GLARE EVALUATION AND POTENTIAL ACUITY TESTING

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INTRODUCTION

This chapter includes a review of:

- Glare evaluation
- Potential acuity testing

GLARE EVALUATION

Glare Evaluation is usually performed when light scatter from media opacity negatively affects **visual performance**. **Light scatter** is produced from sunlight, headlights of automobiles or highly reflective surfaces. Evaluation of the disability imposed by glare is useful in the presence of corneal and lenticular opacities, following cataract surgery, refractive surgery and/or keratoplasty.

Glare evaluation usually involves a source of light to induce light scattering. Visual performance is then measured in terms of **VA** or **contrast sensitivity**. One can use a penlight, transilluminator, ophthalmoscope or an instrument specifically designed for glare evaluation. Several devices are commercially available: Miller-Nadler Glare Tester, Optec 1500 Glare Tester, Mentor Brightness Acuity Tester (BAT), MCT80000 and Terry Vision Analyzer (TVA). The various devices are either hand-held or fixed and each varies slightly in procedure but the fundamental principal is similar in all. The **BAT** and **Miller-Nadler Glare Tester** are the **most commonly used**. The general procedure follows.

PENLIGHT, TRANSILLUMINATOR OR OPHTHALMOSCOPE

- Record BVA
- Occlude non-tested eye
- Place light 30-40cm from the eye and 15-30°from the optic axis
- Allow patient to adapt to glare source for 30 seconds
- Ask patient to report smallest visible line on chart.

GLARE EVALUATION DEVICES

- Record BVA
- Occlude non-tested eye
- Seat patient in front of device
- Tell patient to view chart through aperture or screen
- Allow patient to adapt to glare source for 30 seconds
- Ask patient to report smallest visible line on chart or lowest contrast target visible
- Measurement is recorded as BVA or contrast sensitivity threshold.

CLINICAL RELEVANCE

Patients who have corneal, lenticular opacities or have a history of surgeries that affect the ocular media may suffer disability from glare. Daily functioning such as being exposed to sunlight, headlights, streetlights or highly reflective surfaces may impair visual performance. Various treatment options and support organizations are available to patients impaired by glare. Reliability of results is affected by the type of instrument used for evaluation. Procedures vary, glare sources vary (from a point source of light to a surrounding source of light), and recordings vary (from a measurement of VA to a measurement of contrast sensitivity function). Overall, the lack of uniformity among instruments is responsible for the low reliability of measurements.

POTENTIAL ACUITY TESTING

Potential acuity testing is usually performed when visualization of the retina is obscured by poor media clarity. The procedure helps predict the potential retinal VA measurement “behind” the obstruction. Clinically, it is most useful in the presence of cataracts, opacified capsule secondary to cataract surgery, keratoconus or amblyopia. There are three types of potential acuity tests: the Potential Acuity Meter (PAM), the interferometer and the retinometer.

POTENTIAL ACUITY METER (PAM)

The PAM projects a Snellen chart or number chart of black optotypes on a white background onto the retina. The light forming the chart is diffracted by Maxwellian View through **a 0.1mm transilluminated aerial aperture** and then directed through a condensing lens within the system. Upon leaving the system, the light travels through the ocular media and around opacities to converge onto the retina.

PROCEDURE

- The PAM is mounted on the slit lamp
- Room illumination is dim and **slit lamp illumination is off**
- Patient is **dilated** and positioned in the SL

- The dioptric power control is set to account for refractive error
- The light projected is a red background with a white dot
- Instruct the patient to gaze 10° lower than the optic axis
- Focus the light into the pupil through a "**window**" in the opacity
- Ask to read the smallest line of the chart that is clearly visible
- The patient must correctly identify 3 characters on a line to reach an endpoint measurement. VA levels ranges from 6/6 to 6/120.

INTERFEROMETER AND RETINOMETER

The interferometer and retinometer use a neon-helium or white incandescent bulb which emits two 0.1mm diameter **coherent** light beams. By diffraction (Maxwellian view) the coherent beams pass through the ocular media, overlap and produce a **striped fringe pattern** which focuses on the retina. The available instruments are the Randwal IRAS interferometer and the Haag-Streit Lotmar Visometer and the Rodenstock Retinometer.

Procedure

- Room illumination is dim
- Patient is **dilated** and comfortably seated (at SL if indicated)
- Demonstrate stripe pattern to patient
- Ask patient to indicate **orientation** of stripe pattern
- Start at a low VA level and progress to finest grating visible
- Measurement is recorded from instrument in a reading display.

CLINICAL RELEVANCE

Potential acuity testing is an indication of retinal function. It is useful when considering cataract surgery, laser capsulotomy, keratoplasty or visual therapy for amblyopia. The results from potential acuity assessment vary. The **PAM** tends to give more **falsely low predictions**. **Interferometers** and retinometers tend to give more **falsely high predictive results**. Insufficient dilation, severely dense cataracts, poor patient cooperation, fatigue, fixation and posture can all adversely affect the reliability of the measurements.