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Success in fitting soft toric contact lenses

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Abstract

Purpose: The goal of this thesis was to try to determine the success rate of using spectacle prescription, iris diameter and keratometry measurements in fitting planned replacement soft toric contact lenses. The motivation factors for this thesis were: the need to minimize lens storage facility, to minimize amounts of diagnostic contact lens kits, decrease the amount of chair time and follow-up visits, and to increase the likelihood of successful dispensing of toric soft contact lenses. CooperVision's ToriTrack software was evaluated to determine the likelihood of successful empirical fitting when using this software program to order contact lenses instead of traditional diagnostic fitting. Method: This was a study performed at Pacific University College of Optometry with 19 subjects, who had at least 1 Diopter of cylinder in their spectacle prescription. Their spectacle corrected visual acuity was measured through trial frame and then a corneal topography was done to determine their oblique visible iris diameter and their simulated keratometric reading. 32 subject eyes were fitted with toric soft contact lenses using CooperVision's ToriTrack software to select the appropriate contact lens. The subjects contact lens visual acuity was measured and the fit was assessed. Results: The study showed 83.3% of eyes (25 eyes) achieved a successful fit in terms of obtaining the same or better visual acuity than their habitual glasses prescription. This study also demonstrates a 93.4% (30 eyes) success rate in achieving an acceptable fit. Conclusions: It is shown that using software such as ToriTrack is an acceptable method of achieving dispensable fits of toric soft contact lenses.

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SUCCESS IN FITTING SOFT TORIC CONTACT LENSES

By

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Biographies

Roshanak Namavari grew up in North Texas. She received her Bachelor of Arts degree in Biology in May 2000 from the University of Dallas, where she graduated Magna Cum Laude and was selected to Phi Beta Kappa. She has been a member of Beta Sigma Kappa for two years and is currently a third year optometry student at Pacific University College of Optometry. Her focus is to pursue a career in primary care optometry. She also was the lead coordinator of this thesis.

Tracy Doll is an Oregon native, raised in the small town of Dallas, Oregon. She attended Pacific University College of Arts and Sciences and earned a Bachelor's Degree in Visual Science. During her college studies, Tracy studied abroad in Quito, Ecuador, South America. Tracy enjoys traveling, swimming, and hiking. While in Optometry school, Tracy has been involved in the AMIGOS club, Optometry Admissions and the Fellowship of Christian Optometrists.

Scott Sims has lived most of his life in the San Francisco Bay Area, growing up in Novato, CA, and has lived in Santa Rosa, CA since completing high school. He started college at Santa Rosa Junior College and transferred with an AS degree to Sonoma State University to complete a BS degree in General Biology with a Minor in Chemistry. Scott worked as an Air Quality Specialist for Northern Sonoma County Air Pollution Control District in facility permitting, inspection and compliance, and research on NO_X and O_3 emissions and particulate matter. He is an Eagle Scout, and enjoys outdoor sports such as hiking, backpacking, and mountain biking. Scott also has a passion serving others, and has attended a vision clinic trip to Quaymas, Mexico, and hopes to maintain a life commitment to vision conservation work following graduation as an Optometrist.

Daniel C. Howells attended the University of Utah for most of his undergraduate work. He received a B.S. in Visual Science from Pacific University while concurrently enrolled in Pacific's Optometry Program. His enthusiasm for optometry and owning a small business has motivated him to pursue owning a group practice. He plans to return to Utah after graduation to practice full scope optometry, specializing in contact lens and pediatrics.

