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
EXAMPLE

driving at night

- low luminance objects
- bright light sources
• 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 are 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

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

- **mesopic**
  - Left Eye: Pupil diameter = 6.2 mm
  - Right Eye: Pupil diameter = 6.5 mm
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