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A fitting guide for the Johnson & Johnson disposable contact lens

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Abstract

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Acuvue disposable soft contact lenses, disposable soft contact lenses, centering, movement, retinoscope reflex, subjective statement for soft contact lenses

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A FITTING GUIDE FOR THE JOHNSON & JOHNSON DISPOSABLE CONTACT LENS

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ABSTRACT

This study was conducted with the hope of establishing a fitting guide for the Vistakon disposable lens system with the existing parameters. We wanted to see if the Acuvue lens is truly a "one size fits all" lens system. The subjects were selected based on an averaged keratometer reading, and categorized based on their flattest meridian (Kf). We used a -2.00D and a -4.50D lens on each eye. Each lens had to pass four fitting criteria, which were: centering, movement, retinoscope reflex, and subjective statement. The lens did not seem to fit a large percentage of eyes over a wide range of corneal curvatures. We expected a bell shaped curve distribution of the data, with not many lenses fitting extreme corneal curvatures. We found lower than expected pass percentages. We are providing the eye care practitioner with a table of percentages of successful fits based on corneal curvatures. We hope that this will aid the practitioner in determining who would be a potential disposable contact lens patient.

Key Words: Acuvue disposable soft contact lenses; disposable soft contact lenses; centering, movement, retinoscope reflex, subjective statement for soft contact lenses; success rate for soft contact lenses.

INTRODUCTION

In July of 1987 a new product was introduced that would enhance the contact lens field. Vistakon, a subsidiary of Johnson & Johnson, introduced the first disposable contact lens, the Acuvue. The lens was first test marketed in Florida, and by March of 1988 the Acuvue was available in California. Finally, in June 1988 there was national distribution of the Acuvue. Currently there are two other disposable lenses on the market Bausch & Lomb's See Quence and CIBA Vision's NewVues. There seems to be national acceptance, with nearly 74% of practitioners currently offering disposable lenses.[1]

With the new contact lens system a new philosophy in soft lens care developed, lenses that can be worn for one or two weeks and then simply discarded. The disposable wear system is associated with fewer complications than conventional soft extended wear regimens, and when properly used offers many advantages.[2] This system's main advantage is convenience. It eliminates the need for cleaning, disinfecting, and enzyming, and the related solution problems. This can increase patient compliance, because it makes it easier for the patient to take care of the lenses.

With a disposable lens system, the lens is constantly being replaced so there should be no significant aging of the lens. This should greatly reduce the amount of surface deposits over an extended period of time.[3] Many of the complications associated with soft contact lenses are directly related to surface deposits. The most well known example of which is giant papillary conjunctivitis. The Acuvue, as well the as other disposable lens systems, have been shown to be beneficial in treating giant papillary conjunctivits.[4,5]

Despite the obvious advantages of the disposable lens system there are some drawbacks. Patient noncompliance with instructions and follow-up care procedures are the main concern. Patients may try to wear the lenses for extended periods of time beyond which was recommended because of cost. This may cause the patient to try to extend the life of the lens with or without the use of unprescribed cleaning and disinfection procedures.[6]

Another major disadvantage with this system is the failure of patients to return for follow-up care. Practitioners can help prevent potential problems by providing patients with a limited number of replacement lenses, and by requiring that patients be examined before a new multipacks of replacement lenses are dispensed. Patients with disposable lens should be examined every 12-13 weeks.[7]

With this multiple lens system, lens reproducibility is essential. The eye care practitioner must be confident that the contact lenses sent

home will provide the same fit, comfort, and vision as the fitting lens. In fact, Sheldon Wechsler O.D., vice president of personal affairs for Vistakon, reports that Acuvue's reproducibility is nearly 100 %.[8]

Furthermore, most of the disadvantages of disposable lenses can be greatly eliminated by good patient education and understanding of the system. An informed consent contract which requires written communication with the patient regarding the potential risks of disposable lens wear will also minimize the disadvantages.[9]

However, the biggest disadvantage of the Acuvue may be with the limited parameters. At the time of our study the lens was only available in one base curve of 8.8mm, and in one diameter of 14.0mm. At that time only minus lenses were available in powers from -0.50D to -6.00D, in 0.25D increments. As of July 1989, Vistakon introduced the Acuvue in plus powers from +0.50D to +4.00D also in 0.25D increments, with a base curve of 9.1mm and a diameter of 14.4mm.

There has been little published concerning whether the current Acuvue lens parameters are adequate. Stanley Yamane reported that his clinic was able to fit approximately 85% of selected patients with the current lens parameters.[10] Despite this study, there has been some concern by optometrists that the existing parameters have limited the number of patients that could be fit.[2,11] Currently only 6.4% of the contact lens patient base is wearing disposable lenses, and this is probably directly related to the fact that these lenses are available in such limited parameters.[12] One panel of optometrists, in The Review of Optometry, disliked what has been called the "one size fits all philosophy" and are not very satisfied with the range of disposable lens parameters.[13]

This study was conducted with the hope of establishing a fitting guide for the Vistakon disposable lens system with the existing parameters. We wanted to see if the Acuvue lens is truly a "one size fits all" lens system. It is our hope that this will aid the practitioner in deciding who would be a good candidate for the lens based on keratometry readings only.

