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REFRACTIVE ERRORS

If you need to wear glasses to see clearly, you have a refractive error. There are four types: myopia (nearsightedness), hyperopia (farsightedness), astigmatism (uneven focusing power), and presbyopia (age-related inability to focus up close).

Good vision depends on light rays traveling through the eye and focusing sharply on the retina at the back of the eye. As the light rays pass through the eye, they are refracted (meaning "bent"). If rays coming from a distant object reach the retina in sharp focus, you will see clearly; but if they are not bent the precise amount, vision will be out of focus, and then you have a refractive "error."

People with no refractive error have naturally clear and sharp eyesight without glasses. They can look at any distant object and, effortlessly, have it in focus. This ideal condition of natural sharp vision is called "emmetropia." It occurs only when there is a perfect match between the optical power of the eye and the length of the eyeball. Like all biological mechanisms, the coordination between power and length is often not perfect, so it is not surprising to find mismatches, which is what creates refractive error. The real surprise is that it doesn't happen more often than it does.

Myopia and Hyperopia

When the eye's optical power and length do not match perfectly, vision will not be in focus. If your distance vision is blurry, but close-up objects are clear, you are nearsighted (myopic). You are a high myope (very nearsighted) if you have to hold objects very close to your eyes to see them clearly.

If you are farsighted (hyperopic), you can see clearly in the distance but only by expending more focusing effort than normal, and even more effort for up close. You may not even be aware of the added effort, but over a period of time it can cause eyestrain and headaches. Farsightedness may not become a problem until you get older. (How much older depends on the amount of farsightedness.) Actual difficulty with focusing up close, which becomes evident in everyone by age 45 or so, will probably be noticeable earlier, perhaps when you are about 35, or even sooner if you have a very large hyperopic error.

Having a refractive error does not mean that your eyes are "bad" or "weak." Just as some people are tall and others are short, some have small hands and others have large feet, those having long eyeballs tend to be nearsighted and those with short eyeballs, farsighted. No one can tell by looking at you if your eyeballs are long or short.

Astigmatism

Astigmatism is a specific type of blurred vision usually caused by an uneven (non-spherical) contour of the cornea, the clear front surface of the eye that overlies the colored iris. The cornea is important for focusing, so any shape irregularity can significantly affect your vision. Actually, just about everyone has some astigmatism from birth. It needs correction only if your effort to obtain clear vision creates eyestrain or headaches. Astigmatism is almost always correctable with prescription glasses or with some types of contact lenses.

Presbyopia

Presbyopia, like aging and taxes, is inevitable. It is an age-related decrease in ability to focus up close, caused by a loss in flexibility of the natural lens within the eye. Reading glasses, bifocals, or progressive-addition glasses are needed to correct for this particular refractive error.

Other Facts and Information

It is not possible to have myopia and hyperopia at the same time, but you could have either one coupled with astigmatism. Presbyopia, of course, will occur on top of any combination when you reach middle age, or even if you have no other refractive error.

Interesting point: No matter what type or combination of refractive errors blur your vision, you can always sharpen it by squinting (half-closing your eyes). By looking through a tiny hole, you can always improve visual acuity.