Abstract

Purpose: The goal of this thesis was to try to determine the success rate of using spectacle prescription, iris diameter and keratometry measurements in fitting planned replacement soft toric contact lenses. The motivation factors for this thesis were: the need to minimize lens storage facility, to minimize amounts of diagnostic contact lens kits, decrease the amount of chair time and follow-up visits, and to increase the likelihood of successful dispensing of toric soft contact lenses. CooperVision's ToriTrack software was evaluated to determine the likelihood of successful empirical fitting when using this software program to order contact lenses instead of traditional diagnostic fitting. *Method*: This was a study performed at Pacific University College of Optometry with 19 subjects, who had at least 1 Diopter of cylinder in their spectacle prescription. Their spectacle corrected visual acuity was measured through trial frame and then a corneal topography was done to determine their oblique visible iris diameter and their simulated keratometric reading. 32 subject eyes were fitted with toric soft contact lenses using CooperVision's ToriTrack software to select the appropriate contact lens. The subjects contact lens visual acuity was measured and the fit was assessed. *Results*: The study showed 83.3 % of eyes (25 eyes) achieved a successful fit in terms of obtaining the same or better visual acuity than their habitual glasses prescription. This study also demonstrates a 93.4 % (30 eyes) success rate in achieving an acceptable fit. *Conclusions*: It is shown that using software such as ToriTrack is an acceptable method of achieving dispensable fits of toric soft contact lenses.

Acknowledgements

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Introduction

Since toric soft contact lenses were approved in 1979 [1], optometrists have searched for an easier way to fit toric soft contact lenses without using diagnostic lenses in order to save time [2]. A diagnostic fit includes using a trial lens kit and over-refraction to select the appropriate power of the final contact lens [3]. Now diagnostic fitting is less common due to the ease of the empirical fitting process [3]. Empirical fitting entails ordering contact lenses based on the refraction and topography without using trial contact lenses [3]. Clinical research indicates that the empirical method can be as effective as using trial contact lenses to order contact lenses [3]. Empirical fitting is perhaps the easiest way to order lenses [4]. Many studies indicate that ordering the lenses empirically from the data of the refraction and keratometry achieves an acceptable fit [4].

In the past soft toric lens fittings were attempted less frequently by practioners due to difficulty of the diagnostic fitting processes, the need for large lens inventory, and amount of chair time for the patient [3]. The statistical possibilities for successful fitting were optimistic according to the research of some practioners. In the mid 1980s, practioners thought soft toric contact lens fittings to be potentially successful in about 90 percent of the contact lens wearing population [1]. In 1979, the success rate was 86% and Maltsman's review showed a success rate of 88% (231 out of 268 fittings) [1]. Yet, other researchers demonstrated that achieving a dispensable fit on a first attempt was difficult. In 1985, Remba's study showed that just under half of the studied eyes were successfully fitted with the first soft toric contact lens ordered. By the third ordered and fitted toric contact lens, the success rate increased to just over 75% [5]. The amount of time and the number of fitting attempts required to achieve a successful fit has changed over the years. This study attempted to measure how successful a fit is with a first-ordered toric lens is.

Soft toric hydrogels have historically been considered difficult to reproduce precisely and with consistency [5]. Toric soft contact lenses have changed significantly since then and so has the success rate of empirical fitting. Interestingly enough improvements in lens design and production have helped increase the chance of achieving a successful fit by using the empirical method [4].

One impediment to the success of toric soft lens fittings, is that toric soft lenses usually do not maintain their position on the eye consistently without rotating approximately five to ten degrees throughout the day (3). This rotation can cause someone with astigmatism typically greater than 0.75 diopters to become symptomatic and notice a decrease in visual acuity. Goldsmith and Steel believed that the patients refractive error and corneal topography can significantly affect how stable a lens will be on the eye (6). The variables of corneal toricity still can be a factor even though lens design has improved.

Other researchers have identified that lid structure, amount of myopia, and palpebral aperature affect how the lens sits on the eye and maintains its position (6). The use of corneal topography to determine some of the above mentioned factors has been indicated. Some researchers believe that computerized videokeratoscopy might be helpful to fortell if a fit will be successful or might fail (7). Another author suggest that the shape of the cornea, particularly in the periphery is significant in determining how the lens will position itself on the eye (5).

The soft toric contact lens modality could easily emerge as a leading correction for astigmatism. Presently soft toric contact lens fittings are common place in the general optometric practice as a result of better contact lens designs and materials (3). Of note is that in 2004 toric soft contact lens comprised about 30 to 40 percent of all new soft daily lens fits worldwide and about 33 percent of all new soft daily fits in the U.S (8). To stay competitive in today's contact lens market, the practioner must have a working understanding of the soft toric contact lens process. Interestingly enough, only only twenty percent of patients who know they have astigmatism know that there are contact lens options to correct this condition (4). We need to increase awareness to patients about their lens modality options.