METHODS

Subjects

The subject population consisted of 64 volunteers. (See Table 1). The range of ages were between 18 and 41 years.Our subject population was 44 % female. The majority of these subjects were optometry students at Pacific University, some had previous contact lens experience and others

had none. The subjects were selected based on an averaged keratometer reading, and categorized based on their flattest meridian (Kf). The keratometer readings of the Kf ranged from 38.50-47.50D. The categories were: 1) ≤41.99D 2) 42.00-42.99D, 3) 43.00-43.99D, 4) 44.00-44.99D, 5) 45.00-45.99D, 6) ≥46.00D. Vistakon recommends using corneas with 1.00D or less of astigmatism; however, our range was from 0-1.29D of ΔK due to limited subject availability.

(Insert Table 1)

There were twenty eyes for each category, except in the 43.00-43.99D range there were twenty-four. It should also be mentioned that some subjects were included in more than one category, because of a difference between their two eyes. They were treated as a separate subject for each category. (See Appendix for raw data).

Procedures

Each subject's central corneal curvature was measured with a calibrated keratometer to determine if they could be used in the study. Then three keratometer readings in each meridian were taken on a Bausch & Lomb keratometer, and these findings were then averaged and used as our Kf and ΔK. The horizontal visible iris diameter (VID) was measured with a standard ruler to eliminate any unusual corneal size.

A -2.00D Acuvue lens was placed on each eye. A twenty minute period was allowed for the lens to stabilize on the eye before the fit was evaluated. For a fit to be considered successful it had to pass each of four fitting criteria. The categories were as follows: 1) Centering, the lens must cover the entire limbus by at least 0.5mm circumferential; 2) Movement, the lens must move down across the cornea by 0.5-2.0mm with each blink, and then recenter following the blink; 3) Retinoscope reflex, a bright undistorted light reflex which would indicate no puckering or sinking of the lens; and 4) Subjective statement, whether or not the lens was comfortable. The procedure was then repeated with a -4.50D contact lens. Finally a slitlamp examination was performed to investigate any corneal trauma that may have occurred during the experimental procedures.

Examiners

The three investigators were all fourth year optometry students at Pacific University, and each performed all aspects of the procedures. The procedures were supervised by an experienced optometrist.

RESULTS

The Acuvue lens is certainly not "a one size fits all lens". The lens does not seem to fit a large percentage of eyes over a wide range of corneal curvatures. In our original experimental design we considered a successful fit to be a lens that passed all four categories. We expected a bell shaped curve distribution of the data, with not many lenses fitting extreme corneal curvatures.

(Insert table 2)

Table 2 presents the total percentage of successful fits for each of the six ranges of Kf for the -2.00D and the -4.50D lenses individually. The percentages were determined by the number of eyes that passed all four categories: centering (C), movement (M), reflex (R), and subjective (S). For the -2.00D lens the pass rate ranged from 25% (≤41.99D) to 65% (44.00-44.99D). The mean pass rate was 48.5% for the -2.00D lens. For the -4.50D lens the pass rate ranged from 40% (≤41.99D and 45.00-45.99D) to 65% (42.00-42.99D). The mean for the -4.50D lens was 48.67%. This table also contains the percentage of eyes that were successfully fit with both powers of lenses. This pass rate ranged from 20% (45.00-45.99D) to 55% (42.00-42.99D). The mean pass rate for both lenses on a single eye was 38%.

Table 2 also includes the percentage of failures based on the category or categories that were failed. We were surprised by the high percentage of patients that failed the lenses on the subjective statement only. For the -2.50D lens the percentage of subjects that failed the lens based on comfort alone ranged from 0% (43.00-43.99D and ≥46.99D) to 45.5% (45.00-45.99D). The mean value was 22.37%. For the -4.50D lens the range was 7.1% (43.00-43.99D) to 58.3% (≤41.99D). The mean was 28.32%. These high percentages greatly affected the data.

Adjusted Value

We realized that it would be unfair to consider a fit a failure just because a patient found the lens uncomfortable. We realized that because the lenses were only worn on the eye for a short period of time the patient had little time to adapt to the lens. This is especially true if the patient had never worn a lens before. It became necessary to create a new pass rate without the consideration of the subjective statement. We will call this the adjusted value.

(Insert Table 3)

Table 3 contains the adjusted value for the -2.00D and the -4.50D lenses individually. For the -2.50D lens the new pass rate ranged from 46% (43.00-43.99D) to 80% (44.00-44.99D) for the adjusted value. The mean value was 60.17%. For the -4.50D lens the adjusted pass rate ranged from 46% (43.00-43.99D) to 75% (42.00-42.99D). The mean was 61.%. The adjusted value for the eyes that were successfully fit with both lenses ranged from 30% (≤41.99D) to 60% (42.00-42.99D). The mean adjusted value was 48.67%.

(Insert Figure 1, 2, and 3)

By comparing the two pass rates (figures 1, 2, and 3) the importance of the adjusted value becomes apparent. Figure 1 is a histogram comparing the percentage of eyes that passed all categories with the percentage of the adjusted value for the -2.00D lenses. The adjusted value greatly increased the pass rate in all categories except for the 43.00-43.99D and ≥46.00D ranges. The range went from 25% to 65%, to the new range of 46% to 80%. The mean changed from 48.50% to 60.17%. This histogram was somewhat of a bell curve as we expected. However, we did not anticipate the low pass rate in the 43.00-43.99D range. This may have been related to the increased number of subjects compared to the other groups.

Figure 2 compares the two percentages for the -4.50D data. Again the adjusted value increased the pass percentages. The range went from 40% to 65% to a new range of 46% to 75%. The mean changed from 48.67% to 61%. This histogram was surprising, because we had also expected a bell curve. However, the shape was somewhat linear. The -4.50D lens seemed to fit similarly regardless of corneal curvature. Again we were surprised by the low pass rate of the 43.00-43.99D range.

