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Refraction



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3. Refraction

- All visually impaired patients should undergo refraction to ensure optimal correction for achieving best corrected visual acuity. Most low vision devices are used in conjunction with refractive correction.
- The presence of uncorrected presbyopia or significant uncorrected refractive error could affect success with low vision devices.



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- **Tips for Refraction in patients with low vision:**
- **Auto-refractors** have limited use, due to media problems or eccentric viewing (off axis fixation).
- Previous **glasses** can be a good starting point
- **Keratometry** can be useful to determine the amount and axis of cylinder. Patient may have difficulty in fixation.
- **Retinoscopy** is most useful tool for refraction for low vision, especially if the patient is poor responder.



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- Amount of magnification can be calculated based on the present visual acuity and the required visual acuity
- (a) If VA is measured in a LogMAR notation:
- Magnification = $(1.25)^n$
Where n = number of steps
If the present acuity = 0.5 and the required acuity = 0.1
Then Magnification = $(1.25)^4 = 2.44x$
Magnification required = Required VA / Present VA
- Magnification required = $6 \times 60 / 6 \times 6 = 10X$



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4. Ocular Motility and Binocular Vision Assessment

- Gross assessment of ocular alignment, binocularity and stereopsis is needed.



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5. Visual Field Assessment

The size and location of the scotoma can affect reading ability, despite appropriate magnification and visual acuity improvement

- . Visual field assessment is important for orientation, mobility training, to guide patient for preferred retinal fixation or environmental modifications
- Assessment can be done using:



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- **Confrontation method** for gross field defect is evaluated.
- **Amsler or threshold Amsler grid assessment** - The presence of significant distortion may hamper the quality of vision.
- **Goldman Perimetry** – It is very useful to quantitatively locate the size and extent of scotoma, to evaluate tunnel vision or peripheral visual field loss.



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Ocular Health Assessment

- **External examination** (adnexa, lids, conjunctiva, cornea, iris, lens, and pupillary responses)
- **Biomicroscopy** (lids, lashes, conjunctiva, tear film, cornea, anterior chamber, iris, and lens)
- **Tonometry** - Central and peripheral fundus examination under dilated pupils, unless contraindicated



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7. Supplemental Testing

- **Glare testing** - Patients with albinism, cataract, posterior capsular opacification, aniridia, corneal opacities, corneal edema, glaucoma, lasered proliferative diabetic retinopathy, etc may suffer from glare.
- **Testing glare acuity signifies** the need to add filters or contrast enhancers to improve the distance vision.
- **Glare disability** can be tested objectively by using glare acuity tester and auto refractors, or subjectively by patients' complaints, comparing the visual acuity with or without illumination in vision chart.



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- Contrast sensitivity is related to the visual functioning more closely than visual acuity. Contrast assessment can be done with **Pelli-Robson contrast sensitivity chart at one meter, Lea contrast flip chart, Hiding Heidi contrast test chart.**
- A patient with low contrast acuity will have to be prescribed a low vision aid with higher than expected magnification, higher illumination and/or absorptive filters or typoscopes.



- Color vision Testing - It can be done by **Ishihara's pseudoisochromatic color plates**, or by asking the patient to discriminate, match or sort out various color threads or buttons.

Electrophysiological tests :

- Electroretinogram (ERG)
- Electro-oculogram (EOG)
- Visually Evoked potential (VEP) – It is very helpful in patients of cortical blindness, LCA, mentally retarded patients, infants or kids where the visual acuity cannot be estimated subjectively and has a poor visual prognosis.



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Reference

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