The goal of this thesis was to determine the success of fitting soft toric contact lenses with CooperVision's ToriTrack softwear. A corneal topographer was utilized to measure horizontal iris diameter and simulated keratometric readings. The determination of success was made by comparing visual acuity measured with spectacle corrected lenses in a trial frame with soft contact lens corrected visual acuity. Lens fit was assessed objectively.

Methods

Subjects were recruited from Pacific University College of Optometry by researchers presenting to the three classes in the school, asking for students who are not current RGP wearers or participants in other trials and who had one diopter of cylinder or more without amblyopia to sign up. The range of ages was approximately from 21 to 35. There were nine men recruited and ten women recruited. The range of spectacle corrections was from +1.00 diopter to -9.50 diopters sphere and -1.00 diopter to -4.50 diopters cylinder correction (see Figure 1.0 and 2.0). The mean sphere was -3.38 and the mean cylinder was -1.80. The study protocol and consent was approved by Pacific University College of Optometry Internal Review Board. All subjects signed an informed consent prior to participating. The nineteen subjects, who were optometry students with at least 1.00 D or more of refractive astigmatism, met with researchers on two separate sessions. These students were all healthy adults.

Before the first session, the subjects had emailed their current spectacle prescription or we had verified their spectacle through a lensometer. The students had access to their charts and simply asked for their current prescription from their last eye exam at the college. During the first session a manifest refraction was verified by taking visual acuity through a trial frame with a Bailey-Lovie acuity chart at 20ft. Researchers pressed the subjects to guess during acuity measurement until four numbers were missed (9).

Corneal topography was also performed with the Medmont Topographer. Simulated keratometric readings and oblique visible iris diameter were gathered from the topography data. The ruler tool on the Medmont software was used to obtain oblique visible iris diameter by drawing a diagonal line to get an average estimate of the iris diameter. This took into account both horizontal and vertical iris diameter components which can differ.

The aforementioned data (simulated K's, iris diameter, and spectacle prescription) was entered into the CooperVision ToriTrack software and the suggested toric soft contact lenses were ordered. When mulitiple ordering options were displayed, the blue highlighted contact lenses were ordered according to a hierarchy. Vertex/Encore Toric was most prefered, followed by Frequency 55 and then Hydrasoft. The recommended contact lens parameters were printed from the ToriTrack Fax forms, and the orders were faxed to CooperVision.

The toric soft contact lenses were received in approximately two weeks. The participants returned and the appropriate contact lenses were placed on the eyes and allowed to equilibrate for 15 minutes. Following equilibration, the contact lens fit was assessed using routine slit-lamp evaluation techniques. Contact lenses with less than ¼ mm of movement on the push-up test were deemed too tight and contact lenses that were decentered such that one limbus was not covered were deemed too loose.

Distance visual acuities were measured monocularly through the contact lenses. Masked visual acuities were taken: the two researchers who took acuities with the manifest refraction in the trial frame did not take acuities with the ordered contact lenses, nor did the two researchers who took acuities with the contact lenses know the results of the acuities taken with the trial frame. Then a decision was made as to whether a contact lens was dispensable based on lens fit and visual acuity.

Results

One of the lenses was improperly ordered and so those results were not used in the analysis. There were nineteen patients, with 33 eyes assessed individually and analysis was performed on 32 eyes due to the reason above. We must take into consideration that two eyes of the same individual have similarities in simulated keratometric readings, manifest refractions, and oblique visual iris diameter. A Bailey-Lovie Chart was used and conversions of number of letters to Snellen acuity and number of letters to logMAR can be seen on Table 1.

