RayOne Trifocal: Visual outcomes and IOL stability – long term follow-up

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All authors have no financial interests

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PURPOSE

- To report long term visual outcomes of RayOne® Trifocal IOL (Rayner)
- To compare visual outcomes and patient satisfaction of RayOne® Trifocal IOL with another trifocal IOL (Acrysof IQ PanOptix® - Alcon) and monofocal IOL (AcrySof® IQ Monofocal – Alcon)
- To evaluate post-operative aberrations, IOL stability and PCO in the three different groups

MATERIALS AND METHODS

3 groups of 12 eyes (6 patients) were evaluated in San Marino Hospital after implantation of RayOne Trifocal (Group 1), PanOptix (Group 2) and Acrysof IQ Monofocal (Group 3)

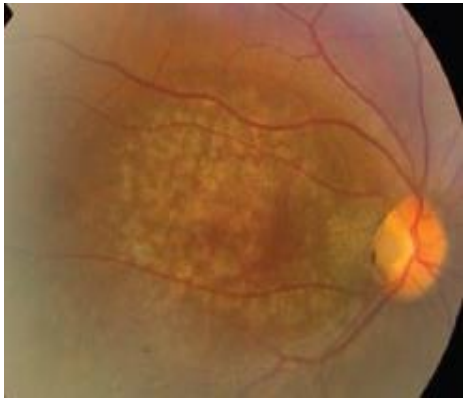
Data evaluated:

- Distance Uncorrected (UCVA) and Distance Best Corrected Visual Acuity (BCVA) (LogMAR)
- Near (UNVA) and Intermediate Visual Acuity (UIVA) (LogMAR) with MNread charts
- Contrast sensitivity with MOS 22 (Dueffe Tecnovision)
- Defocus curve from -4.00 D to +4.00 D
- Aberrometry (OSIRIS – CSO)
- Patient satisfaction with a self-administered questionnaire (NEI-RQL-42™)
- PCO incidence and IOL stability with digital photos of anterior segment

- Minimum follow-up: 10 months
- Average age: 65.4 ± 8.8 (range 48-72)
- Mean pupillar diameter: 3.82 mm (range 5.40-2.32 mm)

EXCLUSION CRITERIA:

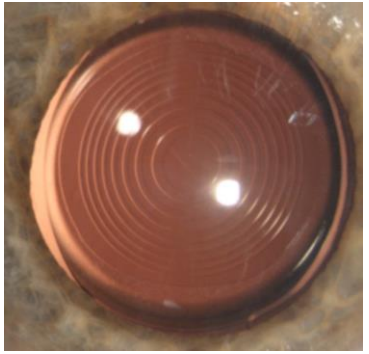
- Previous ocular surgery
- Regular corneal astigmatism greater than 0.75 D
- Irregular astigmatism and corneal opacities
- Glaucoma with impairment of GCL and RNFL
- Macular diseases



MATERIALS AND METHODS

PRE-OPERATIVE EXAMINATION

- Corneal tomography (Sirius – CSO)
- Pupillometry (photopic, mesopic and scotopic) (Sirius – CSO)
- Macular OCT (Spectralis – Heidelberg Engineering Inc.)
- Optical Biometry (IOL Master 700 – Zeiss)
- SRK-T formula with target of emmetropia (A-cost 118.6)

