Vision Monitor

Application to Cataract and Refractive Surgery

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NEED FOR SPECIFIC TESTS

• surgical procedures need to improve the patient’s quality of vision

• BUT in many situations of every day’s life, quality of vision cannot be assessed by classical vision tests
driving at night

- low luminance objects
- bright light sources
WHY

• visual acuity is performed under optimal operating condition of the visual system: high luminance (photopic), high contrast conditions

• the loss of performance can be much more important under low luminance (mesopic) and/or low contrast situations
Physiologic origins of glare

• different mechanisms are involved
• terminology is often confusing
• some types of glare are normal
Physiologic origins of glare

- Veil glare
  (also called: disability glare, bloom …)
- Lenticular halos
- Ciliary corona
Physiologic origins of glare

• Veil glare

Scattering of light by ocular media:
• cornea,
• lens
• retina

Physiologic origins of glare

Lenticular halos

- happens when viewing small bright objects with dilated pupils
- central part of the lens is optically homogeneous
- periphery is composed of large transparent fibers which act as an optical grating

Physiologic origins of glare

Ciliary corona

- rays emanating from a point light source (less than 20 minutes of arc)
- due to fluctuations of density of the nucleus of the lens

CLINICAL APPLICATIONS

objective criteria for deciding surgery

• early detection of cataract:

increase of veil glare occurs before reduction of photopic visual acuity
CLINICAL APPLICATIONS

check if possible non compatibility

• large pupils can be a counter indication of refractive surgery

source . .
CLINICAL APPLICATIONS
low contrast, glare and pupil size measurements

- objective criteria for deciding surgery
- check if possible non compatibility
- report pre-op performance of patient
- report outcome of procedure
- evaluate quality of medical devices and procedures
Methods for testing low contrast
low contrast visual acuity

- optotypes with calibrated low contrast and photopic background
Methods for testing low contrast sinusoidal gratings

- contrast threshold of perception of grating with different spatial frequency
Method for testing glare

- optotypes with calibrated low luminance and dark background
- glare light source
Method for testing glare
Method for measuring the pupil

- controlled visual stimulation (photopic, mesopic, scotopic)
- infrared light source
- highly sensitive CCD image sensor
Method for measuring the pupil

- accuracy: +- 0.1 mm
- data verification: circle fitted with image
- data recorded with image
Method for measuring the pupil

- **accuracy**: +- 0.1 mm
- **data verification**: circle fitted with image
- **data recorded with image**

**Photopic**
- Left Eye: Pupil diameter = 2.7mm
- Right Eye: Pupil diameter = 2.4mm

**Mesopic**
- Left Eye: Pupil diameter = 6.2mm
- Right Eye: Pupil diameter = 6.5mm
Vision Monitor

- Windows XP environment
- On screen video monitoring
- Easy access to results through computer network
- Easy exportation of results
OTHER OPTIONS

• standard visual field

• attention visual field (driving license)

• standard visual electrophysiology

• multifocal visual electrophysiology