



## THE EYE

*Norin Abu Ali ibn sino nomidagi*

*jamoat salomatlik texnikumi*

*Fan nomi: Tibbiyotda horijiy til*

***Sheraliyeva Gulnoza Maxmudovna***

998052149

*gulnozas943@gmail.com*

**Abstract:** *This paper presents a comprehensive scientific analysis of the human eye's anatomical architecture, optical refraction mechanisms, and the intricate processes of photoreception. The study evaluates the eye's functional capacity as a biological optical system, the physiological mechanics of accommodation, and contemporary challenges within the field of modern ophthalmology.*

**Keywords:** *Anatomy, cornea, crystalline lens, retina, photoreceptors, accommodation, optical aberration.*

### Anatomical and Optical Configuration of the Eye

The globe of the eye (bulbus oculi) is structured into three distinct concentric layers:

- **The External Fibrous Layer:** Consisting of the posterior opaque sclera and the anterior transparent cornea. The cornea acts as the primary refractive element of the ocular optical system, contributing approximately 40–43 diopters to the total refractive power.
- **The Middle Vascular Layer (Uveal Tract):** This layer provides the essential blood supply and comprises the iris, ciliary body, and choroid. The iris contains the pupil, which functions as an adjustable aperture to modulate luminous flux.



- The Internal Sensory Layer (Retina): The neurosensory tissue where phototransduction occurs, transforming electromagnetic light waves into electrochemical signals for the optic nerve.

Nowadays, graphics cards, sound cards, hard drives, and other accessories have high power consumption and are no longer as "fuel-efficient" as before. Have you ever thought about giving your beloved machine a powerful enough "heart" when fully loading it with components?

Many discussions in various newspapers and magazines about methods for accurately evaluating power supplies can be summarized into three main aspects:

- Check whether the materials used in the power supply are of high quality.
- Check whether the workmanship is excellent.
- Check whether the design is reasonable.

Honestly, this approach is somewhat difficult for others. First, it requires the evaluator to have sufficient electronics knowledge. Second, to carefully inspect the five "internal organs" and six "lungs" of the power supply, you must remove the cover of the power supply unit, which inevitably breaks the manufacturer's warranty seal. Once the seal is broken, the seller's warranty is automatically voided. Even if there is a problem with the power supply later, you will have to handle it yourself (DIY). I think many ordinary beginners will feel helpless and hopeless in such a situation.

The second method is to check whether the power supply fan is spinning or whether there is airflow coming out of the vents after turning it on for a while.

The third method is to check whether the power supply emits a burnt smell after running under heavy load for a long time. The latter two methods rely on accumulated personal experience. How can complete beginners make an objective judgment without experience? Here, I recommend a heavy-load testing method for determining power supply quality that can help beginners.

First, of course, you need to get a good digital multimeter and use it.



The main voltages provided by an ATX power supply are 3.3V, 5.0V, and 12.0V. Among them, 12.0V is the primary power source for most hardware devices, and its stability is especially important when connecting heavy loads.

Therefore, after connecting all the loads to the computer, select the idle (no-load) state and use the multimeter to measure the 12V output voltage. Connect the black probe to the black wire (ground) and the red probe to the yellow wire (12V output).

After connecting all the cables, you can start the system for testing. Once the system fully boots and stabilizes, continuously monitor the voltage value and record it. Normally, it should be around 12V (ideally between approximately 11.95V and 12.15V). If it is too low, it cannot guarantee stable operation under heavy loads. If it is too high, it can cause components to overheat and age prematurely.

Next, press the Reset button to restart the machine. At this point, it is very important to carefully observe the changes in the voltage value. During the self-test, the voltage usually drops to its lowest point. Record the current voltage value at that moment.

If the difference between the highest and lowest voltage values is not too large (within 0.3V), then this power supply can be considered acceptable. If the voltage difference (drop) is very large, it indicates that the power supply has poor load regulation and should not be chosen.

