Analysis of the visual quality with multifocal intraocular lenses before surgery

P.Nº: 2983

anna.giner-tort@cd6.upc.edu

Anna Giner[1], Mikel Aldaba[1], Sergio O. Luque[2], Maria Borrat[3], Montserrat Arjona[1], Antoni Salvador[4], Jaume Pujol[1]

1: CD6 (Centre for Sensors, Instruments and Systems development) , Terrassa, Barcelona, Spain
2: 10Lens S.L.U, Terrassa, Barcelona, Spain
3: Centre Ocular i Quirúrgic de Terrassa (COQT), Terrassa, Barcelona, Spain
4: Hospital Universitari Mútua de Terrassa, Terrassa, Bercelona, Spain

Purpose: To evaluate the usefulness of a new instrument to predict the visual performance obtained with a multifocal intraocular lens prior to surgery

INTRODUCTION:

- Presbyopia consists on the loss of accommodative amplitude causing blur and uncomfortable vision in near objects. One of the solutions to presbyopia is the implantation of a Multifocal Intraocular Lens (MIOL). MIOLs have complex designs and therefore neural adaptation is involved. Consequently, is important to evaluate the visual performance with MIOLs before surgery.

MATERIAL AND METHODS:

- Patients: 10 presbyopic patients were included in this study. The mean age ± standard deviation (SD) was 67±10years (from 52 to 81years).
- Material:
  - Mplus (Lentis® Oculentis®)
  - Visual Acuity (VA) Chart (Figure 2)
  - CSV- 1000E Test (Figure 3)
  - VirtIOL: is an open-field instrument based on projecting an IOL onto the patients' pupil plane. Thus, the patient sees through the IOL simulating the vision once the IOL is implanted (Figure 1)

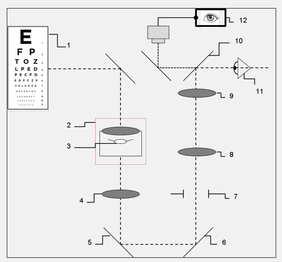

Figure 1: VirtIOL's system scheme (on the left) and VirtIOL's prototype (on the right).

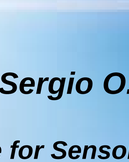

Figure 2: VA Chart

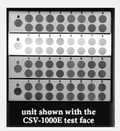

Figure 3: CSV-1000E test

- Methodology: Visual performance was evaluated in terms of:

Visual Acuity (VA) — Contrast Sensitivity (CS) — Visual Perception → Letter / Point Source

The measurements were performed in two sessions:

- First session: Before surgery with VirtIOL and Mplus
- Second session: After surgery with MPlus.

RESULTS:

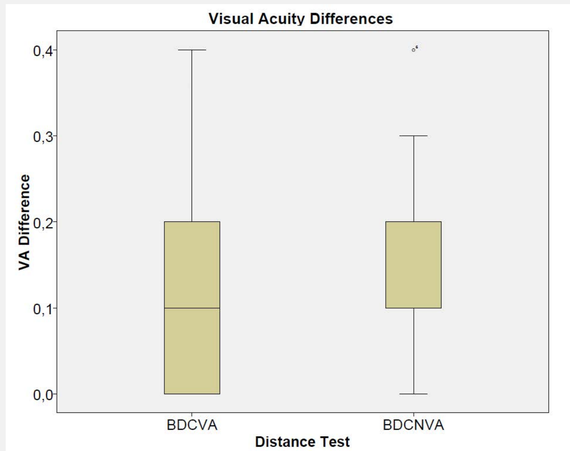

Figure 4: Visual acuity differences between first and second session for the BDCVA (Best Distance Corrected Visual Acuity) and BDCNVA (Best Distance Corrected Near Visual Acuity).

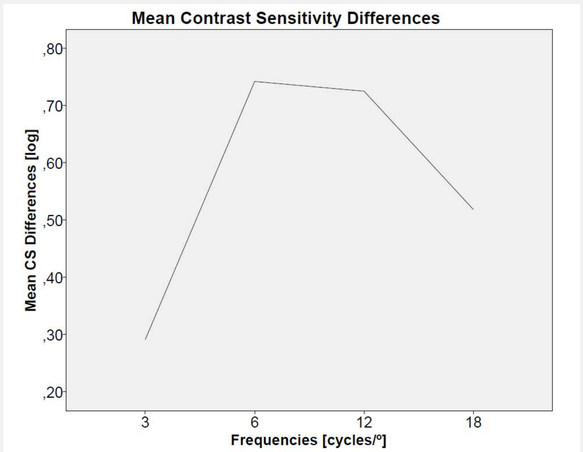

Figure 5: Mean contrast sensitivity differences curve between first and second session for BDCVA (Best Distance Corrected Visual Acuity).

	Visual Acuity		Contrast Sensitivity				Subjective Comparison	
	BDCVA	BDCNVA	A (3cyc/º)	B (6cyc/º)	C (12cyc/º)	D (18cyc/º)	Letter	Point light source
Mean Difference ± SD	0.10 ± 0.13	0.16 ± 0.12	0.29 ± 0.38	0.74 ± 0.68	0.73 ± 0.59	0.52 ± 0.32	3.20 ± 0.79	2.50 ± 0.71

Table 1: Mean Difference ± SD between the first and the second session of the BDCVA (Best Distance Corrected Visual Acuity), BDCNVA (Best Distance Corrected Near Visual Acuity) in terms of Visual acuity; of each frequency in terms of Contrast Sensitivity; of both subjective comparisons.

CONCLUSIONS:

- The new instrument VirtIOL is a useful tool to predict the visual performance of a patient before surgery.
- Differences found between virtual and real implant are associated with a little opacification of the crystalline lens due to the age of the patients.
- The ideal candidate for MIOL simulation through VirtIOL instrument is the patient for Refractive Clear Lens Exchange.

AKNOWLEDGEMENTS:
This study was funded by the Spanish Ministry of Science and Innovation with the project grant DPI2011-30090-C02-01, and the European Union. A. Giner thanks the Ministerio de Economía y Competitividad for the PhD grant she received.