Figure 3 is a histogram comparing the total percentage of eyes that were successfully fit by both lenses to the adjusted value percentage. This adjusted value increased in all ranges except for the 43.00-43.99D range. The range went from 20% to 55% to the new range of 30% to 60%. The mean increased from 38% to 48.67%.

DISCUSSION

We did not find the Acuvue lens to be a truly "one size fits all" lens. We were surprised by the over all low pass percentages. Stanely Yamane had reported an 80% success rate for his selected patients.[10] Ellis Gruber reported a similar percentage of about 70% to 80% of patients that

showed a good cornea to lens fit relationship with the Acuvue.[2] However, both of these studies involved long term wear of the lenses, where as our study was exclusively a fitting study. Despite this difference, we had expected to see a similar pass percentage, however, we did not.

Our reduced pass rate may be related to our procedures. We required every lens to pass each of our fitting requirements before we considered it a successful fit. We also used the convention of measuring only central corneal curvatures. Even though, this is common practice, it must be remembered that a soft contact lens extends over the entire cornea and rides on the conjuctiva. Therefore, it is questionable as to the value of taking only central cornea measurements.

It would also have been beneficial to use a different brand of soft contact lenses with the same over all diameter and base curve as the Acuvue, and test it the same as we did the Acuvue. In this way we could have compared the pass percentages of the two different lenses. It should be remembered that many soft lenses come in only limited parameters, though not as limited as the Acuvue.

Another, major difference in our results compared to others, were the large number of patients that found the Acuvue lens uncomfortable. We usually think of soft lenses as being comfortable, even with first time wear. However, we did not find this to be the case. Even though, this was only a fitting study a number of our experienced patients found the lens uncomfortable, which was a surprise. The cause of this may be in the manufacturing of the Acuvue.

The Acuvue lens is manufactured with a new technology called Stabilized Soft Molding (S.S.M.). This system allows the lens to be molded in a continuous wet state, rendering it less vulnerable to variation in the final parameters, which can occur during hydration.[8] However, the problem with the S.S.M. is that the lens is always soft, and therefore it is not workable for edge polishing as is usually done when a lens is molded unhydrated. One study reported that because the edge is not polished, the Acuvue's edge is not smoothly rounded but is formed into a sharp junction at the posterior surface. Furthermore, when the two molded halves are sealed together, excess material (flash) is frequently observed extending form the edge profile.[14] These factors probably have an effect on the comfort of the lens.

Despite the lower than expected pass rate and the questionable comfort of the Acuvue there is still a significant population of patients that could wear the Acuvue. We are providing the eye care practitioner with a table of percentages of successful fits based on corneal curvatures. We hope that this will aid the practitioner in determining who would be a potential disposable contact lens patient.

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TABLE 1: SUBJECT POPULATION

Kf GROUP	# SUBJECTS	SEX	AGE	C.L. EXPERIENCE	EYES	V.I.D.	Kf	ΔK	LENSES USED
≤41.99D	11	27% F	Range	None: 36%	O.D.: 12	Range	Range	Range	2.00D: 20
		73% M	19-37	S.C.L.: 18%	O.S.: 8	10.5-12.0	38.50-41.91D	0.083-1.17D	4.50D: 20
			Mean	R.G.P.: 9%		Mean	Mean	Mean	
			26.9	Both: 36%		11.3	41.02D	0.63D	
42.00-42.99D	13	50%F	Range	None: 33%	O.D.: 8	Range	Range	Range	2.00D: 20
		50%M	19-41	S.C.L.: 17%	O.S.: 12	11.0-12.0	42.00-42.91D	0.016-1.29D	4.50D: 20
			Mean	R.G.P.: 25%		Mean	Mean	Mean	
			24.3	Both 25%		11.2	42.60D	0.56D	
43.00-43.99D	15	40%F	Range	None: 20%	O.D.: 11	Range	Range	Range	2.00D: 24
		60%M	19-39	S.C.L.: 33%	O.S.: 13	11.0-12.0	43.00-43.92D	0.0-1.12D	4.50D: 24
			Mean	R.G.P.: 13%		Mean	Mean	Mean	
			25.4	Both: 33%		11.3	43.45D	0.62D	
44.00-44.99D	12	42%F	Range	None: 17%	O.D.: 10	Range	Range	Range	2.00D: 20
		58%M	18-39	S.C.L.: 33%	O.S.: 10	11.0-12.0	44.00-44.91D	0.0-1.00D	4.50D: 20
			Mean	R.G.P.: 8%		Mean	Mean	Mean	
			24.4	Both: 42%		11	44.42D	0.54D	
45.00-45.99D	12	50%F	Range	None: 25%	O.D.: 10	Range	Range	Range	2.00D: 20
		50%M	21-39	S.C.L.: 33%	O.S.: 10	10.0-12.0	45.00-45.91D	0.0-1.25D	4.50D: 20
			Mean	R.G.P.: 0%		Mean	Mean	Mean	
			26.3	Both: 42%		10.5	45.31D	0.51D	
≥46.00D	11	36%F	Range	None: 36%	O.D.: 10	Range	Range	Range	2.00D: 20
		64%M	21-33	S.C.L.: 9%	O.S.: 10	10.0-11.5	46.00-47.50D	0.0-1.09D	4.50D: 20
			Mean	R.G.P.: 18%		Mean	Mean	Mean	
			27.5	Both: 36%		11	46.49D	0.46D	

VID-Visible Iris Diameter
Kf-Flattest Keratometer Reading (average of 3 readings)
ΔK-Difference Between Flat & Steep Keratometer Readings