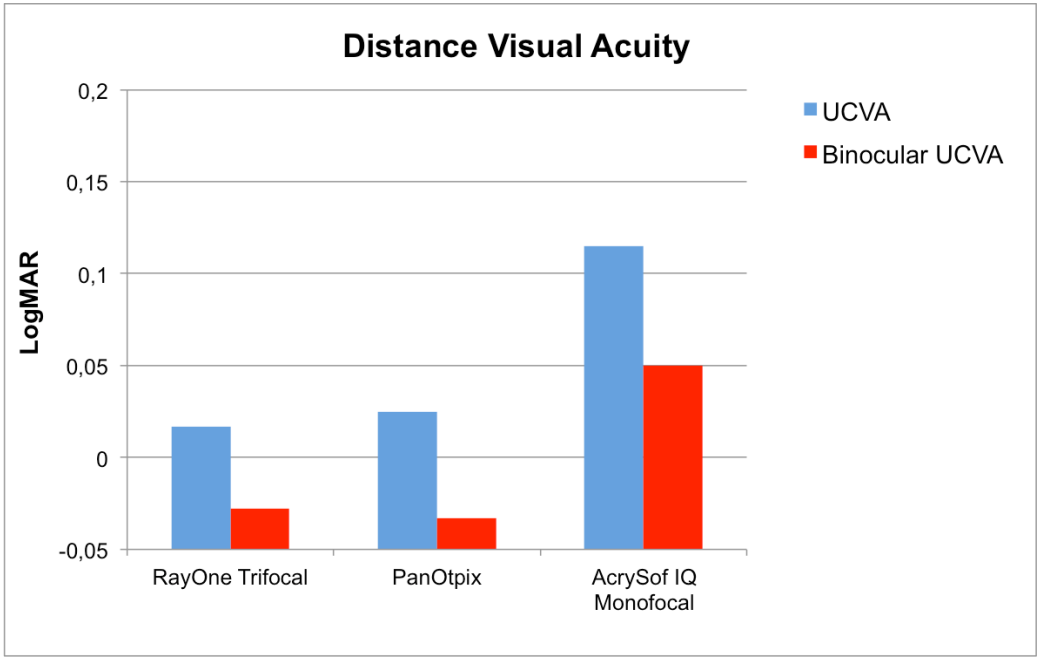


SURGICAL TECHNIQUE

- All operations were performed by the same surgeon (A. M.)
- 2.4 mm clear corneal incision in temporal side
- Continuous curvilinear capsulorhexis with a 5.5 mm diameter
- Phacoemulsification with Chop Technique
- Follow-up: 7 days, 1 month, 3 months, 6 months, 10 months post-operatively
- No intra and post-operative complications

RESULTS – DISTANCE UNCORRECTED VISUAL ACUITY

- All patients in Group 1 (RayOne Trifocal) and Group 2 (PanOptix) achieved monocular UCVA of 0.1 LogMAR or better
- 8 patients (66%) in Group 3 (AcrySof Monofocal) achieved monocular UCVA of 0.1 LogMAR or better

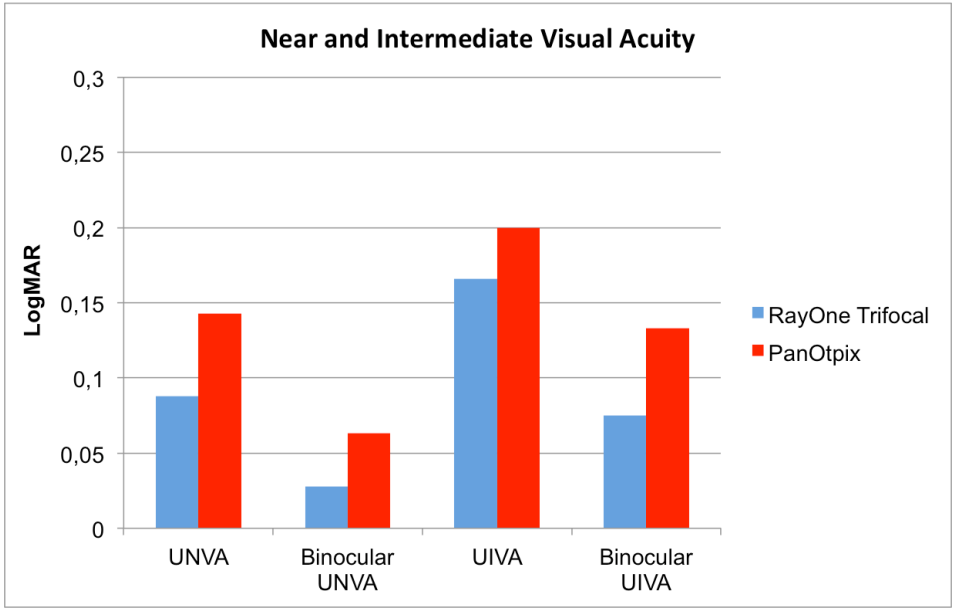


Uncorrected Distance Visual Acuity (LogMAR) – 10 months follow-up

	Mean	St. Dev.
RayOne Trifocal	0,016	0,07
PanOptix	0,025	0,04
AcrySof	0,11	0,11

RESULTS – UNVA AND UIVA

- 8 patients (66%) in Group 1 (RayOne Trifocal) and 6 patients (50%) in Group 2 (PanOptix) achieved monocular UNVA of 0.1 LogMAR or better (Mnread charts)
- 11 patients (91%) in Group 1 (RayOne Trifocal) and 10 patients (83%) in Group 2 (PanOptix) achieved monocular UIVA of 0.2 LogMAR or better
- No statistical differences were noted between 2 groups



