Light rays enter the eye through the cornea, the clear front “window” of the eye. The cornea’s refractive power bends the light rays in such a way that they pass freely through the pupil the opening in the center of the iris through which light enters the eye.

The iris works like a shutter in a camera. It has the ability to enlarge and shrink, depending on how much light is entering the eye.

After passing through the iris, the light rays pass thru the eye’s natural crystalline lens. This clear, flexible structure works like the lens in a camera, shortening and lengthening its width in order to focus light rays properly.

Light rays pass through a dense, transparent gel-like substance, called the vitreous that fills the globe of the eyeball and helps the eye hold its spherical shape.

In a normal eye, the light rays come to a sharp focusing point on the retina. The retina functions much like the film in a camera. It is responsible for capturing all of the light rays, processing them into light impulses through millions of tiny nerve endings, then sending these light impulses through over a million nerve fibers to the optic nerve.

Because the keratoconus cornea is irregular and cone shaped, light rays enter the eye at different angles, and do not focus on one point the retina, but on many different points causing a blurred, distorted image.

In summary, the cornea is the clear, transparent front covering which admits light and begins the refractive process. It also keeps foreign particles from entering the eye.

The pupil is an adjustable opening that controls the intensity of light permitted to strike the lens. The lens focuses light through the vitreous humor, a clear gel-like substance that fills the back of the eye and supports the retina.

The retina receives the image that the cornea focuses through the eye’s internal lens and transforms this image into electrical impulses that are carried by the optic nerve to the brain. We can tolerate very large scars on our bodies with no concern except for our vanity. This is not so in the cornea. Even a minor scar or irregularity in the shape can impair vision. No matter how well the rest of the eye is functioning, if the cornea is scarred, clouded or distorted, vision will be affected.

In keratoconus, the irregular shape of the cornea does not allow it to do its job correctly, leading to distortion of the image it passed to the retina and transmitted to the brain.

**Photoreceptors**

The retina is the back part of the eye that contains the cells that respond to light. These specialized cells are called **photoreceptors**. There are 2 types of photoreceptors in the retina: **rods** and **cones**.

The rods are most sensitive to light and dark changes, shape and movement and contain only one type of light-sensitive pigment. Rods are not good for color vision. In a dim room, however, we use mainly our rods, but we are "color blind." Rods are more numerous than cones in the periphery of the retina. Next time you want to see a dim star at night, try to look at it with your peripheral vision and use your ROD VISION to see the dim star. There are about 120 million rods in the human retina.

cThe cones are not as sensitive to light as the rods. However, cones are most sensitive to one of three different colors (green, red or blue). Signals from the cones are sent to the brain which then translates these messages into the perception of color. Cones, however, work only in bright light. That's why you cannot see color very well in dark places. So, the cones are used for color vision and are better suited for detecting fine details. There are about 6 million cones in the human retina. peopleSome people cannot tell some colors from others - these people are "color blind." Someone who is color blind does not have a particular type of cone in the retina or one type of cone may be weak. In the general population, about 8% of all males are color blind and about 0.5% of all females are color blind.

**Retinal pigment epithelium**

The RPE is composed of a single layer of hexagonal [cells](https://en.wikipedia.org/wiki/Cell_(biology)) that are densely packed with pigment granules.[[1]](https://en.wikipedia.org/wiki/Retinal_pigment_epithelium#cite_note-Cassin-1)

At the [ora serrata](https://en.wikipedia.org/wiki/Ora_serrata), the RPE continues as a membrane passing over the [ciliary body](https://en.wikipedia.org/wiki/Ciliary_body) and continuing as the back surface of the iris. This generates the fibers of the dilator. Directly beneath this epithelium is the [neuroepithelium](https://en.wikipedia.org/wiki/Neuroepithelium) (i.e., [rods](https://en.wikipedia.org/wiki/Rod_cell) and [cones](https://en.wikipedia.org/wiki/Cone_cell)) passes jointly with the RPE. Both, combined, are understood to be the ciliary epithelium of the embryo. The front end continuation of the retina is the posterior iris epithelium, which takes on pigment when it enters the iris.[[4]](https://en.wikipedia.org/wiki/Retinal_pigment_epithelium#cite_note-4)

When viewed from the outer surface, these cells are smooth and hexagonal in shape. When seen in section, each cell consists of an outer non-pigmented part containing a large oval [nucleus](https://en.wikipedia.org/wiki/Cell_nucleus) and an inner pigmented portion which extends as a series of straight thread-like processes between the rods, this being especially the case when the eye is exposed to light.

 **Light absorption**: RPE are responsible for absorbing scattered light. This role is very important for two main reasons, first, to improve the quality of the optical system, second, light is radiation, and it is concentrated by a lens onto the cells of the macula, resulting in a strong concentration of photo-oxidative energy. Melanosomes absorb the scattered light and thus diminish the photo-oxidative stress. The high perfusion of retina brings a high oxygen tension environment. The combination of light and oxygen brings oxidative stress, and RPEs have many mechanism to cope with it.

 **Epithelial transport**: As mentioned above, RPE compose the [blood–retinal barrier](https://en.wikipedia.org/wiki/Blood%E2%80%93retinal_barrier), the epithelia has tight junctions between the lateral surfaces and implies an isolation of the inner retina from the systemic influences. This is important for the immune privilege (not only as barrier, but with signalling process as well) of eyes, a highly selective transport of substances for a tightly controlled environment. RPE supply nutrients to photoreceptors, control ion homeostasis and eliminate water and metabolites.

 **Spatial buffering of ions**: Changes in the subretinal space are fast and require a capacitative compensation by RPE[[6]](https://en.wikipedia.org/wiki/Retinal_pigment_epithelium#cite_note-6) many cells are involved in transduction of light and if they are not compensated for, they are no longer excitable and proper transduction would not be possible. The normal transepithelial transport of ions would be too slow to compensate quickly enough for these changes, there are many underlying mechanisms based on the activity of voltage-dependent ion channels add to the basic transepithelial transport of ions.[[7]](https://en.wikipedia.org/wiki/Retinal_pigment_epithelium#cite_note-7)

 **Visual cycle**: The visual cycle fulfills an essential task of maintaining visual function and needs therefore to be adapted to different visual needs such as vision in darkness or lightness. For this, functional aspects come into play: the storage of [retinal](https://en.wikipedia.org/wiki/Retinal) and the adaption of the reaction speed. Basically vision at low light intensities requires a lower turn-over rate of the visual cycle whereas during light the turn-over rate is much higher. In the transition from darkness to light suddenly, large amount of 11-cis retinal is required. This comes not directly from the visual cycle but from several retinal pools of retinal binding proteins which are connected to each other by the transportation and reaction steps of the visual cycle.

**Sclera** is the tough, white, fibrous outside wall of your eye. It’s connected to the clear cornea in front. It protects the delicate structures inside the eye.

Signals from the photoreceptors travel along nerve fibers to the optic nerve. It sends the signals to the visual center in the back of the [brain](https://www.webmd.com/brain/picture-of-the-brain).

**And that’s how you see: Light, reflected from an object, enters the eye, gets focused, is converted into electrochemical signals, delivered to the** [**brain**](https://www.webmd.com/brain/ss/slideshow-concussions-brain-injuries)**, and is interpreted, or "seen," as an image.**