TABLE 2: PASS PERCENTAGES FOR BOTH -2.00D -4.50D LENSES

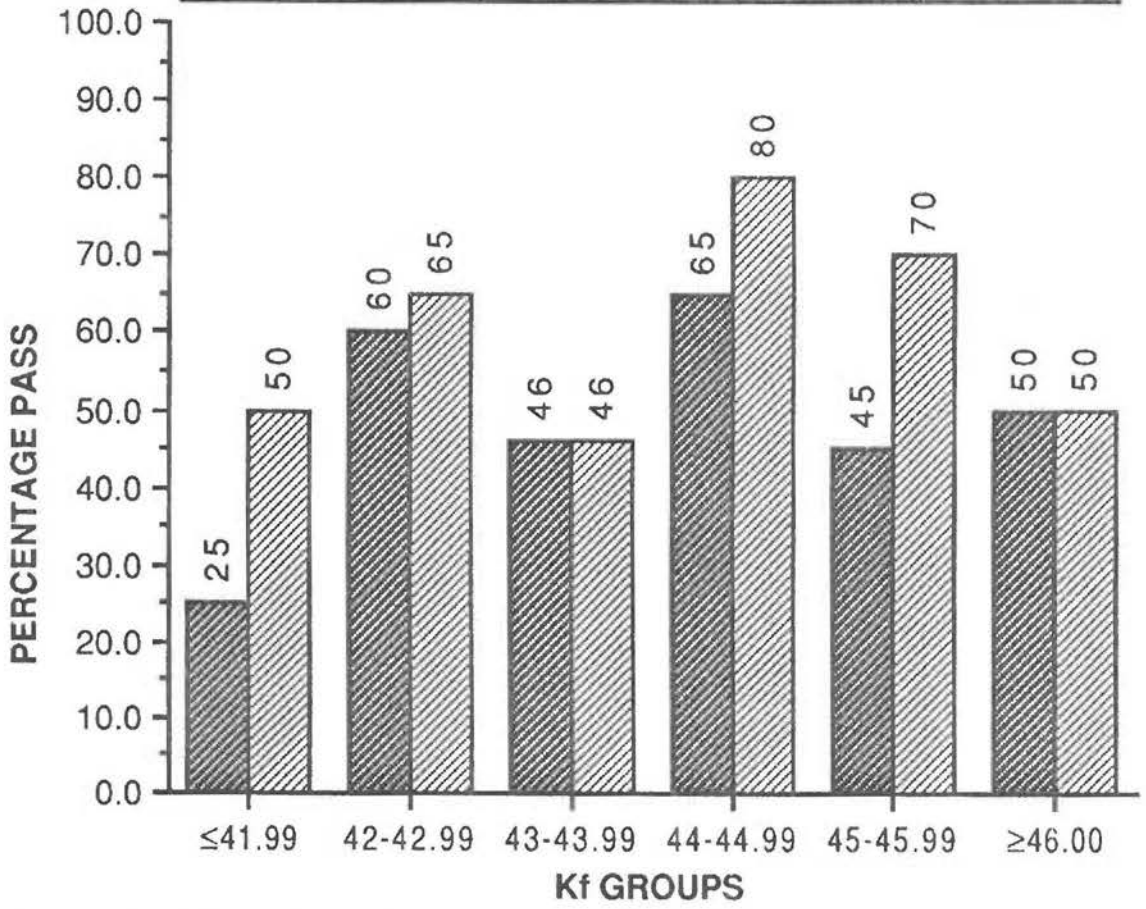
GROUP	LENS	% PASS	CATEGORY FAILED	LENS	% PASS	CATEGORY FAILED	% PASSED BOTH
≤ 41.99D	2.00D	25	33.3% M	4.50D	40	58.3% S	25
			33.3% S			16.6% M	
			13.3% M,S			16.6% M,S	
			13.3% C,M,R			8.3% C,M	
			6.0% C,M				
42.00-42.99D	2.00D	60	37.5% M	4.50D	65	28.5% C	55
			25.0% C,M,S			28.5% S	
			12.5% C			14.3% C,M	
			12.5% S			14.3% C,S	
			12.5% C,S			14.3% M,S	
43.00-43.99D	2.00D	46	33.3% C	4.50D	42	38.7% C,M	33
			30.8% C,M			28.6% C	
			15.4% C,M,S			14.3% M	
			7.7% M			7.1% S	
			7.7% C,M,R			7.1% C,S	
						7.1% C,M,S	
44.00-44.99D	2.00D	65	42.9% C	4.50D	60	75.0% C	45
			42.9% S			12.5% S	
			14.2% M			12.5% C,S	
45.00-45.99D	2.00D	45	46.5% S	4.50D	40	27.3% C	20
			27.3% C,S			27.3% S	
			9.1% C			27.3% C,M	
			9.1% M			9.1% C,S	
			9.1% M,S			9.1% M,S	
≥46.00D	2.00D	50	38.5% M,S	4.50D	45	36.4% S	40
			15.4% C,M			18.2% C,M	
			15.4% C,R,S			18.2% M,S	
			7.8% C			18.2% C,R,S	
			7.8% M			9.1% M	
			7.8% C,S				
			7.8% C,M,S				