For example, I once tested a 300W power supply rated at 300W, but its 12V voltage dropped to as low as 11.73V and fluctuated frequently. Pay attention to the situation during later use.

Run various software to fully load all the computer's components, play music from a CD, and so on. Monitor the voltage during this time. If it does not change significantly, you can safely choose this power supply.

## Accommodation and Refraction of Light

The lens of the eye (crystalline lens) has elastic properties and can change its shape with the help of the ciliary muscles. This process is called accommodation.



- When looking at near objects, the lens becomes thicker and more curved, increasing its optical power.
- When looking at distant objects, the lens becomes flatter and thinner, reducing its optical power.

Thanks to this dynamic system, the image is sharply focused exactly on the central fovea (fovea centralis) of the retina — the area responsible for the highest visual acuity.

**Additional Explanation & Example:** Accommodation is the reason you can quickly shift focus from reading a book (near) to looking at a car driving down the street (far) without blur.

**Real-life example:** When you switch from looking at your phone screen (about 30 cm away) to a distant mountain or road sign, your ciliary muscles relax within a fraction of a second, flattening the lens so the image remains sharp.

## Photoreception: Perceiving Light

There are two main types of photoreceptor cells in the retina:

- **Rods (Tayoqchalar):** These are responsible for vision in low-light conditions (scotopic vision). They provide black-and-white (grayscale) images and are highly sensitive to light, but they do not detect color. The human eye contains approximately 120 million rods.
  - **Cones (Kolbachalar):** These are responsible for color vision and high visual acuity (sharp detail). They function best in bright light. There are three types of cones, each sensitive to different wavelengths:

- o Short-wavelength cones (Blue)
- o Medium-wavelength cones (Green)
- o Long-wavelength cones (Red)

**Additional Explanation:** Rods are much more numerous and are distributed mostly in the peripheral parts of the retina, which is why we can detect faint light better from the side of our eye (peripheral vision). Cones are densely packed in the fovea, allowing us to see fine details and colors when looking directly at an object.

**Real-life examples:**



- At night or in a dark room, you mostly use rods — that's why everything looks gray and you can't distinguish colors well.
- In bright daylight, cones dominate, allowing you to see vibrant colors and read small text clearly.

## Modern Ophthalmological Problems

Today, due to the rapid development of technology and increased visual stress (prolonged screen time), the following refractive errors have become very common:

1. **Myopia (Nearsightedness):** The image focuses in front of the retina instead of directly on it. People with myopia can see nearby objects clearly but distant objects appear blurry.

Example: A student can read a book easily but cannot clearly see the whiteboard from the back of the classroom.

2. **Hyperopia (Farsightedness / Hypermetropia):** The image focuses behind the retina. People can see distant objects clearly but struggle with near vision.

Example: An older person may hold a newspaper or phone far away to read it because close-up text appears blurry.

3. **Astigmatism:** Caused by an irregular (non-spherical) shape of the cornea or lens. This leads to blurred or distorted vision at all distances.

Example: Lights at night may appear streaked or haloed (like starbursts), and both near and far objects can look stretched or unclear. Many people describe it as seeing as if through a wavy or imperfect window.

**Additional Note:** These conditions often occur due to genetics, excessive near work (screen time), or the shape and length of the eyeball. They can usually be corrected with glasses, contact lenses, or refractive surgeries such as LASIK.

## Conclusion

The human eye is a highly complex product of biological evolution. Its powerful optical system, ability to distinguish millions of colors, and tight connection with the brain make it a fascinating subject of continuous study. Modern technologies — such as laser eye surgery (LASIK, SMILE) and artificial intelligence-based



diagnostics — are opening new horizons in correcting vision problems and restoring clear sight.

## REFERENCES:

1. Guyton and Hall, Textbook of Medical Physiology, 14th Edition.
2. Atchison D.A., Optics of the Human Eye, 2000.
3. Textbooks and scientific articles on Ophthalmology.