Referring to data Table 2, 30 eyes (93.4%) had dispensable fits, and the other two fits were loose. According to Table 3, 83.3% (25) of subject eyes either had no change in VA or improved in the number of letters they read with soft toric contacts versus habitual spectacle prescription. 46.875% (15) subject eyes saw better with contact lenses, meaning they gained three or more letters. 31.25% (10) subject eyes had no change in letter acuity, with plus or minus two letters being considered the criteria of no change. 21.875% (7) subject eyes decreased in the number of letters they read with contact lenses, meaning they lost three or more letters.

All subjects were able to see 20/50 or better (See Table 4). Twenty-four subject eyes (75.0%) were able to achieve a visual acuity of 20/20 or better. Twenty seven subject eyes (84.375%) were able to achieve a visual acuity of 20/25 or better. Twenty-eight subject eyes (87.5%) eyes were able to achieve a visual acuity of 20/32 or better. Thirty-one subject eyes (96.875%) were able to achieve a visual acuity of 20/40 or better. No patient reported any kind of significant discomfort throughout the study.

Statistical Evaluation

Wilcoxen Matched Pairs test was used to compare the difference in the median acuity for the two sets of data (best corrected spectacle and contact lens VA). The difference in mean number of letters read was 1.0 letter with SD = 6.72. Median difference was 2.0. This difference is not significant (two tailed P = 0.231, 95 % CI for difference of medians –3.423 to 1.423).

Spearman Rank Correlation was then used to compare the visual acuity scores with spectacles and with the contact lens. For N = 32 cases, Spearman r = 0.5563, 95% confidence interval: 0.2475 to 0.7626. This indicates that r is significantly different from zero, P = 0.0009. Figure 1 displays correlation of ranks for the data.

Due to the nature of the study, it is expected that there would be good correlation between the two measures, and thus the above findings are not unexpected. As such, consideration was given to testing for agreement, as opposed to correlation. Following the method described by Bland and Altman (10), the difference for each pair is plotted against the mean measurement of each pair in Figure 2.

It can be seen from figure 2 that the range of disagreement in acuity is fairly wide. One can expect 95% of the differences to be between +/- 2 standard deviations of the mean difference. The mean difference is 1.0 letter, but the SD is 6.7, thus the limits of agreement are 1.0 + (2X6.7) to 1.0 – (2X6.7). This means the acuity with the contact lens will be between 14.4 letters more, or 12.4 letters less than the acuity with spectacle correction 95% of the time.

Discussion

This study did demonstrate a significant effect that successful toric soft contact lens fitting can be achieved through utilization of CooperVision's ToriTrack software. The software was good at predicting toric soft contact lens fit. With regards to visual acuity, the results of the study were mixed; the results indicated that predictability of visual acuity with empirical method was less than optimum, but clinically the results are believed to be better. Perhaps multiple measures of visual acuity could improve the results.

The cases where vision was significantly worse with trial frame perhaps is due to the fact that many of the subjects are long-term soft contact lens wearers and perhaps some changing of the corneal surface has occurred, causing these subjects visual acuity to be much better with contact lenses than spectacles. The subjects whose visual acuity was significantly worse with contact lenses also might have been due to abnormalities in their corneal topography, which might affect the data gathered from the topographer and entered into CooperVision's ToriTrack.

It is difficult to tell if this software program works better for lower amounts of cylinder versus higher amounts, but we predict that success will be more likely with lower amounts of cylinder. It is clinically accepted that rotation with lower amounts of cylinder is more tolerable for toric soft contact lens patients than higher amounts of cylinder. In summary, CooperVision's Tori Track program can be successfully used to fit soft toric contact lenses and achieve the same visual acuity as a spectacle correction.

Conclusion

The fact that our subject population is predominatly young, healthy optometry students without any extreme amount of cylinder prescription, and no one greater than four diopters of spectacle cylinder must be taken into account. Further studies with a larger population that is more diverse in terms of corneal topography and toricity with more extreme elements would be beneficial and recommended. Again, repeated measures may have improved the accuracy of the results.

The software program is user friendly and efficient allowing order forms to be printed for fax or email. We would recommend further investigation on how CooperVision could reduce the number of contact lenses recommended in its final display calculation. We believe that if the practitioner does not have a Medmont Topographer, he could use a bio-microscope measuring reticule to determine oblique iris diameter and use a manual keratometer to determine keratometric readings. We do not know how different the results would be by using the measuring reticule, but that would be interesting for other researchers to examine.