C-Centering M-Movement S-Subjective Feeling R-Retinoscopy Reflex

TABLE 3: PASS PERCENTAGES FOR ADJUSTED VALUES

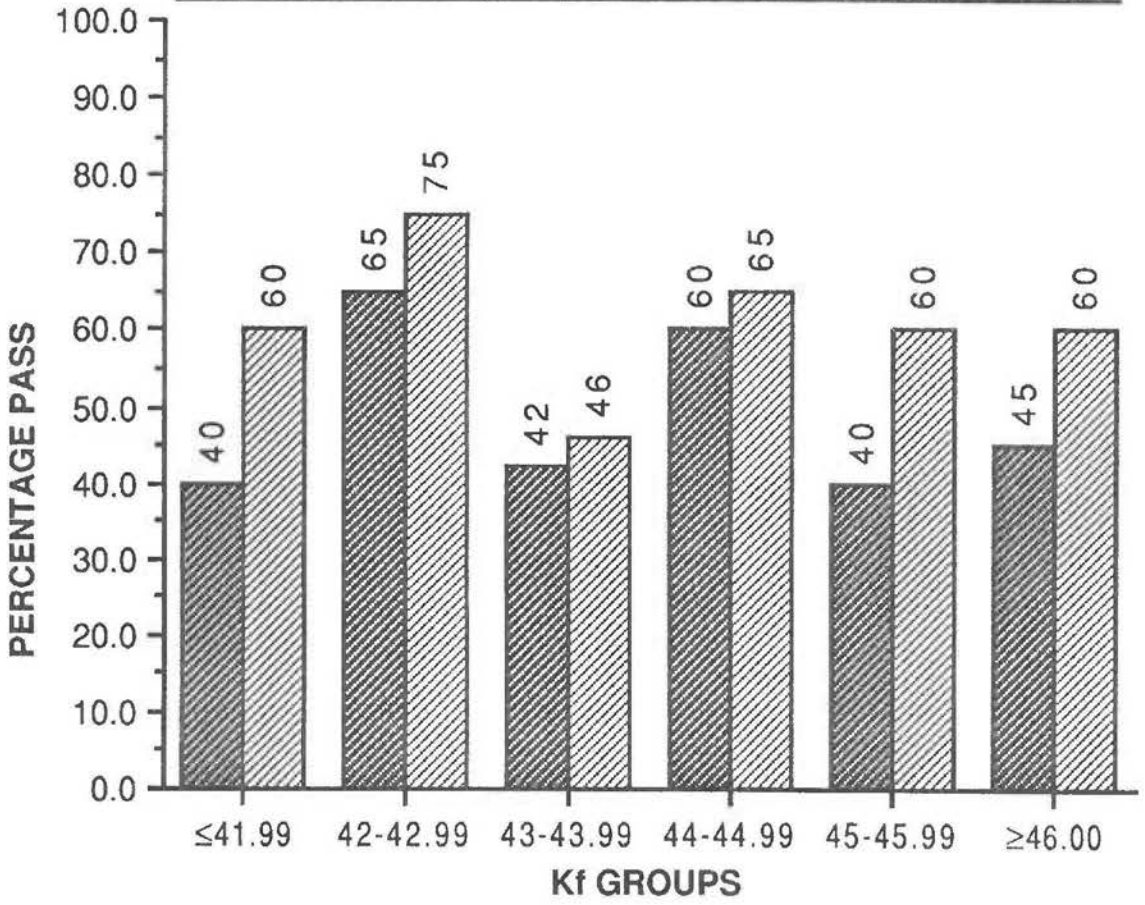
GROUP	LENS	% FAILED BY SUBJECTIVE STATEMENT ONLY	SUBJECT'S PREVIOUS LENS EXPERIENCE	% PASSED--WITH ADJUSTED VALUE	% PASSED BOTH--WITH ADJUSTED VALUE
≤41.99D	2.00D	33.3	66.7%--S.C.L. & R.G.P.	50	30
			33.3%--NONE		
42.00-42.99D	2.00D	12.5	100.0%--NONE	65	60
43.00-43.99D	2.00D	ZERO	N/A	46	42
44.00-44.99D	2.00D	42.9	66.7%--S.C.L.	80	60
			33.3%--S.C.L. & R.G.P.		
45.00-45.99D	2.00D	45.5	50.0%--S.C.L.	70	55
			50.0%--S.C.L. & R.G.P.		
≥46.00D	2.00D	ZERO	N/A	50	45
GROUP	LENS	% FAILED BY SUBJECTIVE STATEMENT ONLY	SUBJECT'S PREVIOUS LENS EXPERIENCE	% PASSED--WITH ADJUSTED VALUE	% PASSED BOTH--WITH ADJUSTED VALUE
≤41.99D	4.50D	58.3	50.0%--R.G.P.	60	30
			50.0%--S.C.L. & R.G.P.		
42.00-42.99D	4.50D	28.5	100.0%--NONE	75	60
43.00-43.99	4.50D	7.1	100.0%--NONE	46	42
44.00-44.99D	4.50D	12.5	100.0%--NONE	65	60
45.00-45.99D	4.50D	27.3	100.0%--NONE	60	55
≥46.00D	4.50D	36.4	80.0%--NONE	60	45
			20.0%--S.C.L.		

