



Ministry of Higher Education and Scientific Research  
University of Al-Mustaqbal  
The College of Health and Medical Technologies  
**Medical and Optical physics -2-**  
**Frist Stage**



# A Lecture one Title / Theoretical

## Optical Models of the Human Eye

### Part One

By

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## General guidelines:

- **Keep your mobile phone on silent mode during the lecture.**
- **Maintain quiet and avoid noise inside the hall.**

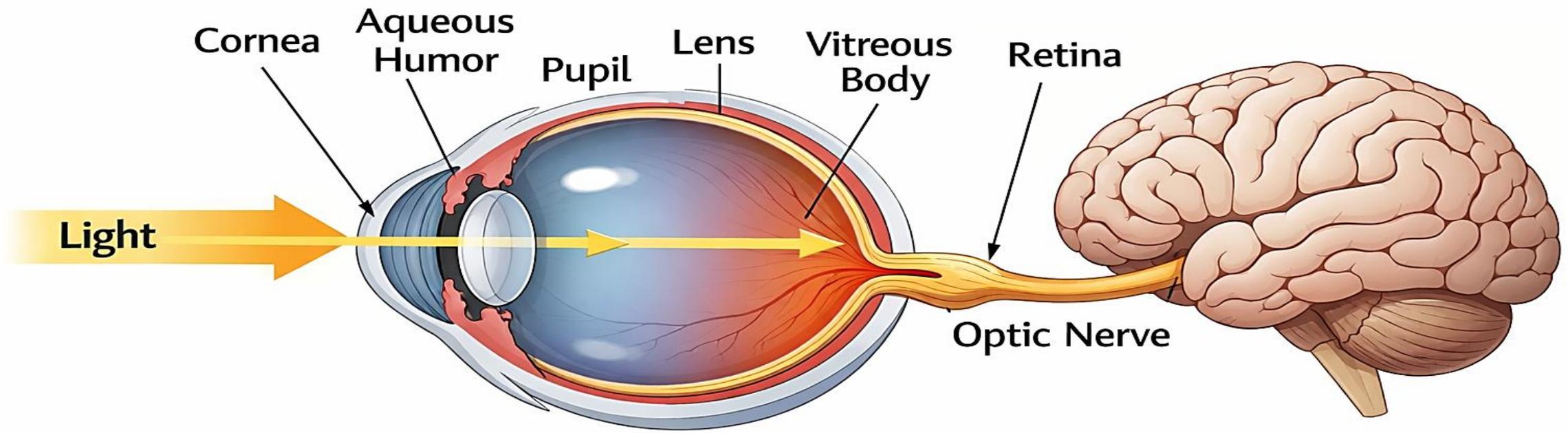


# The Human Eye as an Optical System

The human eye is a sophisticated optical instrument that transforms light into neural signals. Its optical components work in concert to focus images onto the retina, where photoreceptors convert light energy into electrical impulses.

Schematic eye models simplify the complex biological structure into manageable optical systems, allowing us to predict how light travels through ocular media, calculate image formation, and design corrective lenses. These models balance anatomical accuracy with practical utility, serving as essential tools for education, diagnosis, and optical device development.

# Key Optical Components of the Eye



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## 1. Cornea

The cornea is the transparent front layer of the eye. It is the first structure that light passes through.

Its functions include:

- It acts as the primary refractive surface of the eye.
- The cornea provides about two-thirds of the eye's focusing power.
- It also serves as a protective barrier against dust, microorganisms, and injury.

