

COLOR BLINDNESS

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Color Blindness

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When we see different colors, we are perceiving differences in the type of light that is reaching our eyes. The way we see different colors is something like the way we hear different sounds as being “low” or “high.” This is called a pitch, and it corresponds to the frequency of the sound.

[What causes color blindness?](#)

The keys on the left side of a piano keyboard make low-frequency sounds, for example, and the frequency of the sound gets higher as one plays keys further to the right. There is a similar order to the colors we see.

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The colors of every rainbow always appear in the same order: red, orange, yellow, green, blue, and violet. The different colors in each part of the rainbow correspond to a different wavelength of light. Reddish colors are long in wavelength and bluish colors are shorter. And just as there are many notes on the piano, there are many wavelengths of light corresponding to different colors.



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How does the eye normally see colors?

Think of your eye as a camera. The front of the eye contains a lens that focuses images on the inside of the back of the eye. This area, called the retina, is covered with special nerve cells that react to light.

These retinal nerve cells include the rods and cones. The rods and cones react to light because they contain pigments that change when light strikes them.

The cones are responsible for color vision. There are several kinds of pigments present in three types of cone cells. Some cones react to short-wavelength light, others react to medium wavelengths, and others react to higher wavelengths.

There is only one kind of pigment in the rods, and it reacts the same way to any wavelength of light. The rods do not have anything to do with color vision; however, they are very sensitive to light and allow us to see at night.

When the rods and all the types of cones are working together, the eye sees all possible colors. It is something like the way a painter can mix a few colors together and make paint of every possible color.

What is color blindness?

If there is some problem with the pigments in the cones, the eye will not see colors in the usual way. This is called color deficiency or color blindness.

If just one pigment is missing, the eye might have trouble seeing certain colors. Red-green color blindness – where red and green might look the same – is the most common form of color blindness, followed by blue-yellow color blindness. Patients who have blue-yellow color blindness almost always have red-green color blindness, too.

Rarely, none of the pigments are present in the cones, so the eye does not see color at all. This most severe form of color blindness is known as achromatopsia.

What causes color blindness?

Color blindness is a genetic condition that only rarely occurs in women, but affects one of every 15 men to some degree. When someone is color blind, it is usually because his or her eyes do not make the normal types of cone cell pigments needed for color vision.

Does color blindness cause other health problems?

The kind of color blindness that is present at birth does not lead to additional vision loss or total blindness. But because the cone cells of the retina are also used to see fine details, people who are color blind tend to have vision that is less sharp. The rod cells also tend to be “overloaded” by bright light, so tinted eyeglasses often help color blind people to see better.

If you think you have a problem with color vision, you should schedule an appointment with an eye doctor right away. The doctor will be able to tell you whether you are seeing colors properly and what to do if you are not.

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