1. Visual Impairment: What is It?

1.1. Definitions

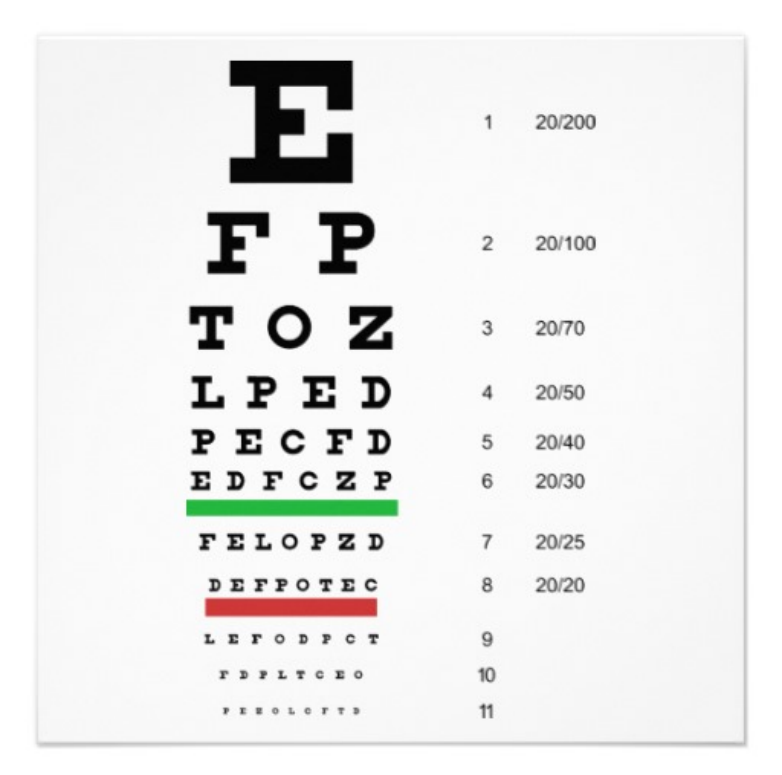
Visual impairment or low vision is a severe reduction in vision that cannot be corrected with standard glasses, contact lenses, medicine or surgery and reduces a person's ability to function at certain or all tasks.

Legal blindness refers to a best-corrected central vision of 20/200 or worse in the better eye or a visual acuity of better than 20/200 but with a visual field no greater than 20°. People with very poor vision may be able only to count fingers at a given distance from their eyes. This distance becomes the measure of their ability to see.

Total blindness is the inability to tell light from dark, or the total inability to see.

1.2. Measurement

Vision is normally measured using a Snellen chart. A Snellen chart has letters of different sizes that are read, one eye at a time, from a distance of 20 ft. People with normal vision are able to read the 20 ft line at 20 ft - 20/20 vision—or the 40 ft line at 40 ft, the 100 ft line at 100 ft, and so forth. If at 20 ft the smallest readable letter is larger, vision is designated as the distance from the chart over the size of the smallest letter that can be read.



Eye care professionals measure vision in many ways:

- The ***clarity*** (sharpness) of vision indicates how well a person's central visual status is.
- The ***diopter*** is the unit of measure for refractive errors such as nearsightedness, farsightedness, and astigmatism and indicates the strength of corrective lenses needed.
- The ***visual field*** represents the entire area of vision. Some people have good vision (e.g., see clearly) but have areas of reduced or no vision (blind spots) in parts of their visual field. Others have good vision in the center but poor vision around the edges.

The World Health Organization (WHO) defines impaired vision in five categories:

