

# How We See

by Sophia

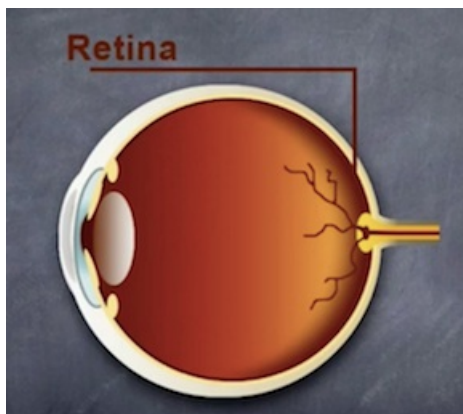


## WHAT'S COVERED

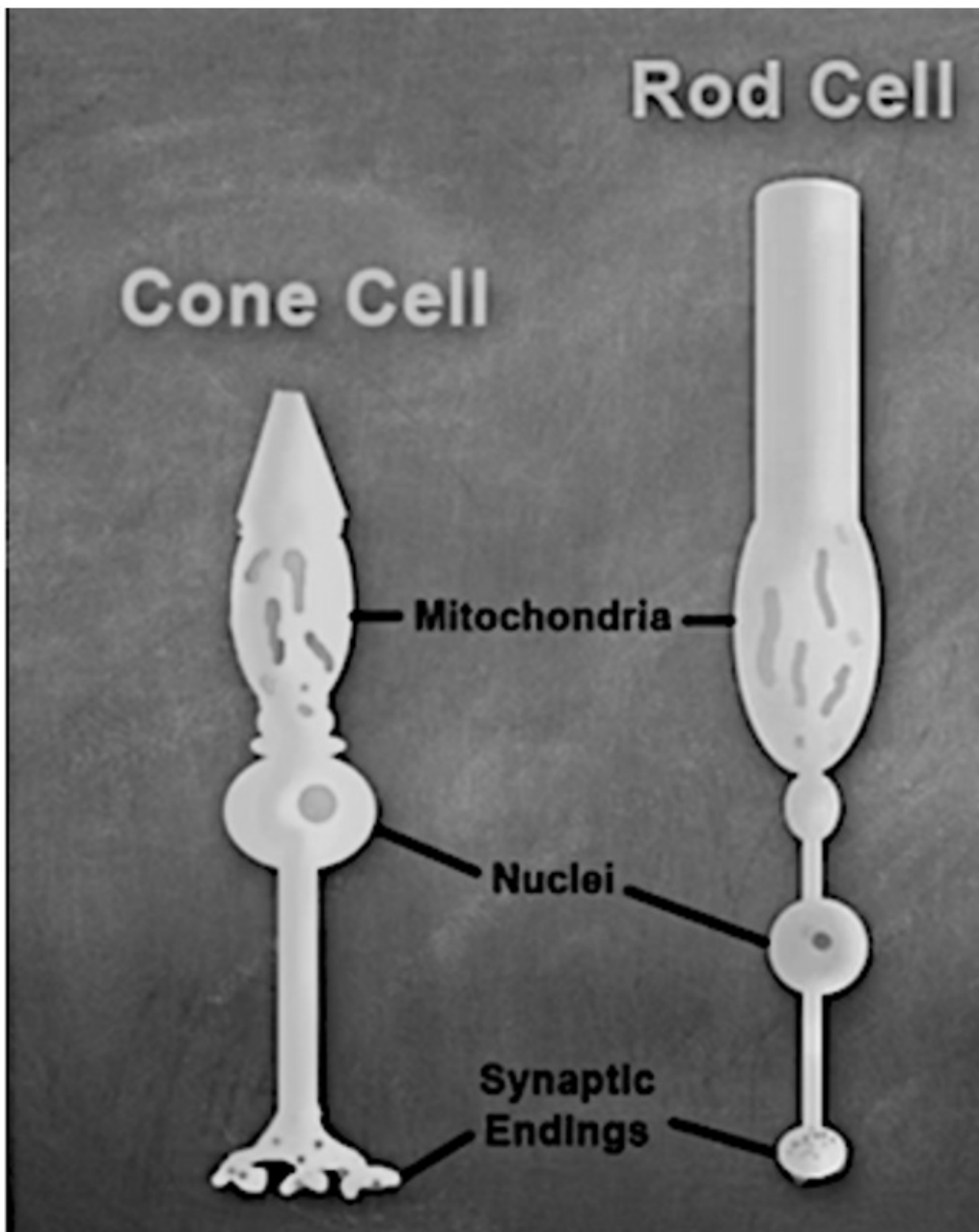
This lesson will introduce the anatomy and physiology of the human visual system, its connection to the brain, and how this system processes light. Specifically, you will learn about:

## 1. Structure of the Eye

The human eye is a complex sensory organ that is designed to see light and color, which play an important part in the visual communication process. While there is currently a lot that we do understand about this process, our knowledge is still very incomplete, and there's plenty of research ongoing.