Uncorrected Near Visual Acuity (LogMAR) – 10 months follow-up

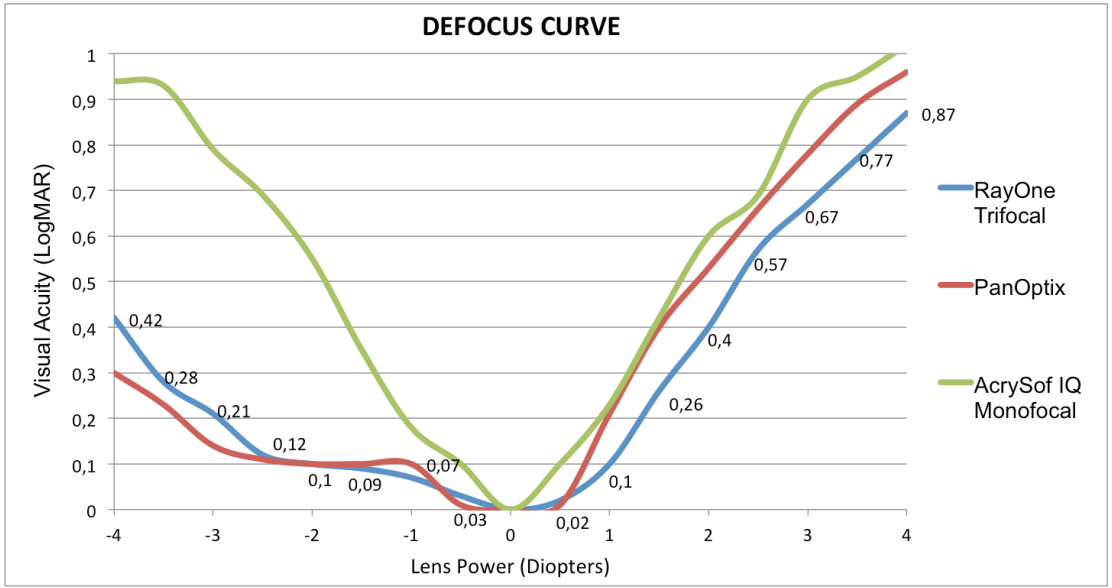
	Mean	St. Dev.	T values	P values
RayOne	0,088	0,08	1,9573	0,0631
PanOptix	0,143	0,04		