FIGURE 1: % PASS FOR -2.00D LENS



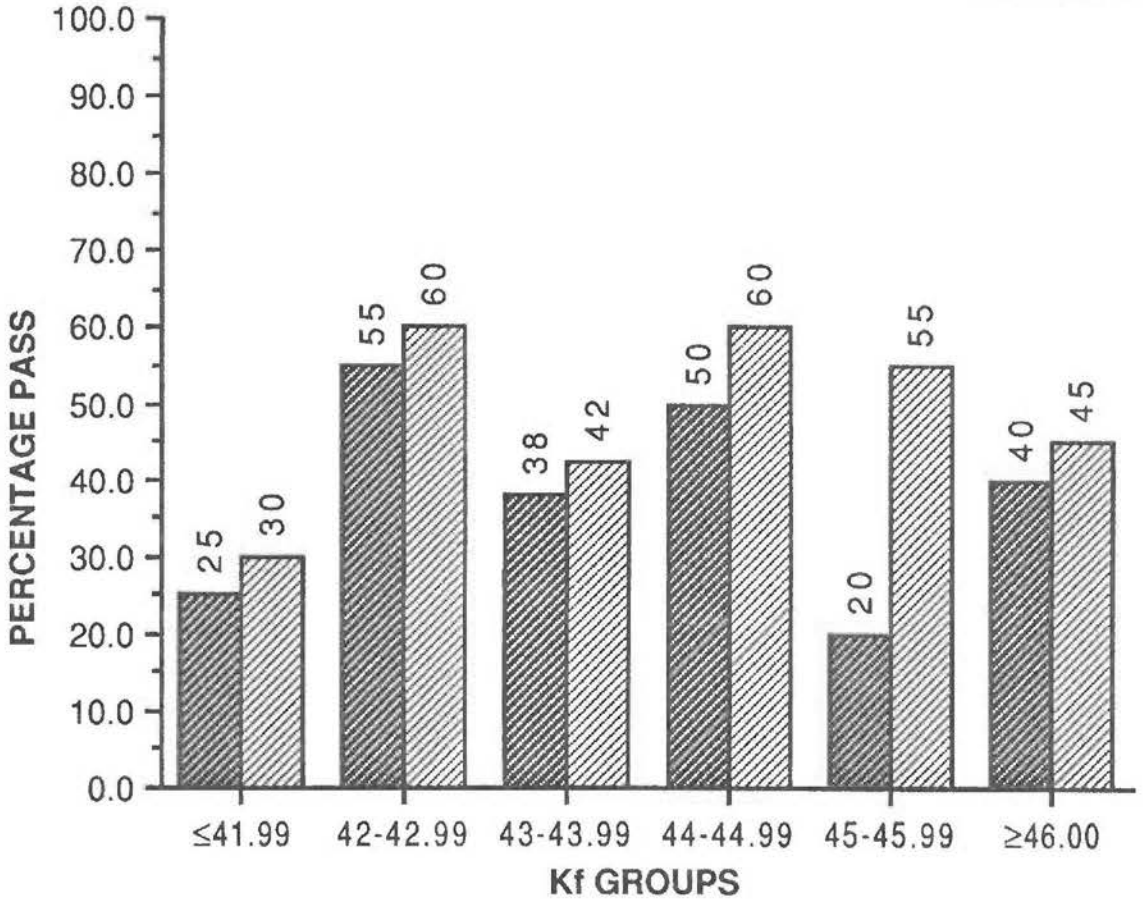
Column 1 Total Pass Percentage
Column 2 Total Pass Percentage With Adjusted Value

FIGURE 2: % PASS FOR -4.50D LENS



Column 1 Total Percentage Pass
Column 2 Total Percentage Pass With Adjusted Value

FIGURE 3: % PASS FOR BOTH -2.00D & -4.50D LENSES



Column 1 Total Percentage Pass
Column 2 Total Percentage Pass With Adjusted Value

APPENDIX

<41.99D

#	SEX	AGE	C.L. EXP.	EYE	VID	Kf	ΔK	Lens	C	M	R	S
1	F	24	SCL	OD	12	41.08	0.5	2	P	P	P	P
				OS	12	41.04	0.37	2	F	F	P	P
				OD	12	41.08	0.5	4.5	P	P	P	P
				OS	12	41.04	0.37	4.5	F	F	P	P
2	M	24	NONE	OD	11	40.79	1.04	2	P	F	P	P
				OS	12	40.29	1.12	2	P	F	P	P
				OD	11	40.79	1.04	4.5	P	P	P	P
				OS	12	40.29	1.12	4.5	P	F	P	P
3	F	23	RGP & SCL	OD	12	40	1.17	2	F	P	P	P
				OS	12	40.08	0.92	2	F	P	P	P
				OD	12	40	1.17	4.5	F	P	P	P
				OS	12	40.08	0.92	4.5	F	P	P	P
4	M	23	RGP & SCL	OD	11	41.06	0.58	2	P	P	P	F
				OS	11	41.06	0.95	2	P	P	P	F
				OD	11	41.06	0.58	4.5	P	P	P	F
				OS	11	41.06	0.95	4.5	P	P	P	F
5	M	27	NONE	OD	11.5	41.42	0.083	2	P	F	P	F
				OS	11.5	41.5	0.08	2	P	F	P	F
				OD	11.5	41.42	0.083	4.5	P	F	P	P
				OS	11.5	41.5	0.08	4.5	P	F	P	F
6	M	19	SCL	OD	10.5	41.2	1.12	2	P	P	P	P
				OS	10.5	41.04	1.12	2	P	P	P	P
				OD	10.5	41.2	1.12	4.5	P	P	P	P
				OS	10.5	41.04	1.12	4.5	P	P	P	F
7	M	25	NONE	OD	11	41.17	0.8	2	P	P	P	P
				OS	11	41.17	0.83	2	P	P	P	P
				OD	11	41.17	0.8	4.5	P	P	P	P
				OS	11	41.17	0.83	4.5	P	F	P	F
8	M	27	NONE	OD	11.5	41.75	0.116	2	P	P	P	F
				OD	11.5	41.75	0.116	4.5	P	F	P	F
9	M	31	RGP & SCL	OD	11	41.83	0.42	2	F	F	P	F
				OS	11	41.91	0.59	2	F	F	P	F
				OD	11	41.83	0.42	4.5	P	P	P	P
				OS	11	41.91	0.59	4.5	P	P	P	P
10	F	36	RGP	OD	11	41.37	0.3	2	P	F	P	P
				OS	11	41.83	0.17	2	P	F	P	P
				OD	11	41.37	0.3	4.5	P	P	P	F
				OS	11	41.83	0.17	4.5	P	P	P	F
11	M	37	BOTH	OD	12	38.5	0.25	2	P	F	P	P
				OD	12	38.5	0.25	4	P	P	P	P