Above is an image of the side of the eye. The **retina** is a thin, transparent tissue at the back of the eye that contains light-sensitive receptors called the **rods** and **cones**.



Rods are the long, thin, light-sensitive parts of the retina that process night vision. Cones are the light-sensitive parts of the retina that process color and day vision. In the retina, there are as many as 120 million rods and 6 or 7 million cones.



#### TERMS TO KNOW

##### **Retina**

A thin, transparent tissue at the back of the eye that contains light-sensitive receptors called rods and cones.

##### **Rods**

The long, thin light-sensitive parts of the retina that process night vision.

##### **Cones**

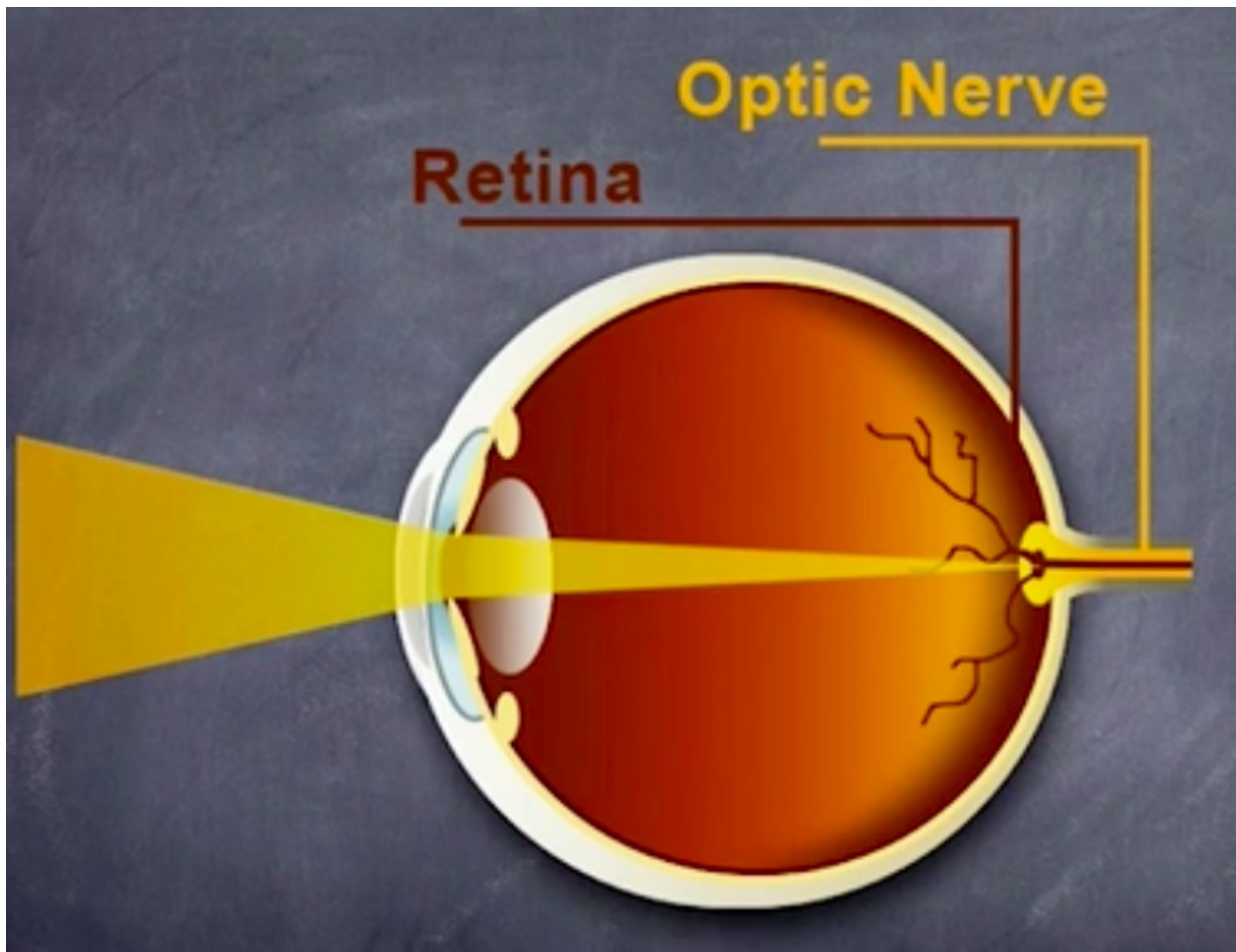
The light-sensitive parts of the retina that process color and day vision.