Uncorrected Intermediate Visual Acuity (LogMAR) – 10 months follow-up

	Mean	St. Dev.	T values	P values
RayOne	0,16	0,05	1,4406	0,1638
PanOptix	0,2	0,05		

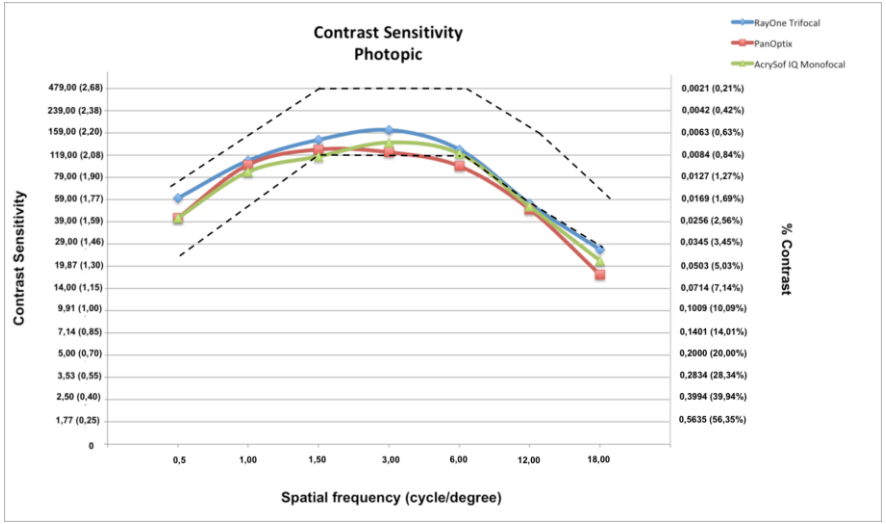
RESULTS – DEFOCUS CURVE

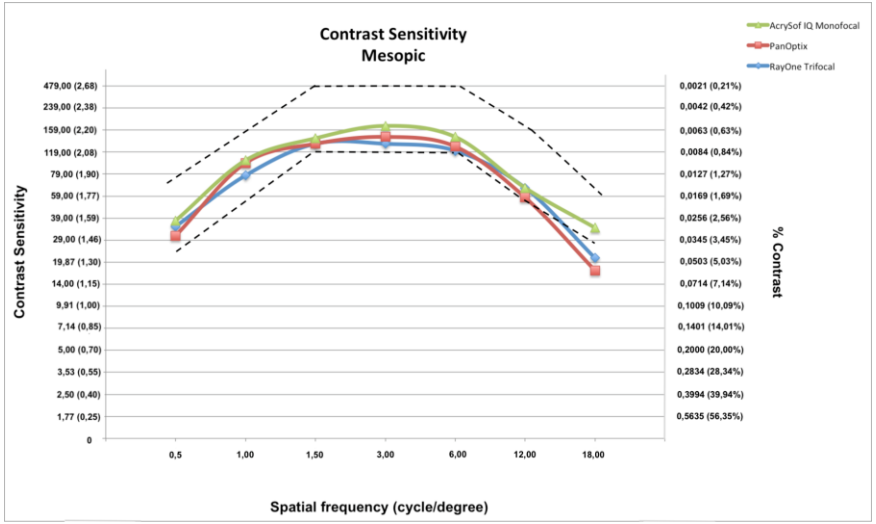
- At 10 months post-operatively, RayOne and PanOptix groups showed a smooth transition phase between the far and the near focus, resulting better than the AcrySof group
- From +1.00 D to -2.00 D, visual acuity was >0.10 LogMAR in all patients, demonstrating good intermediate vision
- At -2.50 D, corresponding to near vision at 40 cm, visual acuity was 0,12 LogMAR or better
- At -3.00 D (near vision at 33 cm) and -4.00 D (near vision at 25 cm) visual acuity was respectively 0.21 and 0.42 LogMAR for RayOne group, and 0.14 and 0.3 LogMAR for PanOptix group
- Defocus curves are not fully representative of reading visual acuity as the effects of convergence and pupillary constriction are not taken in consideration



RESULTS – CONTRAST SENSITIVITY

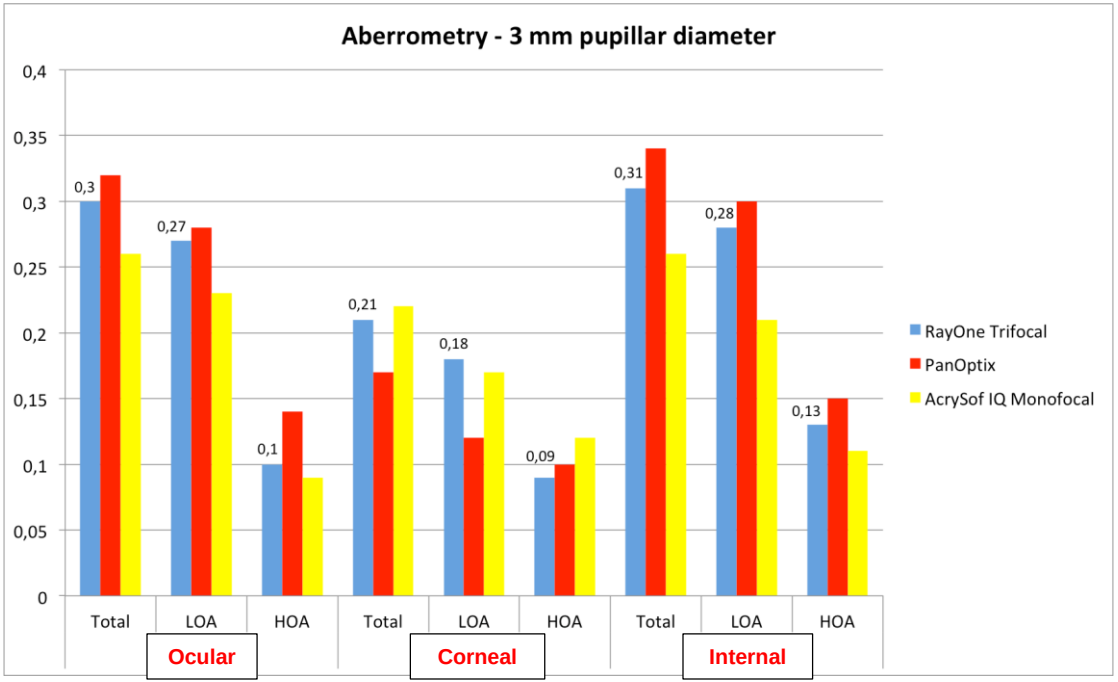
- Contrast sensitivity levels of the all groups were within normal limits under both photopic (85 cd/m^2) and mesopic (3 cd/m^2) conditions throughout follow-up
- At higher spatial frequency (> 6 cycle/degree) PanOptix group showed lower contrast sensitivity than the other groups under photopic and mesopic conditions



