Assessing Vision

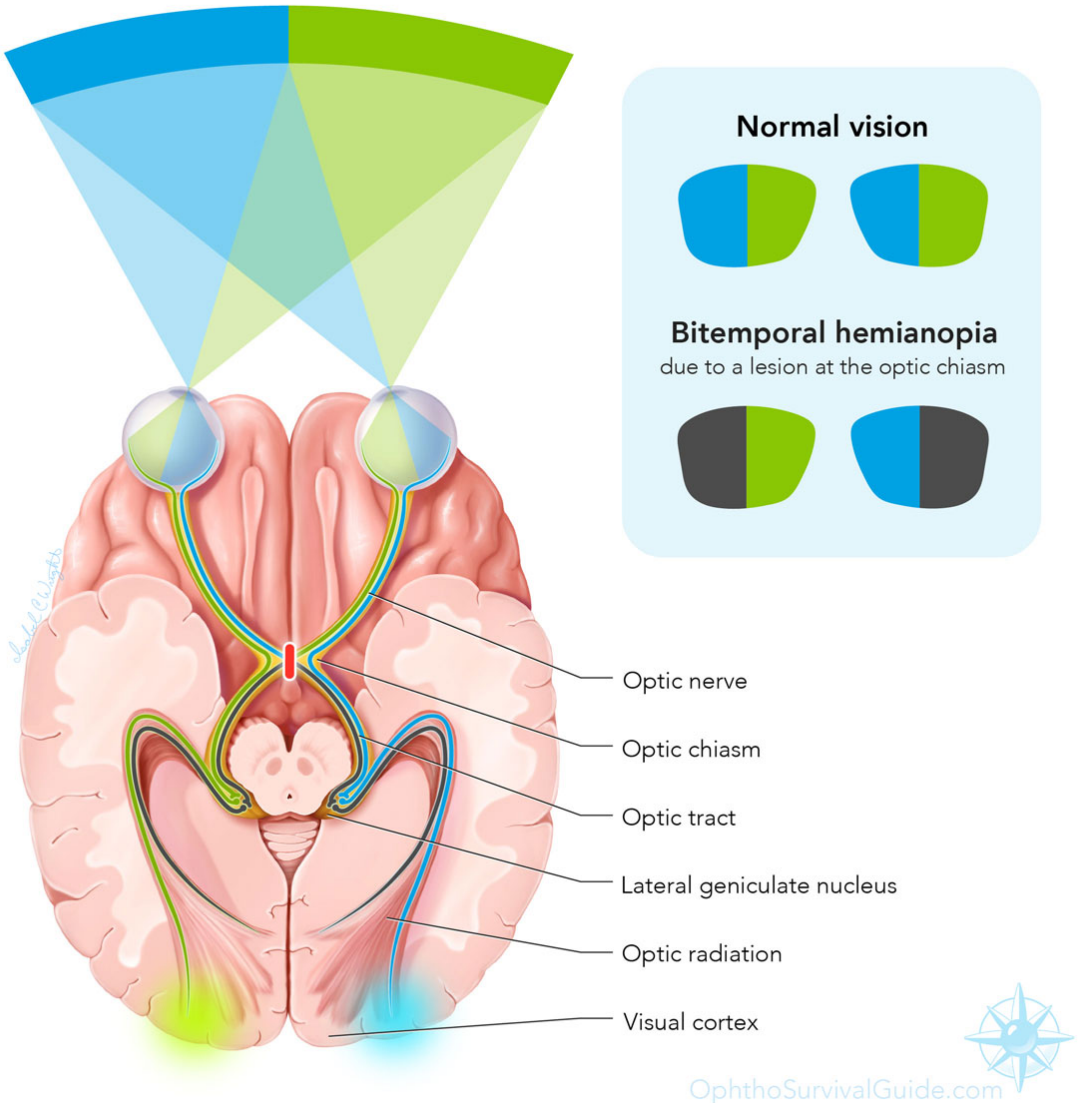
Peripheral Vision

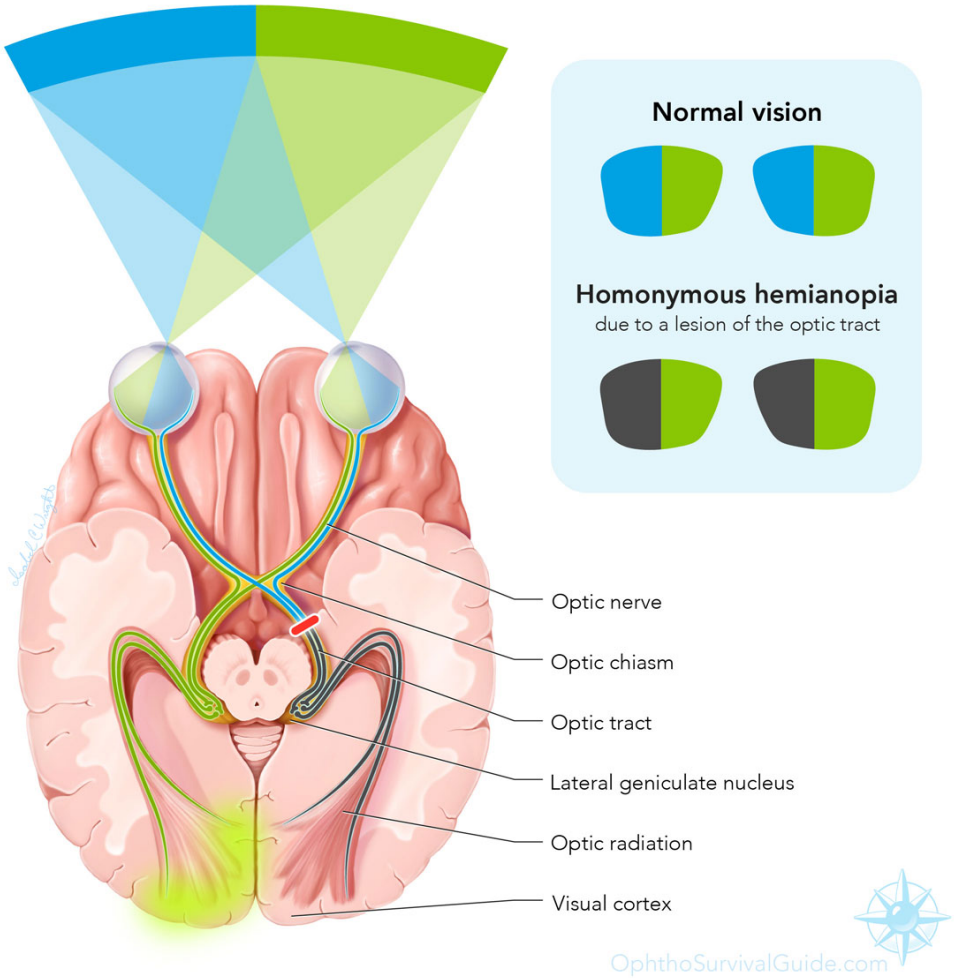
Central visual acuity, though critically important, is only one aspect of a patient's vision. From the point of view of the retina, central visual acuity only represents a very small area including the fovea and macula, where retinal cone photoreceptors (i.e. like pixels) are at sufficient density to allow for high levels of spatial resolution. The remaining 90% of the retina outside of the macula represents our peripheral vision, and includes the photoreceptors that are most active under scotopic, or low illumination, conditions (i.e. rods). Many disease processes, including glaucoma, retinitis pigmentosa, retinal detachment, drug toxicity, and stroke, present initially with changes in peripheral vision.

There are many ways for peripheral vision to be evaluated, and the method chosen will depend on the situation and what is available to the examiner. At the bedside, or in the examination lane, the easiest way to evaluate for gross defects in peripheral vision is called the confrontation visual field testing. The idea behind this test is to compare the peripheral vision of the patient to that of the examiner, with each eye tested separately. This method can be performed effectively in many different examination settings and does not require patient literacy. It can even be performed in very young children or infants, where the examiner looks for the child to make a fixation movement in the direction of the target as it is presented in various positions in the visual field.

Lesions of the retina or optic nerve cause visual field defects that are limited to the affected eye and only large retinal lesions produce visual field defects that can be reliably detected using confrontation testing. Lesions of the optic chiasm, or posterior to the chiasm (i.e. on the brain side of the chiasm), produce visual field defects that are bilateral and fairly or highly symmetric. Lesions of the chiasm itself, primarily affecting