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## 2. How the Eye Functions

When you see an image, light passes through the eye lens and hits the retina. In the retina, those rods and cones create nerve impulses and convert light into electrical signals, which travel through the brain via the **optic nerve**.

The optic nerve is the tissue that connects the retina to the **visual cortex** in the back of the brain, which you can see in the image below.



#### TERMS TO KNOW

##### **Optic Nerve**

Tissue that connects the retina to the visual cortex in the back of the brain.

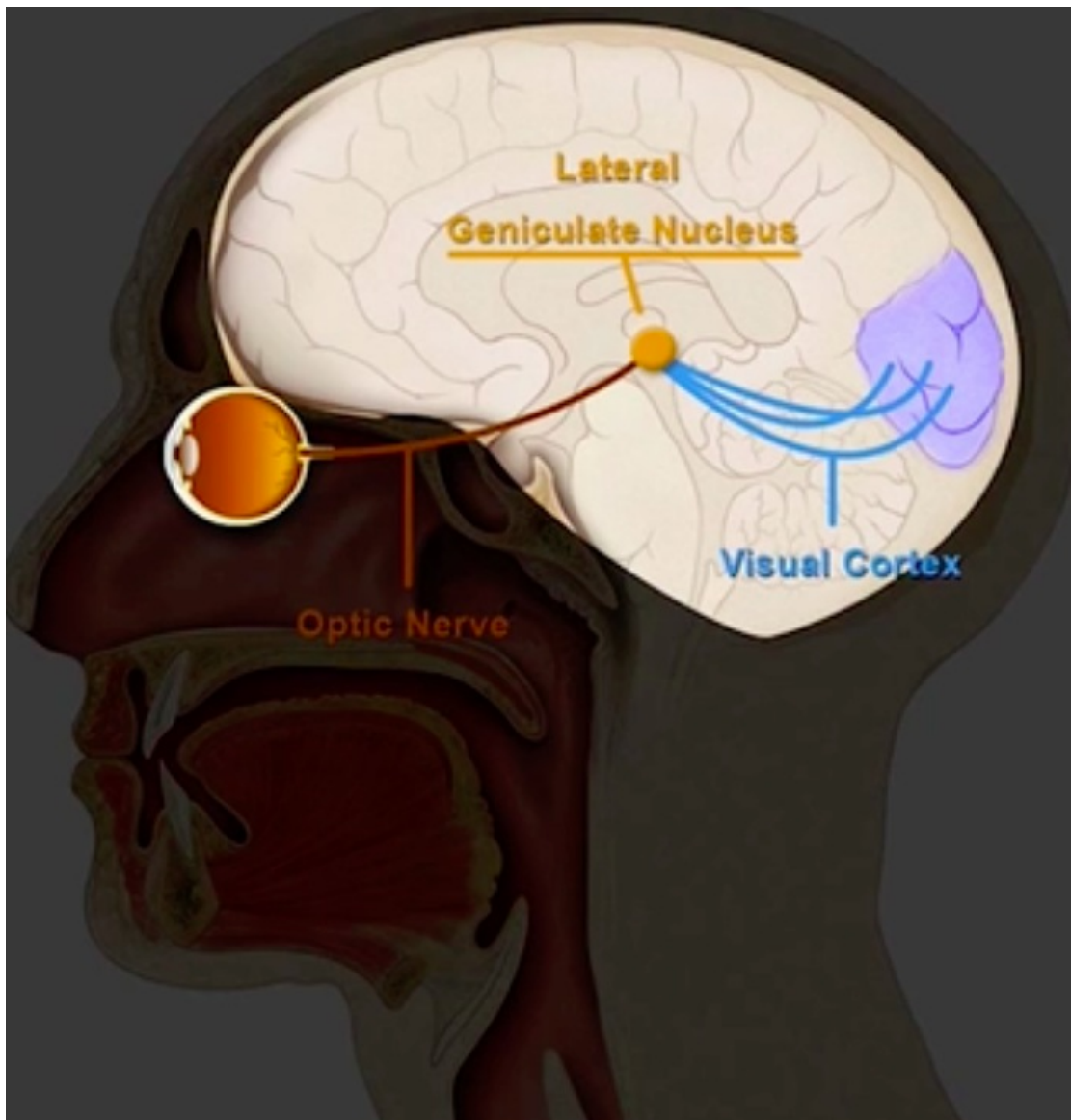
##### **Visual Cortex**

The part of the brain which processes visual information from the retina, communicated via a network of nerve cells.

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## 3. The Eye and the Brain

If you look at the side cut of a face below, you can see the image of the eye from earlier, as well as a nice view of the brain.

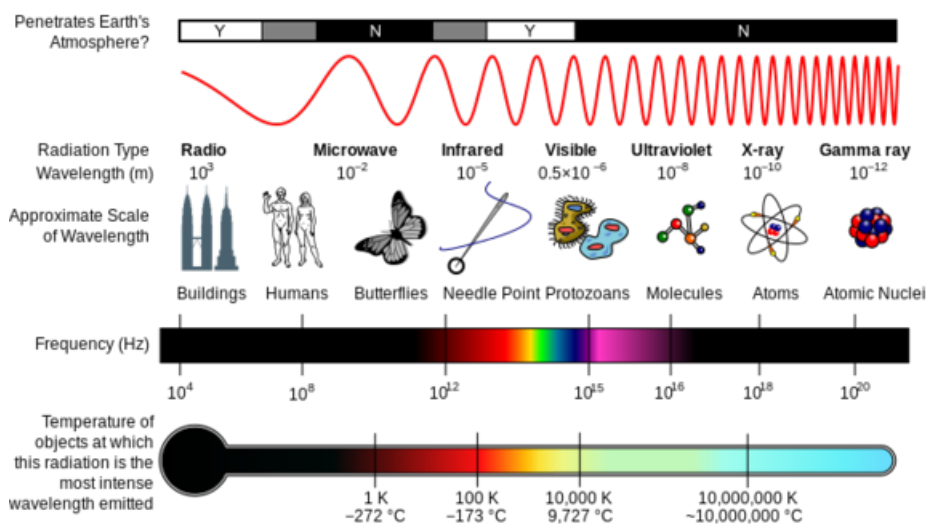


Light hits the retina with your cones and rods, and that information travels through the optic nerve, which routes it to the lateral geniculate nucleus. The lateral geniculate nucleus then routes the information to the lower back side of the brain called the visual cortex. This is the part of the brain which processes visual information from the retina, communicated via a network of nerve cells.

As you can see, there is a lot of complexity to the way we process images and light. **Electromagnetic radiation** is another name for light, and the human eye is only sensitive to the portion of it known as visible light. All electromagnetic radiation, or light, travels in waves at the same speed, which we refer to as the speed of light.

