Color Blindness

What is color blindness?

Color blindness occurs when you are unable to see colors in a normal way. It is also known as color deficiency. Color blindness often happens when someone cannot distinguish between certain colors. This usually happens between greens and reds, and occasionally blues.

In the **retina,** there are two types of cells that detect light. They are called **rods** and **cones**. Rods detect only light and dark and are very sensitive to low light levels. Cone cells detect color and are concentrated near the center of your vision. There are three types of cones that see color: red, green and blue. The brain uses input from these cone cells to determine our color perception.

Color blindness can happen when one or more of the color cone cells are absent, not working, or detect a different color than normal. Severe color blindness occurs when all three cone cells are absent. Mild color blindness happens when all three cone cells are present but one cone cell does not work right. It detects a different color than normal.

There are different degrees of color blindness. Some people with mild color deficiencies can see colors normally in good light but have difficulty in dim light. Others cannot distinguish certain colors in any light. The most severe form of color blindness, in which everything is seen in shades of gray, is uncommon. Color blindness usually affects both eyes equally and remains stable throughout life.

Eye Words to Know

Retina: Layer of nerve cells lining the back wall inside the eye. This layer senses light and sends signals to the brain so you can see.

Rods: One of the two types of "photoreceptor" (light sensing) cells in the retina. These cells are found in the side of the retina. They help us with our peripheral or side vision. They also help us see in low light or at night.

Cones: These are the other type of photoreceptor cells in the retina. They are found in the middle of the retina and give us our central vision. They also help us read and see colors.

Color blindness is usually something that you have from birth but you can also get it later in life. Change in color vision can signify a more serious condition. Anyone who experiences a significant change in color perception should see an ophthalmologist.

What are the symptoms of color blindness?

The symptoms of color blindness can range from mild to severe. Many people have such mild symptoms that they are unaware that they have a color deficiency. Parents may only notice a problem with a child when he is learning his colors.

The symptoms include:

- trouble seeing colors and the brightness of colors in the usual way
- inability to tell the difference between shades of the same or similar colors. This happens most with red and green, or blue and yellow.

Except in the most severe form, color blindness does not affect the sharpness of vision. The inability to see any color at all and to see everything only in shades of gray is called achromatopsia. This rare condition is often associated with:

- amblyopia (poor vision in an eye that did not develop normal sight during childhood)
- nystagmus (involuntary, rapid eye movement)
- light sensitivity, and
- poor vision

What are the causes of color blindness?

Most people with color blindness are born with it. (This is called a congenital condition.) Congenital color vision defects usually pass from mother to son.

These defects are due to partial or complete lack of light-sensitive photoreceptors (cones) in the retina. Cones help you to distinguish the colors red, green, and blue.

Most color vision problems that occur later in life are a result of:

- disease
- trauma
- toxic effects from drugs
- metabolic disease, or
- vascular disease

Color vision defects from disease are less understood than congenital color vision problems. Disease-specific color blindness often affects both eyes differently. Color vision defect caused by disease usually gets worse over time. Acquired color vision loss can be the result of damage to the retina or optic nerve.

Who is at risk for color blindness?

Men are at much higher risk for being born with color blindness than women, who seldom have the problem. An estimated one in ten males has some form of color deficiency. Color blindness is more common among men of Northern European descent.

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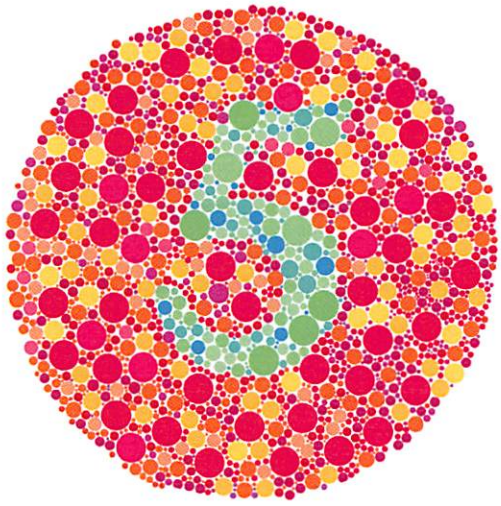
Having certain conditions may increase your risk for acquired color deficiency, including:

- glaucoma
- diabetes
- macular degeneration
- Alzheimer's disease
- Parkinson's disease
- chronic alcoholism
- leukemia, and
- sickle cell anemia

Certain drugs may also increase your risk for acquiring color blindness. The drug hydroxychloroquine (Plaquenil) can cause color blindness. It is used to treat rheumatoid arthritis, among other conditions.



A person with color deficiency may not be able to see the number 5 among the dots in this picture.

How is color blindness diagnosed and treated?

Your ophthalmologist will be able to conduct a simple test to determine if you have color blindness.

A person with color deficiency may not be able to see the number 5 among the dots in this picture.

The test consists of showing you a pattern made up of multi-colored dots. If you do not have a color deficiency, you will be able to see numbers and shapes among the dots. If you are color blind, you will have a hard time finding the number or shape in the pattern. You may not see anything in the pattern at all.

There is no treatment for congenital color blindness. It usually does not cause any significant disability. However, there are special contact lenses and glasses that may help.

Your ophthalmologist can treat acquired forms of color blindness. He or she will address the underlying condition or drug that caused the problem.

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Summary

Color blindness occurs when you are unable to see colors in a normal way. Color blindness often happens when someone cannot distinguish between certain colors. This usually happens between greens and reds, and occasionally blues. Color blindness can happen when one or more of the color cone cells are absent, not working, or detect a different color than normal.

Color blindness is usually something that you have from birth but you can also get it later in life. Change in color vision can signify a more serious condition. Anyone who experiences a significant change in color perception should see an ophthalmologist.

Your ophthalmologist will be able to conduct a simple test to determine if you have color blindness. There is no treatment for color blindness if you were born with it, but your ophthalmologist can treat acquired forms of color blindness.

If you have any questions about your vision, speak with your ophthalmologist. He or she is committed to protecting your sight.

Get more information about color blindness from EyeSmart—provided by the American Academy of Ophthalmology—**aao.org/color-blindness-link**.

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