## 2. Aqueous Humor

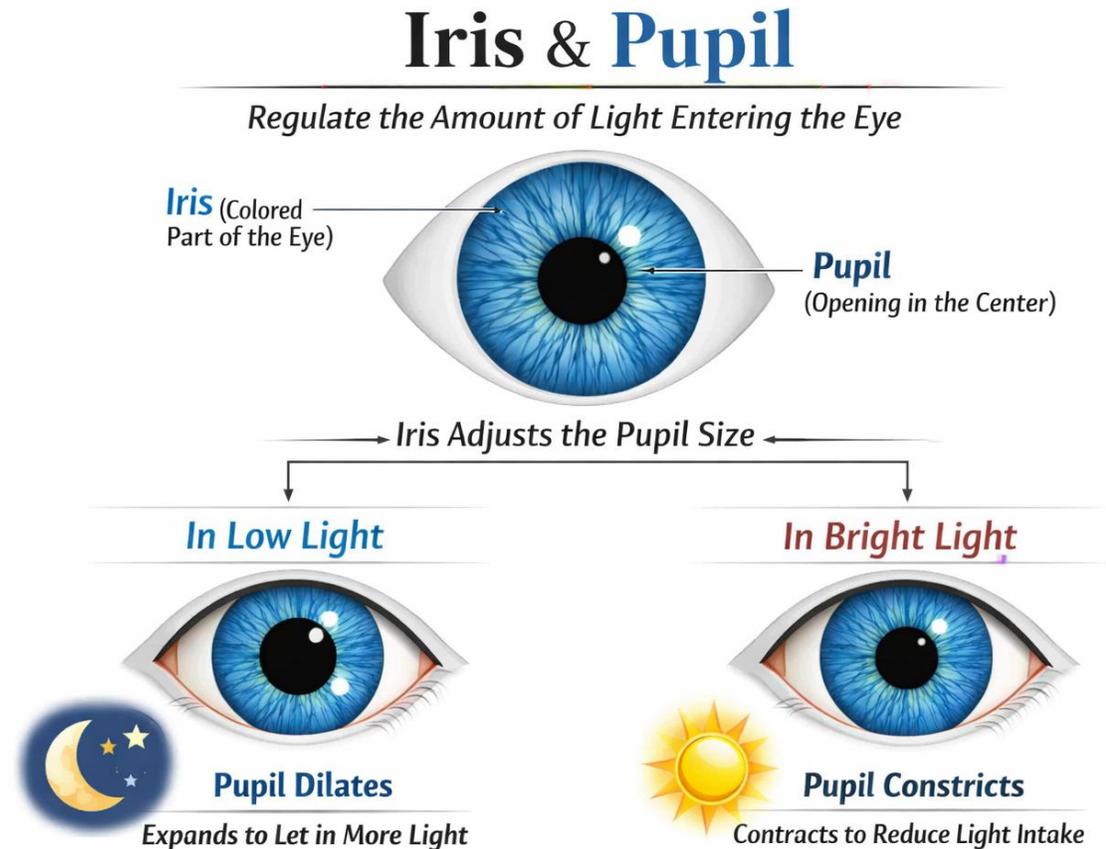
The aqueous humor is a clear fluid that fills the anterior chamber of the eye.

Its functions include:

- Maintaining intraocular pressure.
- Providing nutrients and oxygen to the cornea and lens.
- Removing metabolic waste products.

### 3. Iris and Pupil

- The **iris** is the **colored part** of the eye.
- The **pupil** is the **opening** in the **center** of the **iris**.
- Their **main function** is to **regulate** the **amount of light** entering the eye.
- The **iris** adjusts the **pupil size**:
- The pupil **dilates** in low light.
- The pupil **constricts** in bright light.