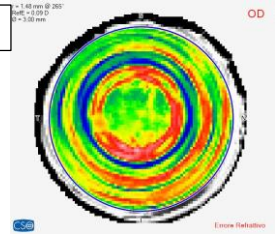


RESULTS – ABERROMETRY

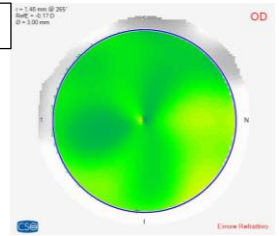
- RMS values (µm) were better in AcrySof IQ Monofocal group regarding ocular and internal aberrations
- RayOne group showed lower LOA and HOA internal aberrations than PanOptix group (not statistically significant)
- Internal aberrations are directly related to the IOL: low values of RSM indicate a minimum dispersion of the light inside the eye



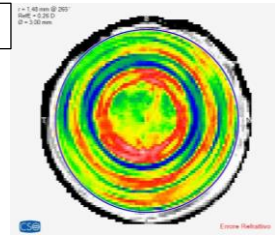
Ocular



Corneal

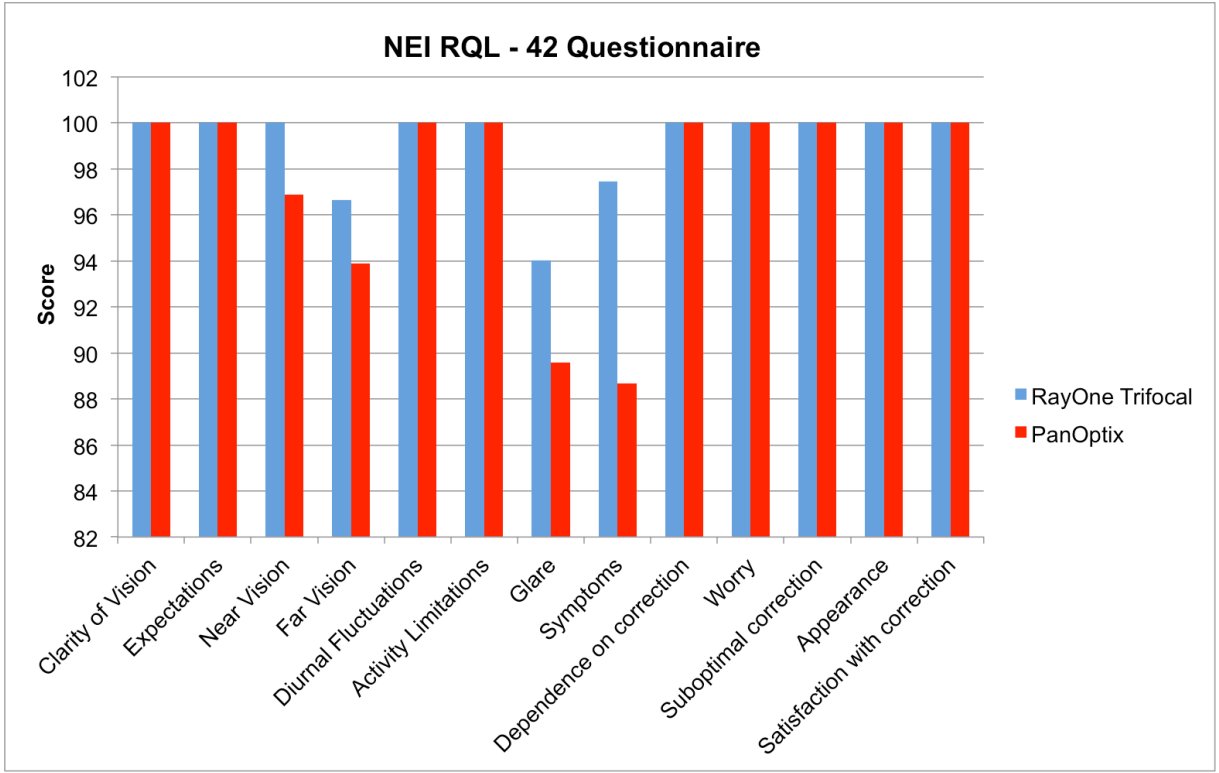


Internal



RESULTS – PATIENT SATISFACTION

- High patient satisfaction was found for both the RayOne Trifocal and PanOptix group
- Increased Patient satisfaction for glare and symptoms category was found greater in RayOne group than the PanOptix group (not statistically significant)



RESULTS – PCO AND IOL STABILITY

- We evaluated IOL stability and Posterior Capsular Opacification (PCO) incidence with digital photo of anterior segment during the follow-up