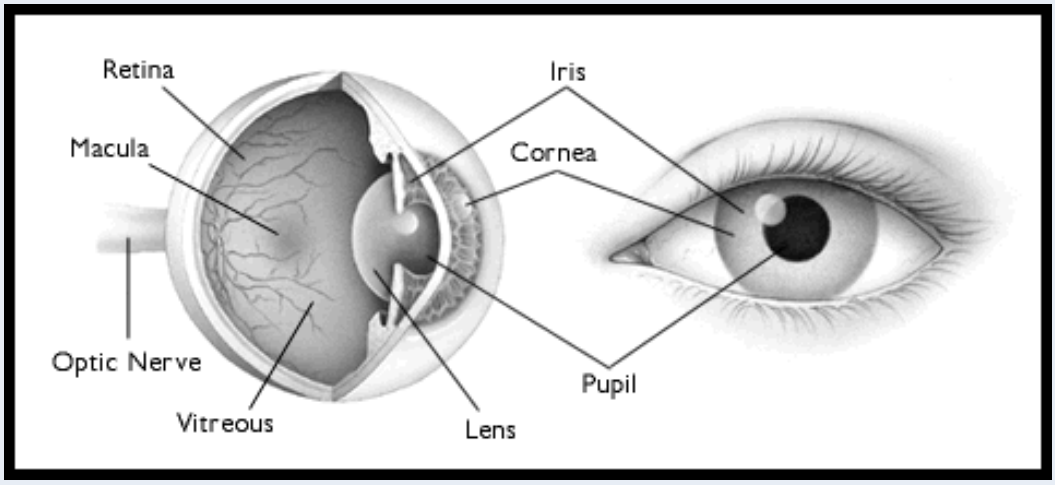
- Low vision 1 is a best corrected visual acuity of 20/70.
- Low vision 2 starts at 20/200.
- Blindness 3 is below 20/400.
- Blindness 4 is worse than 5/300.
- Blindness 5 is no light perception at all.

A visual field between 5° and 10° (compared with a normal visual field of about 120°) goes into category 3; less than 5° into category 4, even if the tiny spot of central vision is perfect.

1.3. Different Kinds of Visual Impairments

1.3.1. About the eye

Here is a basic knowledge of the main parts of the eye:



- The ***pupil*** is the central black area of the eye which contracts in bright light and dilates in the dark.
- The ***iris*** is the colored part of the eye.
- The ***cornea*** is a tough, transparent, dome-shaped tissue that covers the front of the eye (not to be confused with the white, opaque sclera). The cornea lies in front of the iris.
- The ***lens*** is a transparent, double-convex structure located behind the iris.

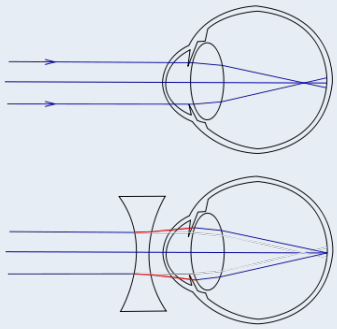
- The ***retina*** is a thin membrane that lines the rear of the eyeball. Light-sensitive retinal cells convert incoming light rays into electrical signals that are sent along the optic nerve to the brain, which then interprets the images.
- The ***macula*** is an irregularly oval, yellow-pigmented area on the central retina, containing color-sensitive rods and the central point of sharpest vision.
- The ***vitreous*** is the clear gel that fills the space between the lens and the retina of the eyeball.
- The ***optic nerve*** transmits visual information from the retina to the brain.

In people with normal vision, parallel light rays enter the eye and are bent by the cornea and the lens (a process called refraction) to focus precisely on the retina, providing a crisp, clear image.

1.3.2. Myopia

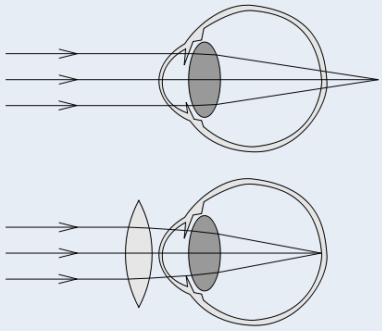
Myopia is the medical term for nearsightedness. People with myopia see objects clearly when they are close to the eye, while distant objects appear blurred or fuzzy.

This is due to an oval shaped eye where an image focuses in front of the retina. A corrective lens can help restoring the point of focus.



1.3.3. Hypermetropia

Hypermetropia is the medical term for farsightedness. It is the opposite of the myopia. People with Hypermetropia see objects clearly when they are distant to the eye, while close objects appear blurred or fuzzy. This is due to a flattened shaped eye where an image focuses behind the retina. A corrective lens can help restoring the point of focus.



1.3.4. Presbyopia

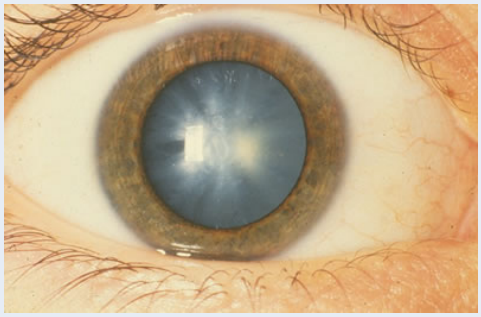
Presbyopia is the inability of the eye to focus sharply on nearby objects, resulting from loss of elasticity of the crystalline lens with advancing age. Presbyopia affects people as soon as in their early forties.