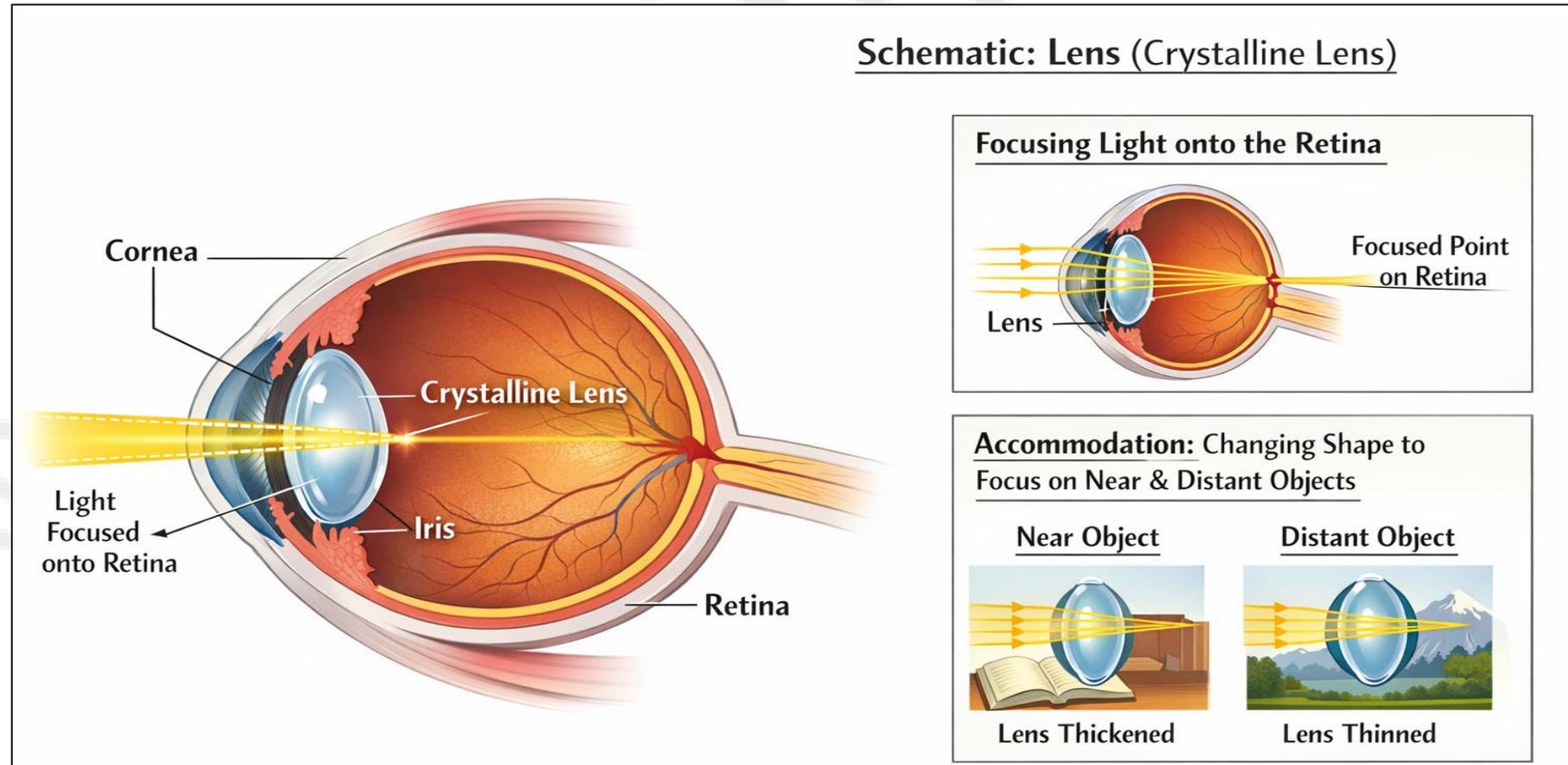


## 4. Lens (Crystalline Lens)

The lens is a transparent, flexible structure located behind the iris.

Its functions include:

- Focusing light onto the retina.
- Changing its shape in a process called accommodation to focus on near and distant objects.