optic nerve fibers that represent projections from the nasal retina (and therefore temporal visual field) from each eye, produce a so-called bitemporal hemianopia. This sort of defect may not be highly congruent (i.e. symmetric in each eye), but is highly localizing. In contrast, lesions posterior to the chiasm produce defects that are homonymous (on the same side) and in the field of vision opposite the side of the lesion. For example, a lesion of the right optic tract produces a homonymous defect in the left visual field of each eye. A lesion of the left visual cortex produces a homonymous defect in the right visual field of each eye. Because roughly half of the optic nerve fibers cross at the optic chiasm, lesions posterior to the chiasm generally produce either no effect, or at best a very subtle RAPD in the pupil contralateral to the side of the lesion.





More formalized and detailed testing of the peripheral vision can be done using specialized devices called perimeters. They are most often automated, and the results are presented in a format that provides many different metrics related to the patient's performance. They are extremely useful not only because of their standardized nature and metrics, but also because the results can be easily tracked, analyzed, and compared over time. One of the more commonly used automated perimeters is the Humphrey Field Analyzer. Its output provides a visual representation of the area tested as well as numerous metrics regarding patient performance and reliability. A complete discussion of automated perimetry and the assessment of peripheral visual function is beyond the scope of this survival guide, but the reader is encouraged to delve further into this fascinating and clinically important topic.

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