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#	SEX	AGE	C.L. EXP.	EYE	VID	Kf	ΔK	D	C	M	R	S
8	M	27	NONE	OS	11.5	42.25	0.62	2	P	P	P	P
				OS	11.5	42.25	0.62	4.5	P	P	P	P
12	F	22	RGP	OD	12	42.4	1.08	2	P	P	P	P
				OS	12	42.2	1.29	2	P	P	P	P
				OD	12	42.4	1.08	4.5	P	P	P	P
				OS	12	42.2	1.29	4.5	P	P	P	P
13	M	25	RGP	OD	11	42.5	0.75	2	P	P	P	P
				OS	11	42.5	0.75	2	P	P	P	P
				OD	11	42.5	0.75	4.5	P	P	P	P
				OS	11	42.5	0.75	4.5	P	P	P	P
14	F	41	NONE	OS	12	42.75	0.93	2	P	F	P	P
				OS	12	42.75	0.93	4.5	P	P	P	P
15	F	23	SCL	OS	11	42.75	0.62	2	F	F	P	F
				OS	11	42.75	0.62	4.5	P	F	P	F
16	M	26	SCL	OD	12	42.91	0.33	2	P	F	P	P
				OS	12	42.87	0.29	2	P	F	P	P
				OD	12	42.91	0.33	4.5	F	P	P	P
				OS	12	42.87	0.29	4.5	P	P	P	P
17	F	25	RGP & SCL	OD	11	42.75	0.58	2	F	F	P	F
				OD	11	42.5	0.75	4.5	P	P	P	P
18	M	25	RGP & SCL	OD	11	42.75	1	2	P	P	P	P
				OS	11	42.67	0.5	2	P	P	P	P
				OD	11	42.75	1	4.5	P	P	P	P
				OS	11	42.67	0.5	4.5	P	P	P	P
19	M	24	NONE	OD	11	42.71	0.75	2	P	P	P	P
				OS	11	42.83	0.38	2	P	P	P	P
				OD	11	42.71	0.75	4.5	F	P	P	P
				OS	11	42.83	0.38	4.5	P	P	P	P
20	F	24	RGP/SCL	OD	11	42.58	0.16	2	P	P	P	P
				OS	11	42.5	1	2	P	P	P	P
				OD	11	42.58	0.16	4.5	P	P	P	P
				OS	11	42.5	1	4.5	P	P	P	P
21	F	25	RGP	OD	12	42.5	0.42	2	F	P	P	P
				OS	12	42	1.17	2	F	P	P	F
				OD	12	42.5	0.42	4.5	P	P	P	F
				OS	12	42	1.17	4.5	F	P	P	F
22	M	19	NONE	OS	12	42.83	0.16	2	P	P	P	P
				OS	12	42.83	0.16	4.5	P	P	P	P
23	M	35	RGP/SCL	OD	11	42.71	0.37	2	P	P	P	P
				OD	11	42.71	0.37	4.5	P	P	P	P

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15	F	23	SCL	OS	11	43.5	0.5	2	F	F	P	F
				OS	11	43.5	0.5	4.5	F	F	P	F
17	F	25	SCL & RGP	OS	11	43.37	0.63	2	F	F	F	P
				OS	11	43.37	0.63	4.5	F	F	P	P
23	M	35	SCL & RGP	OS	11	43.16	0.5	2	P	P	P	P
				OS	11	43.16	0.5	4.5	P	P	P	P
22	M	19	NONE	OD	12	43.08	0	2	P	P	P	P
				OD	12	43.08	0	4.5	P	P	P	P
24	F	19	NONE	OS	11	43.62	0.127	2	P	P	P	P
				OS	11	43.62	0.127	4.5	P	P	P	F
25	F	39	SCL	OD	11	43.5	0.33	2	P	P	P	P
				OS	11	43	1.083	2	P	F	P	P
				OD	11	43.5	0.33	4.5	P	P	P	P
				OS	11	43	1.083	4.5	P	P	P	P
26	F	22	RGP	OD	11.5	43.5	0.66	2	F	F	P	P
				OS	11.5	43.12	0.336	2	F	F	P	F
				OD	11.5	43.5	0.66	4.5	F	F	P	P
				OS	11.5	43.12	0.336	4.5	F	F	P	P
27	M	24	SCL	OD	12	43.42	0.7	2	F	P	P	P
				OS	12	43.5	0.66	2	F	P	P	P
				OD	12	43.42	0.7	4.5	P	F	P	P
				OS	12	43.5	0.66	4.5	P	P	P	P
28	M	31	SCL & RGP	OD	12	43.87	0.29	2	P	P	P	P
				OS	12	43.92	0.5	2	F	P	P	P
				OD	12	43.87	0.29	4.5	F	P	P	P
				OS	12	43.92	0.5	4.5	F	P	P	F
29	M	24	SCL & J&J	OD	11	43.58	0.83	2	P	P	P	P
				OS	11	43.25	0.29	2	P	P	P	P
				OD	11	43.58	0.83	4.5	P	P	P	P
				OS	11	43.25	0.29	4.5	P	P	P	P
30	M	27	RGP & SCL	OD	12	43.62	1	2	F	P	P	P
				OS	12	43.87	1.12	2	F	F	P	P
				OD	12	43.62	1	4.5	F	F	P	P
				OS	12	43.87	1.12	4.5	F	F	P	P
31	M	23	SCL	OD	11	43.58	0.91	2	F	P	P	P
				OS	11	43.25	0.91	2	P	P	P	P
				OD	11	43.58	0.91	4.5	F	F	P	P
				OS	11	43.25	0.91	4.5	P	F	P	P
32	M	26	NONE	OD	11	43.92	0.08	2	P	P	P	P
				OD	11	43.92	0.08	4.5	P	P	P	P
33	M	25	SCL	OD	11	43.42	0.92	2	F	P	P	P
				OS	11	43.33	0.83	2	F	F	P	P
				OD	11	43.42	0.92	4.5	F	P	P	P
				OS	11	43.33	0.83	4.5	F	P	P	P
34	F	19	RGP	OD	11.5	43.21	0.83	2	P	P	P	P
				OS	11.5	43.21	0.91	2	P	P	P	P
				OD	11.5	43.21	0.83	4.5	P	P	P	P
				OS	11.5	43.21	0.91	4.5	P	P	P	P

