



# Comparison between an open field autorefractor and an internal fixation target autorefractor



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## INTRODUCTION

The purpose of this work is to evaluate the refractive results between an open-field autorefractor (OFA), the Grand Seiko wam 5500 (GS) and an internal fixation target autorefractor (IFT), the Nikon Speedy-k (NK), comparing the agreement with subjective refraction

## MATERIALS AND METHODS

34 Subjects were examined, ranging in age from 19 to 25 years, with different refractive errors but with no eye diseases.

Two optometrists conducted all subjective and objective measurements. Subjective refraction was performed before auto refraction to keep masking. The two objective measurements were conducted by an optometrist while the subjective measure by another, alternating them in a random way. We made three different measurements for every eye, using NK in monocular mode and GS in binocular one. Then the mean and standard deviation were calculated. The spherocylindrical notation was then converted to the power vectors notation (Thibos1997), in order to improve the statistical analysis using the angular terms:

$$M = S + \frac{C}{2} \quad J_0 = -\frac{C}{2} \cos(2\alpha) \quad J_{45} = -\frac{C}{2} \sin(2\alpha)$$

## RESULTS

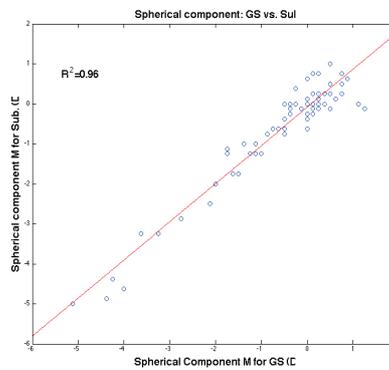
Using the subjective measurement as the gold standard the results of the two autorefractors were compared. Initially, the traditional spherocylindrical notation was compared

Method	Sph. NK	Sph. GS	Sph. Sub.
Mean	-0.94	-0.32	-0.49
St. Dev	1.6	1.4	1.4

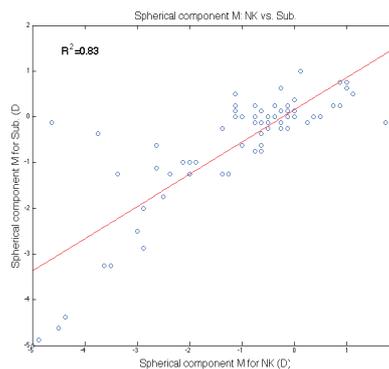
Method	Cyl. NK	Cyl. GS	Cyl. Sub.
Mean	-0.38	-0.53	-0.31
St. Dev	0.45	0.44	0.37

At a first glance, GS appears to be better than NK for the spherical component. On the contrary, we can express a very light preference in favor of NK for the cylindrical component, but this is not statistically significant.

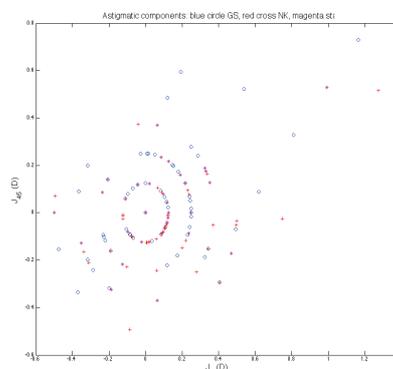
Using the power vector analysis different and probably more interesting results were obtained.



Correlation between spherical equivalent for GS and for subjective measurements is good



Correlation between spherical equivalent for NK and for subjective measurements is not very good



Astigmatic components show some little problems for GS

Univariate analysis (Naeser 2001) for the difference between GS and Subjective measurements

shows no statistically significant differences

	Mean±SD	P value
<b>M</b>	0.05±0.39	0.27
<b>J0</b>	0.01±0.16	0.56
<b>J45</b>	0.03±0.16	0.15

Univariate analysis (Naeser 2001) for the difference between NK and Subjective measurements shows statistically significant differences in M and J45.

	Mean±SD	P value
<b>M</b>	-0.38±0.39	<0.0001
<b>J0</b>	0.01±0.16	0.52
<b>J45</b>	-0.05±0.16	0.0005

Successively, a multivariate analysis using T2 Hotelling technique (Anderson 1984) was performed. For this technique NK and subjective measurements are not comparable.

	p-value	Comparability
GS-Sub	p=0.262	Comparable Methods
NK-Sub	p<0.001	Not Comparable Methods

## CONCLUSIONS AND POSSIBLE DEVELOPMENTS

The results show that the OFA instrument (GS) seems more similar to subjective refraction, especially for the measurement of Spherical Equivalent; it could be assumed that this could be due to the relaxation of accommodative effort, that may not be completely neutralized when using IFT instruments (Wesemann 2000). About the astigmatic component a limitation of this study could be noticed in the low proportion of subjects with a major cylinder component; it is necessary to perform a new study among subjects with higher cylindrical component in their refraction.

## REFERENCES

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 Wesemann W, Dick B. Accuracy and accommodation capability of a handheld autorefractor. J Cataract Refract Surg 000;26:62-70.

## Contact Information

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