References

1. Maltzman BA and Rengel A. Soft Toric Lenses: An Update. *The CLAO Journal* 1985;11:335-8.

2. Kleinstein RN. Simplified fiiting procedures for toric soft contact lenses. *Journal of the Ameridcan Optometric Association* 1984;55:777-8.

3. Young G and Hickson-Curran S. Reassessing Toric Soft Lens Fitting. *Contact Lens Spectrum* January 2005:42-5.

4. Epstein AB and Remba M. *Hydrogel Toric Contact Lens Correction.* Clinical Contact Lens Practice. Ed ES Bennet and BA Weissman. Philadelphia: 2005, 515-530.

5. Remba M. Clinical Evaluation of Contemporary Soft Toric lenses. *International Contact Lens Clinic* 1985;12:294-03.

6. Young G, Hunt C, Covey M. Clinical Evaluation of Factors Influencing Toric Soft Contact Lens Fit. *Optometry and Vision Science* 2002;79:11-9.

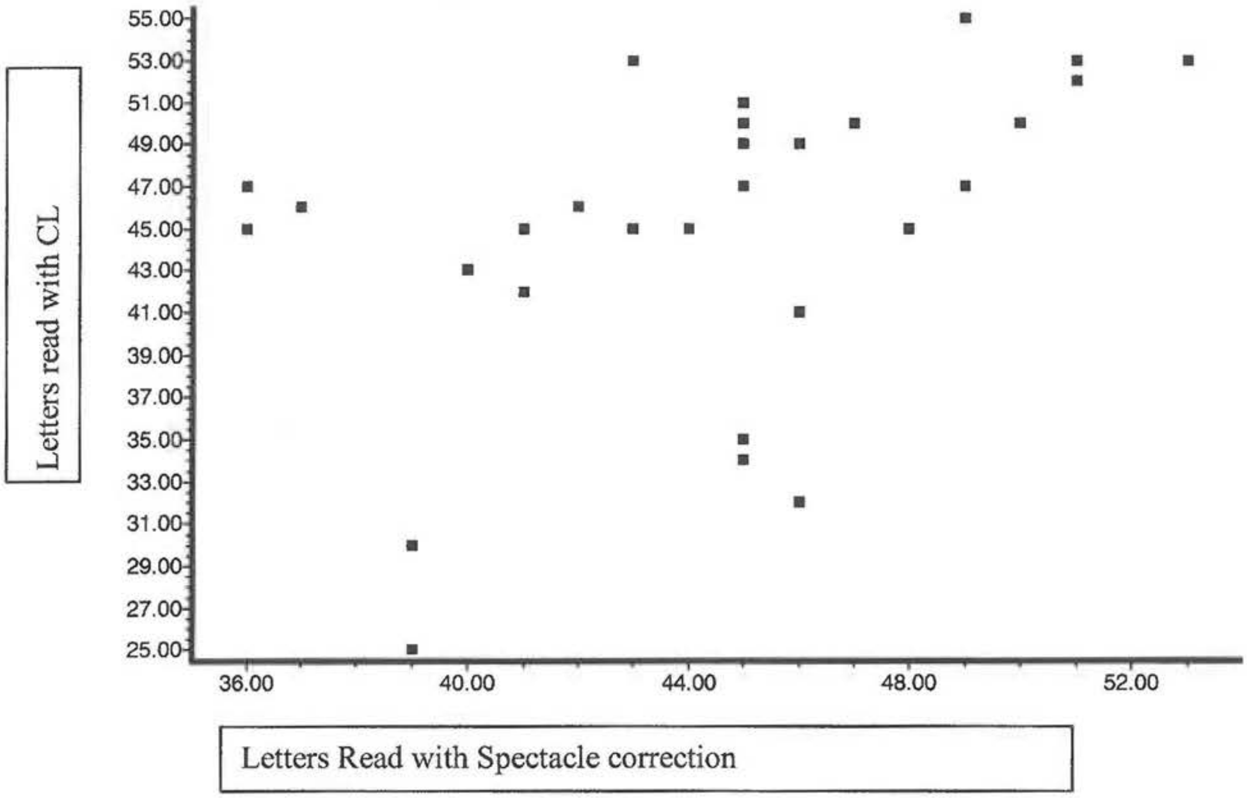
7. Reddy T, Szczotka LB, Roberts C. Peripheral Corneal Contour Measured by Topography Influences Soft Toric Contact Lens Fitting Success. *The CLAO Journal* 2000;26:180-5.