- No PCO was reported in any patients
- IOL stability and centration was excellent during the follow-up: no tilting or decentration was reported in any case

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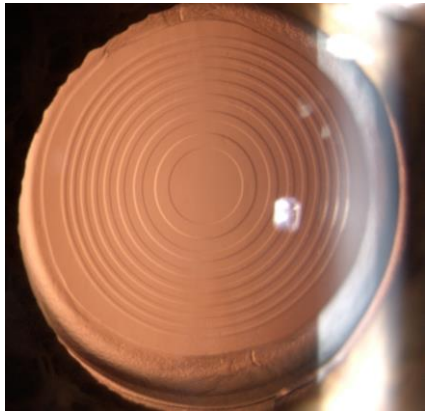

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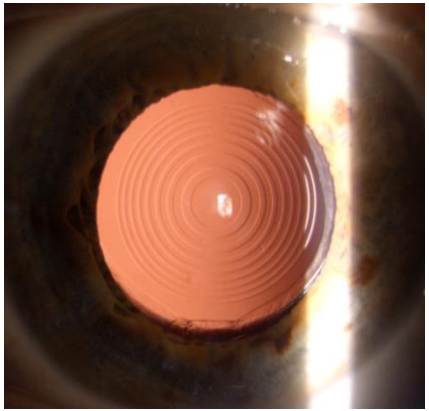

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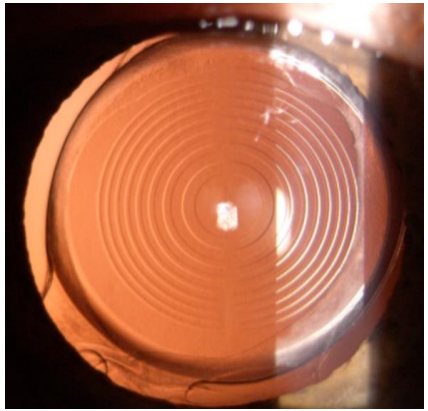

CONCLUSIONS

- RayOne Trifocal IOL showed excellent results regarding distance, intermediate and near uncorrected visual acuity
- All the examined patients showed a very high level of spectacle independence, with a high post-operative satisfaction
- RayOne Trifocal IOL demonstrated long term stability, good centration and no PCO
- RayOne Trifocal IOL and PanOptix IOL showed similar results regarding visual outcomes, defocus curve, contrast sensitivity, aberrations and patient satisfaction

THANKS FOR ATTENTION