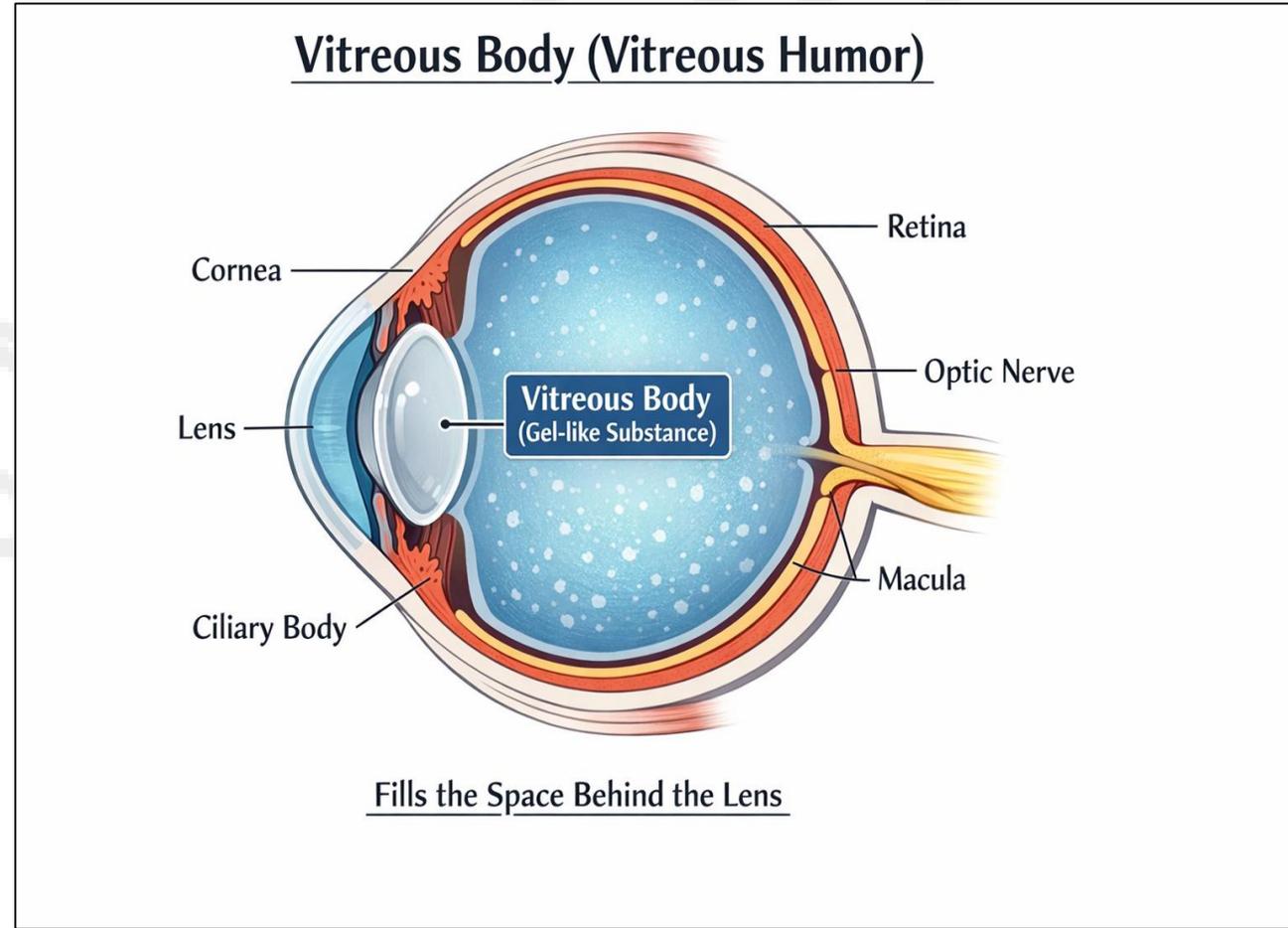


## 5. Vitreous Humor (Vitreous Body)

The vitreous body is a transparent, gel-like substance that fills the large space behind the lens.

Its functions include:

- Maintaining the spherical shape of the eye.
- Holding the retina in place.
- Allowing light to pass through to the retina.



## 6. Retina

The retina is the light-sensitive layer located at the back of the eye.

Its functions include:

- Converting light into electrical nerve signals.
- Containing specialized photoreceptor cells:
  - Rods for low-light vision.
  - Cones for color vision and fine detail.

These signals are transmitted to the brain through the optic nerve, where the image is interpreted.