8. Morgan P et all. International Contact Lens Prescribing in 2004. *Contact Lens Spectrum* January 2005: 34-7.

9. Carkeet A. Modeling logMAR Visual Acuity Scores: Effects of Termination Rules and Alternative Forced-Choice Options. *Optometry and Vision Science* 2001;78:529-38.

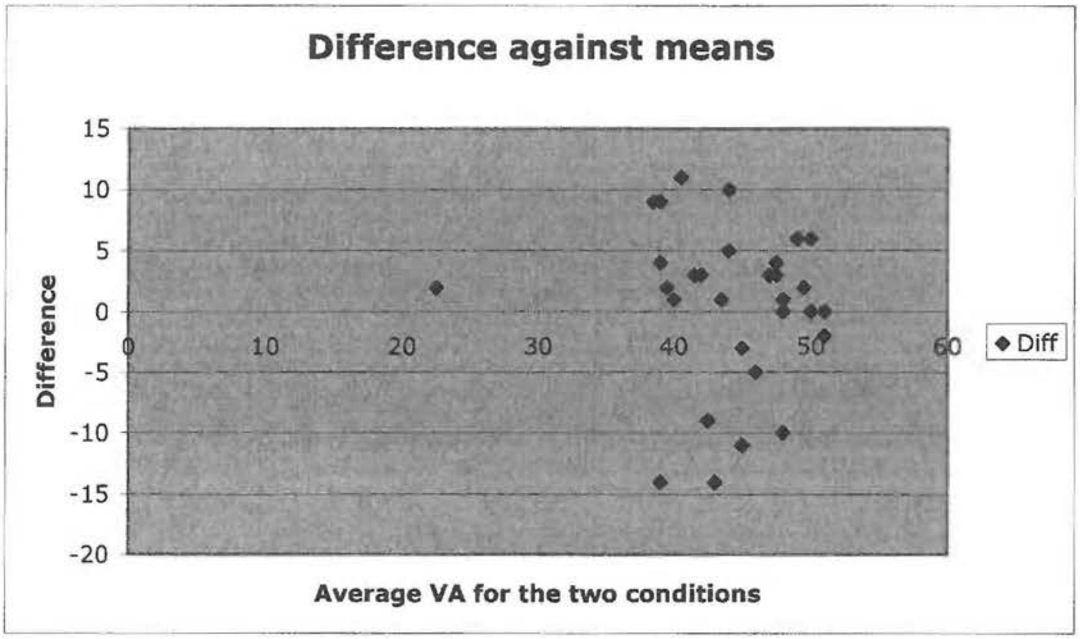
10. Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986; i:307-10.

Figure 1



Correlation of ranks for number of letters read. Spearman r = 0.5563. P = 0.0009

Figure 2



Plot of difference against mean. Visual acuity (VA) noted in units of total letters read.

Table 1

Number of Letters Read on Chart	Correlation to Snellen VA	LogMar Value
20	20/63	0.5
25	20/50	0.4
30	20/40	0.3
35	20/32	0.2
40	20/25	0.1
45	20/20	0.0
50	20/16	-0.1
55	20/12.5	-0.2
60	20/10	-0.3

Table 1 represent the visual acuity measured in terms of numbers read on a Bailey-Lovie Chart and its correlation to Snellen visual acuity and to the Log Mar value.