1.3.5. Astigmatism

Astigmatism is a visual defect in which the unequal curvature of one or more refractive surfaces of the eye, usually the cornea, prevents light rays from focusing clearly at one point on the retina, resulting in blurred vision.

1.3.6. Cataract

Cataract is a clouding of the lens inside the eye which leads to a decrease in vision. It is the most common cause of blindness and is conventionally treated with surgery.



Visual loss occurs because opacification of the lens obstructs light from passing and being focused on to the retina at the back of the eye.

1.3.7. Macular Degeneration

Macular degeneration is a condition in which the cells of the macula degenerate, resulting in blurred vision and ultimately blindness.

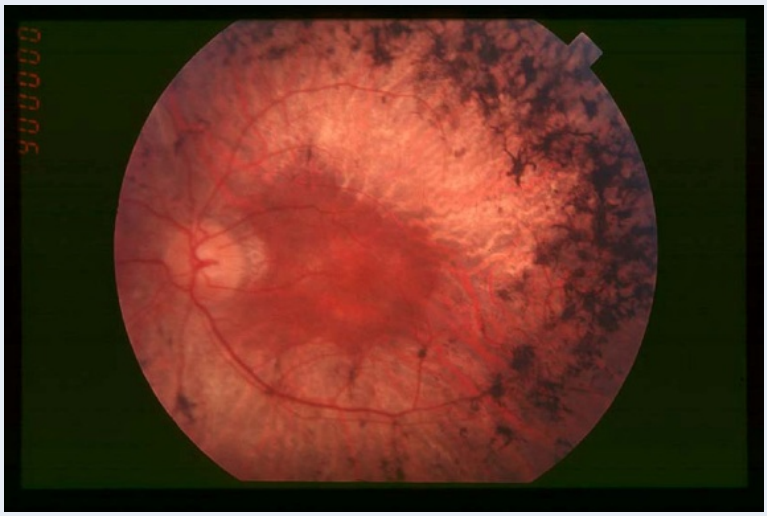
1.3.8. Retinal Degeneration

Retinal degeneration is a retrogressive pathological change in the retina, focal or generalized, caused by genetic defects, inflammation, trauma, vascular disease, or aging.

1.3.9. Retinitis Pigmentosa

Retinitis pigmentosa is an inherited, degenerative eye disease that causes severe vision impairment and often blindness. Sufferers will experience one or more of the following symptoms:

- Night blindness or nyctalopia.
- Tunnel vision.
- Peripheral vision.
- Aversion to glare.
- Slow adjustment to change of lights.
- Blurring of vision.
- Poor color separation.
- Extreme tiredness.



1.3.10. Glaucoma

A glaucoma is an ocular disease, occurring in many forms, having as its primary characteristics an unstable or a sustained increase in the intraocular pressure which the eye cannot withstand without damage to its structure or impairment of its function. The consequences of the increased pressure may be manifested in a variety of symptoms, depending upon type and severity, such as excavation of the optic disk, hardness of the eyeball, corneal anesthesia, and reduced visual acuity, seeing of colored halos around lights, disturbed dark adaptation, visual field defects, and headaches.

1.3.11. Tunnel Vision

Tunnel vision (also known as Kalnienk vision) is the loss of peripheral vision with retention of central vision, resulting in a constricted circular tunnel-like field of vision. Usually a normal field of vision has an angle of 120°. Tunnel vision can greatly reduce the field of vision too only a few degrees.

