


Figure 1. For myopic eye Fig. 2. Lens correction of hypermetropia. Lens correction.

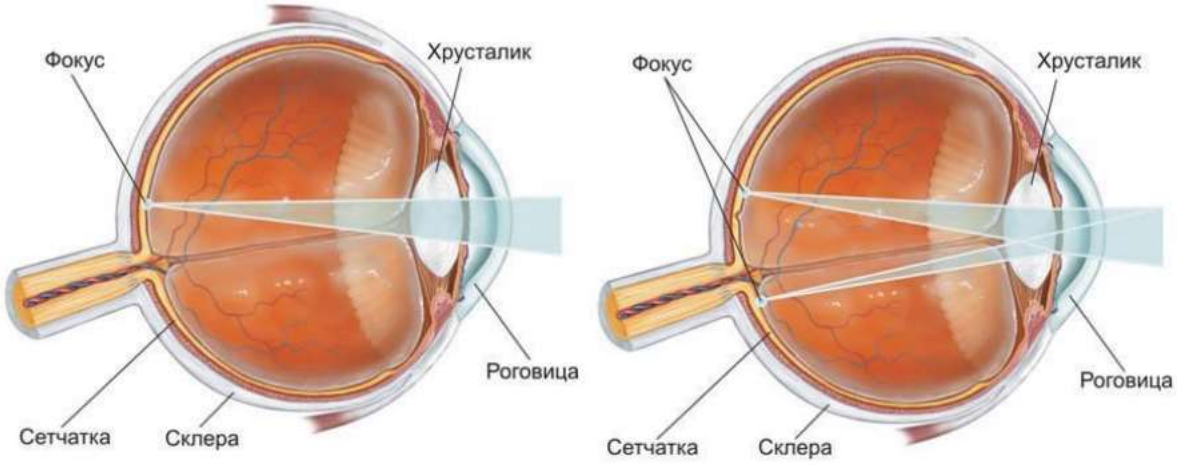


Figure 3. Astigmatism disease.

- Curves in astigmatism and cylindrical lenses for their correction can be explained graphically.

4. Short memorization rule for memorization Simple short rules help to memorize. For example, The formula can be memorized:

- M Minus - Myopia → Minus lens for myopia (concave lens).
- G Plus - Hyperopia → Plus lens for hyperopia (convex lens)

5. Practical classes. Practical exercises on the use of different lenses for each student conducting helps students retain knowledge more firmly. Through the process of working with lenses and selecting them based on eye condition students gain more experience and remember more easily. Through these methods, what kind of lens can students use for myopia, hyperopia, and astigmatism? easy and understandable explanation and memorization of the choice can be created.

Conclusion. The optical properties of light and the optical structure of the eye are great in the process of vision is of great importance. For medical students, this topic is about eye health and ophthalmology provides the necessary knowledge for understanding diseases. Presented in this article the information is useful for mastering basic concepts in the field of ophthalmology will be. The properties of optics and light are great in the field of medicine and ophthalmology is of great

importance. The properties of light, such as reflection, refraction, and interference understanding how the visual process occurs through the optical system of the eye shows. Physics of light and optics in the diagnosis and treatment of eye diseases laws play an important role. As well as modern optical technologies and laser visual correction methods with the help of is coming. This article provides medical students with a deeper understanding of optical processes and practical application.

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