Table 2

ID #	OVID	Sim K1H	Sim K2V	Sp Sph	Cyl	Axis	CL Sph	Cyl	Axis	BC	Dia	FIT	Sp VA	CL VA	Ch VA
1	11.81	42.7@162	44.5@072	-3.25	-2.25	160	-3.25	-1.75	160	8.60	14.4	GOOD	45	35	-10
2	10.98	42.5@003	43.9@093	-3.75	-1.25	180	-3.50	-1.25	180	8.60	14.4	GOOD	51	53	2
3	10.69	42.4@160	43.9@070	-2.25	-2.00	150	-2.25	-1.75	150	8.60	14.4	GOOD	48	45	-3
4	11.55	41.9@163	42.6@073	-4.25	-2.00	180	-4.00	-1.75	180	8.60	14.4	GOOD	42	46	4
5	10.72	41.5@180	42.9@090	-3.50	-1.25	180	-3.25	-1.25	180	8.60	14.4	GOOD	36	47	11
6	10.61	45.9@004	49.0@094	-3.00	-1.75	170	-3.00	-1.25	170	8.60	14.4	GOOD	45	50	5
7	11.37	42.8@004	45.0@094	-1.25	-1.00	3	-1.25	-0.75	180	8.60	14.4	GOOD	43	45	2
8	11.66	43.6@031	43.2@121	-1.25	-1.50	108	-1.25	-1.25	110	8.60	14.4	GOOD	36	45	9
9	11.65	43.3@043	44.0@133	-1.00	-1.25	61	-1.00	-1.25	60	8.60	14.4	GOOD	41	45	4
10	11.70	43.7@180	45.2@090	-3.00	-1.25	10	-3.00	-0.75	10	8.60	14.4	GOOD	37	46	9
11	10.91	43.3@001	45.3@091	-3.00	-1.25	160	-3.00	-0.75	160	8.60	14.4	GOOD	41	42	1
12	10.66	43.0@180	46.1@090	-6.25	-4.00	179	-5.75	-3.25	180	8.70	14.4	GOOD	39	25	-14
13	11.07	43.2@016	45.5@106	-6.50	-2.25	26	-6.00	-1.75	30	8.60	14.4	GOOD	39	30	-9
14	11.03	45.4@012	48.6@102	-0.50	-1.50	180	-0.50	-1.25	180	8.60	14.4	GOOD	46	41	-5
15	11.03	45.0@175	48.5@085	-1.50	-2.00	174	-1.50	-1.75	170	8.60	14.4	GOOD	46	32	-14
16	11.52	44.5@028	47.4@118	-8.50	-2.75	27	-7.50	-2.25	30	8.60	14.4	GOOD	40	43	3
17	11.16	44.3@178	47.5@088	-8.25	-3.00	175	-7.00	-2.50	175	8.60	14.2	GOOD	44	45	1
18	11.51	45.6@001	47.4@091	-3.50	-1.00	10	-3.25	-0.75	10	8.60	14.4	GOOD	43	53	10
19	11.92	41.6@030	43.6@120	-3.25	-3.25	41	-3.25	-2.75	40	8.40	14.4	GOOD	45	34	-11
20	11.47	45.4@009	47.3@099	-4.25	-1.25	180	-4.00	-1.25	180	8.60	14.4	GOOD	45	51	6
21	11.82	44.9@142	44.1@052	1.00	-1.75	82	1.00	1.75	180	8.60	14.4	GOOD	53	53	0
23	11.46	43.0@169	45.2@079	-10.50	-2.00	180	-9.00	-1.75	180	8.60	14.2	GOOD	47	50	3
24	11.45	42.3@001	45.0@091	-9.50	-3.00	180	-8.00	-2.50	180	8.60	15.0	GOOD	47	50	3
25	11.85	44.7@178	46.4@088	-3.00	-1.25	10	-3.00	-0.75	10	8.60	14.4	FLAT	36	47	11
26	11.92	44.5@018	46.6@108	-2.00	-1.25	10	-2.00	-1.25	10	8.60	14.4	FLAT	45	49	4
27	11.21	45.1@022	47.3@112	-1.50	-1.50	26	-1.50	-1.25	30	8.60	14.4	GOOD	50	50	0
28	11.42	44.7@166	46.9@076	-1.50	-1.50	154	-1.50	-1.25	150	8.60	14.4	GOOD	46	49	3
29	11.55	43.3@028	42.3@118	-1.50	-1.50	107	-1.50	-1.25	110	8.60	14.4	GOOD	49	47	-2
30	11.40	45.5@034	44.8@124	-2.00	-1.00	90	-2.00	-0.75	90	8.60	14.4	GOOD	53	53	0
31	10.83	44.7@012	44.1@102	-0.50	-1.50	100	-0.50	-1.25	100	8.60	14.4	GOOD	49	55	6
32	10.60	44.8@001	43.9@091	-0.50	-1.50	80	-0.50	-1.25	80	8.60	14.4	GOOD	51	52	1
33	12.06	42.5@148	43.7@058	-4.75	-2.25	136	-4.50	-1.75	140	8.60	14.4	GOOD	45	47	2