When we talk about light traveling in waves, we also talk about **frequency**, which is the number of waves passing a certain point per second, measured in hertz. Light can be characterized by its **wavelength**.

➞ **EXAMPLE** The human eye can see wavelengths somewhere between 400 and 900 nanometers, which is referred to as visible light within the electromagnetic spectrum. Light waves with a shorter wavelength and a higher frequency, such as gamma rays, x-rays, and ultraviolet light, are beyond the human eye's visibility range. Infrared light, microwaves, and radio waves are also beyond what the human eye can see, due to their longer wavelengths and lower frequencies.



## TERMS TO KNOW

### Wavelength

The measure of the distance from two consecutive wave crests or troughs, commonly measured in nanometers.

### Electromagnetic Radiation

Another name for light; the human eye is only sensitive to a portion of it, known as visible light.

### Frequency

The number of waves passing a certain point per second, measured in hertz.



## SUMMARY

In this lesson, you learned how the **structure and function of the human eye** allow for sight to take place. You also learned how **the eye and the brain** connect to process images and light.

Keep up the learning and have a great day!

Source: THIS WORK IS ADAPTED FROM SOPHIA AUTHOR MARIO E. HERNANDEZ



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### Electromagnetic Radiation

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### Frequency

The number of waves passing a certain point per second, measured in hertz.

### Optic Nerve

Tissue that connects the retina to the visual cortex in the back of the brain.

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