Mesopic Contrast Sensitivity in a Young Population

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Limitations of visual acuity:

- Refractive error
- Diffraction
- Aberrations
- Scatter
- Photoreceptor function
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Measuring visual function:

• Objective:
  – Ocular wavefront aberration calculations

• Subjective:
  – Visual acuity
  – Contrast sensitivity:
    • Pelli-Robson Chart (same size letters)
    • Small Letter Contrast Test
    • ETDRS Low contrast chart
    • Mesotest II, Oculus
    • Vistech / FACT
Contrast sensitivity tests
Why measure contrast sensitivity?

- JAR-FCL requires that a candidate undergoing refractive surgery can be considered fit for flying provided that glare sensitivity is within “normal standards” and mesopic contrast sensitivity is not “impaired”.
How do we measure?
CS is influenced by:

- Ageing
- Cataract
- Amblyopia
- Refractive error
- Aberrations
- And more

Mesopic cs (without glare) several years after LASIK in 60 year old:
Method:

- Test: Optec 6500, 3 and 85 cd/m$^2$
  - Mesopic test with and without glare
  - Dark adaptation 10 minutes
  - Encouraged to guess/answer (not forced choice)
  - No strict time limit
Study population:

- 202 examined, n=165 after exclusion
- Binocular test
- Median age 22, range 17-54
- 92% males
- 39% army pilots
Ophthalmic findings:

- 16% had corrective lenses, refractive error range: Sphere +2 to -4.75, cylinder up to -2
- No eye pathology, amblyopia, colour deficiency or night vision problems, IOP under 21
- VA monocularly ≥0.7, VA ou ≥ 1.0
- 93% had normal photopic contrast sensitivity
- Pupil size: Not measured
Results mesopic data:

- Mesopic range (no glare)
  2,5 and 97,5 percentile
- Mesopic range (no glare)
  5 and 90 percentile
Mesopic with glare:
Photopic data:

**Conclusions:**

1. Mesopic data: There is a wide range in contrast sensitivity in the higher spatial frequencies.

2. Photopic data: Our material correlates well with the population norms.
Future research:

• Expand the sampled population
• CS in hypoxia?
• CS after +Gz acceleration?