Table 2.0 represents the data gathered from the study.

The ID# represents the patient identification number. OVID represents the oblique visible iris diameter. Sim K1H is the simulated keratometric reading for the horizontal meridian. Sim K2V is the simulated keratometric reading for the vertical meridian. Sp Sph is the sphere power of the spectacles, which is then followed by the amount of cylinder and the axis of the spectacle prescription. CL Sph is the sphere power of the contact lens, which is then followed by the amount of cylinder and the axis of the contact lens ordered according to ToriTrack. BC is the base curve of the contact lens and Dia is the diameter of the contact lens. Fit describes the fit of the contact lens. Sp VA is the visual acuity in terms of number of letters read on a Bailey-Lovie Chart with the spectacle prescription in a trial frame. CL VA is the visual acuity in terms of number of letters read on a Bailey-Lovie chart with the contact lenses ordered according to ToriTrack. Ch VA is the change in the visual acuity with contact lenses versus spectacle prescription in terms of the number of letters read on a Bailey-Lovie Chart.

Note: Eye ID# 22's Cl was misordered, so they are not included.

Table 3

Change in Letters able to Read With Contacts instead of Spectacles	Number of Eyes able to Read those Letters	Percentage of Eyes able to Read those Letters
Loss Letters (3 or more)	7	7/32 = 21.875%
No Change (+/-2 Letters)	10	10/32 = 31.25%
Gained Letters (3 or more)	15	15/32 = 46.875%

Table 3 displays the change in visual acuity as measured by the number of letters read with spectacles and with contact lenses.

Table 4

Able to Achieve Snellen VA with Contact Lenses	**Percentage of Subjects Able to Achieve this VA**
20/12.5 or better	1/32 = 3.125 %
20/16 or better	11/32 = 34.375 %
20/20 or better	24/32 = 75.0 %
20/25 or better	27/32 = 84.375 %
20/32 or better	28/32 = 87.5 %
20/40 or better	31/32 = 96.875 %
20/50 or better	32/32 = 100 %

Table 4 displays the Snellen visual acuity achieved and number of percentage of subjects who achieved that visual acuity.

Table 5

Range of Number of Letters Read	Correlation to Snellen VA (Able to Read at Least this amount)	Number of Eyes Reading this Number of Letters with Spectacles	Percentage of Eyes with Spectacles Reading this Range of Letters	Number of Eyes Reading This Number of Letters with Contact Lenses	Percentage of Eyes with Contacts Reading this Range of Letters
25-29	20/50	0	0/32 = 0%	1	1/32 = 3.125%
30-34	20/40	0	0/32 = 0%	3	3/32 = 9.375%
35-39	20/32	6	6/32 = 18.75%	1	1/32 = 3.125%
40-44	20/25	7	7/32 = 21.875%	3	3/32 = 9.375%
45-49	20/20	14	14/32 = 43.75%	13	13/32 = 40.625%
50-54	20/16	5	5/32 = 15.625%	10	10/32 = 31.25%
55-59	20/12.5	0	0/32 = 0%	1	1/32 = 3.125%

Table 5 displays the number and percentage of subjects that were able to achieve a certain range of visual acuity in terms of letters read and in terms of Snellen visual acuity with both spectacles and contact lenses.