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Specialized Cells of the Retina

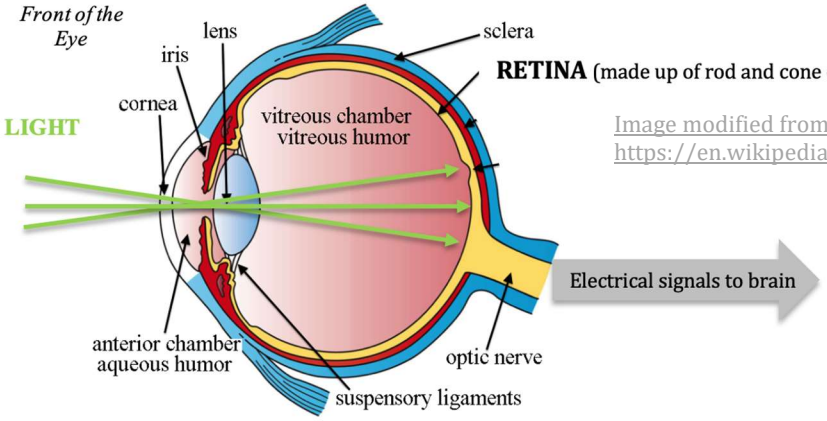
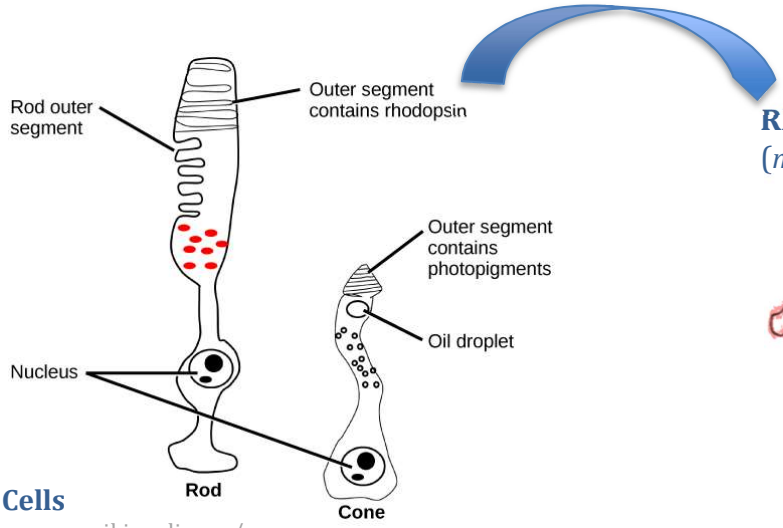


Image modified from, https://en.wikipedia.org/wiki/Retina

The **retina** is the innermost, light-sensitive layer of tissue in the eye. There are several highly specialized cell types in the retina that sense light and send messages to the brain, providing our sense of sight: **cones cells**, which detect specific colors, and **rod cells**, which are extremely sensitive to even small amounts light, allowing us to see in low-light conditions. What is it that makes these cells unique and gives them their special abilities? It is the properties of certain proteins found in rods and cones that underly the structure and function of these important cells that make it possible for us to "see" the world around us.

Since it is proteins that enable these cells to perform their jobs, let's look more closely at the proteins that make retinal cells unique. To keep things simple, we will focus just on rod cells. Rods contain 15,630 of the nearly 20,000 different proteins found in the human body. Almost all of those are also found in varying amounts in cells of other tissues in the body, but 87 of them are said to be **"enriched"** in rods, meaning they are found in ***much*** higher amounts in rod cells than other cells. One of the most important of the enriched rod cell proteins is **rhodopsin**, and it is the properties of this particular protein that make it possible for rods to detect light. Unlike other proteins, when rhodopsin is exposed to even tiny amounts of light, the molecule undergoes a specific sequence of chemical changes that eventually trigger a series of electrical signals. These signals ultimately travel by way of the optic nerve to the brain where they are interpreted and perceived by us as light. In other words, it is when a signal from our rods arrives in our brain that we "see" light.

In humans, RHO (the gene that codes for rhodopsin) is located on chromosome 3.



Retinal Cells
https://commons.wikimedia.org/wiki/File:Figure_36_05_03.jpg

Rhodopsin protein molecule:
(*millions of these in each rod cell).*

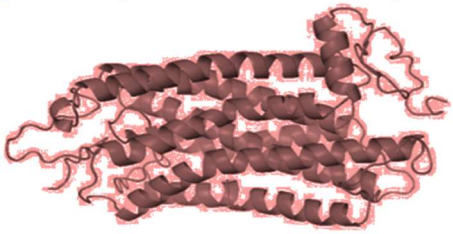


Image modified from, https://commons.wikimedia.org/wiki/File:Rhodopsin_3D.jpeg