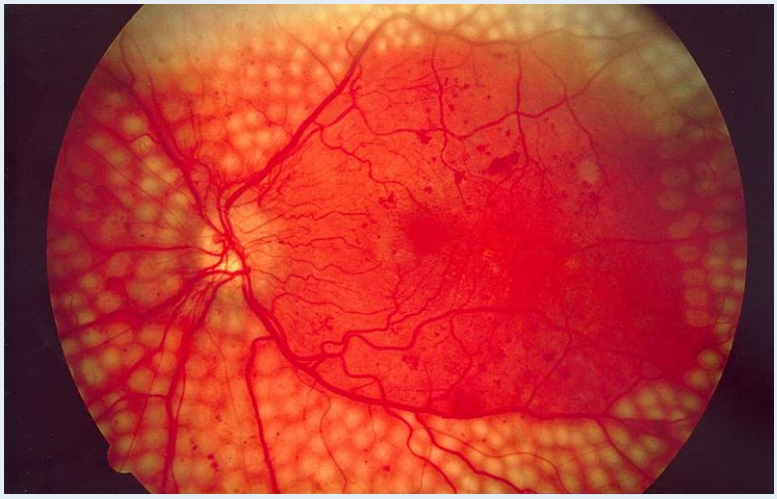
1.3.12. Peripheral Vision

Peripheral vision is the opposite of tunnel vision resulting in an obstructed central field of vision. Peripheral vision is weaker in humans, compared with other animals, especially at distinguishing color and shape. This is because receptor cells on the retina are greater at the center and lowest at the edges. In addition, there are two types of receptor cells, ***rod cells*** and ***cone cells***; rod cells are unable to distinguish color and are predominant at the periphery, while cone cells are concentrated mostly in the center of the retina.

1.3.13. Diabetic Retinopathy

Diabetic retinopathy is damage to the retina caused by complications of diabetes, which can eventually lead to blindness. It affects up to 80 percent of all patients who have had diabetes for

10 years or more.



1.3.14. Color Blindness

Color blindness is the inability or decreased ability to see color, or perceive color differences, under normal lighting conditions. There is no actual blindness but a deficiency of color vision. The most usual cause is a fault in the development of one or more sets of retinal cones that perceive color in light and transmit that information to the optic nerve.

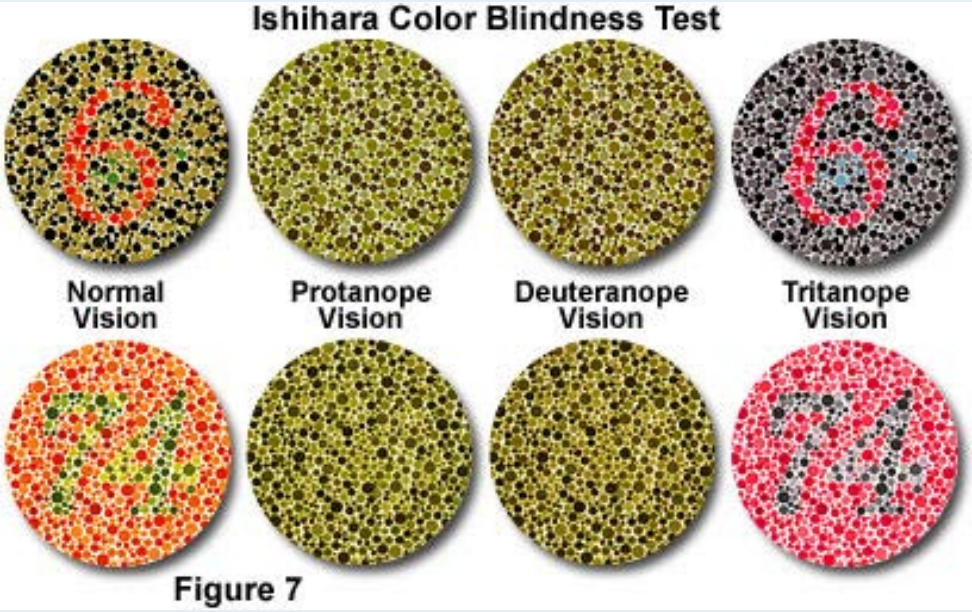


Figure 7

1.3.15. Albinism

Albinism (also called achromia, achromasia, or achromatosis) is a congenital disorder characterized by the complete or partial absence of pigment in the skin, hair and eyes. While an organism with complete absence of melanin is called an ***albino***, an organism with only a diminished amount of melanin is described as ***albinoid***. The human eye normally produces enough pigment to color the iris blue, green or brown and lend opacity to the eye. However, there are cases in which the eyes of an **albinistic** person appear red or purple, depending on the amount of pigment present, due to the red of retina being visible through the iris. Lack of pigment in the eyes also results in problems with vision such as photophobia (discomfort or pain to the eyes due to light exposure or by presence of actual physical photosensitivity of the eyes), nystagmus (voluntary or involuntary eye movement) and astigmatism.