Refractive errors

About 120 million people in the United States wear eyeglasses or contact lenses to correct their refractive error—also known as nearsightedness, farsightedness, or astigmatism. These visual disorders are the most common vision problems in the US.

Refractive errors result when the curve of the cornea is irregular (too steep or too flat). When the cornea is of normal shape and curvature, it bends, or refracts, light onto the retina precisely. However, when the curve of the cornea is too steep or flat, the cornea bends light imperfectly onto the retina, resulting in blurred vision. The refractive process can be likened to the way a camera takes a picture. The cornea and lens in your eye are similar to the camera lens. The retina acts as the film. If the image is not focused properly, the film (or retina) receives a blurry image. The image that your retina receives then goes to your brain, which tells you what the image is.

When the cornea is curved too much (too steep), or if the eye itself is too long, faraway objects will appear blurry because they come into focus in front of the retina. This is called myopia, or nearsightedness. Myopia affects over 25 percent of all adult Americans.

Hyperopia, or farsightedness, is the opposite of myopia. Distant objects are clear, and close-up objects appear blurry. With hyperopia, images focus on a point behind the retina. Hyperopia results from an eye that is too short or a cornea that is too flat.

Astigmatism is a condition in which the uneven curvature of the cornea blurs and distorts both distant and near objects. A normal cornea is round, with even curves from side to side and top to bottom, much like the side of a basketball. With astigmatism, the cornea is shaped more like the side of a football, curved more in one direction than in another. This causes light rays to focus on two separate areas of the retina, distorting or blurring the image. Two-thirds of Americans with myopia also have astigmatism.

Refractive errors are usually corrected by eyeglasses or contact lenses. Although these are safe and effective methods for treating refractive errors, refractive surgeries are becoming an increasingly popular option.