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#	SEX	AGE	C.L. EXP.	EYE	VID	Kf	ΔK	LENS	C	M	R	S
35	F	19	NONE	OD	11	44.16	0	2	P	P	P	P
				OD	11	44.16	0	4.5	P	P	P	P
32	M	26	NONE	OS	11	44	0	2	P	P	P	P
				OS	11	44	0	4.5	P	P	P	P
36	M	39	RGP	OD	11	44.58	0.417	2	P	P	P	P
				OS	11	44	0.67	2	P	P	P	P
				OD	11	44.58	0.417	4.5	F	P	P	P
				OS	11	44	0.67	4.5	P	P	P	P
37	M	18	SCL	OD	11	44.08	0.96	2	P	P	P	P
				OS	11	44.04	1	2	P	P	P	P
				OD	11	44.08	0.96	4.5	P	P	P	P
				OS	11	44.04	1	4.5	P	P	P	P
38	M	23	SCL & RGP	OD	11	44.75	0.42	2	P	P	P	P
				OS	11	44.83	0.42	2	P	P	P	P
				OD	11	44.75	0.42	4.5	P	P	P	P
				OS	11	44.83	0.42	4.5	P	P	P	P
39	F	23	SCL	OD	12	44.25	0.41	2	P	P	P	F
				OS	12	44.67	0	2	F	P	P	P
				OD	12	44.25	0.41	4.5	P	P	P	P
				OS	12	44.67	0	4.5	P	P	P	P
40	M	23	SCL	OD	12	44	0.83	2	P	P	P	P
				OS	12	44.58	0.91	2	P	P	P	F
				OD	12	44	0.83	4.5	F	P	P	P
				OS	12	44.58	0.91	4.5	F	P	P	P
41	M	24	SCL & RGP	OD	11	44.66	0.86	2	P	P	P	P
				OS	11	44.5	0.54	2	P	P	P	F
				OS	11	44.66	0.86	4.5	P	P	P	P
				OS	11	44.5	0.54	4.5	P	P	P	P
42	F	25	SCL	OD	11	44.75	0.5	2	F	P	P	P
				OS	11	44.83	0.25	2	P	F	P	P
				OD	11	44.75	0.5	4.5	F	P	P	F
				OS	11	44.83	0.25	4.5	P	P	P	F
43	F	25	RGP & SCL	OD	11	44.58	0.25	2	P	P	P	P
				OS	11	44.08	0.75	2	P	P	P	P
				OD	11	44.58	0.25	4.5	P	P	P	P
				OS	11	44.08	0.75	4.5	P	P	P	P
44	F	23	RGP & SCL	OD	11.5	44.91	0.62	2	P	P	P	P
				OD	11.5	44.91	0.62	4.5	F	P	P	P
45	M	25	RGP & SCL	OS	12	44.54	0.92	2	F	P	P	P
				OS	12	44.54	0.92	4.5	F	P	P	P

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#	SEX	AGE	C.L. EXP.	EYE	VID	Kf	ΔK	LENS	C	M	R	S
45	M	25	RGP & SCL	OD	12	45.12	0.75	2	P	P	P	P
				OD	12	45.12	0.75	4.5	F	P	P	P
44	F	23	RGP & SCL	OS	11.5	45.17	0.95	2	P	F	P	P
				OS	11.5	45.17	0.95	4.5	F	P	P	P
46	M	32	RGP & SCL	OD	10	45.08	0.043	2	P	P	P	F
				OS	10	45.17	0.5	2	P	P	P	F
				OD	10	45.08	0.043	4.5	P	P	P	P
				OS	10	45.17	0.5	4.5	P	P	P	P
47	M	25	SCL	OD	11.5	45.17	0.92	2	P	P	P	F
				OS	11.5	45.17	0.5	2	P	P	P	F
				OD	11.5	45.17	0.92	4.5	P	P	P	P
				OS	11.5	45.17	0.5	4.5	P	P	P	P
48	F	23	NONE	OD	11	45.21	0.66	2	F	P	P	P
				OS	11	45.12	0.37	2	F	P	P	F
				OD	11	45.21	0.66	4.5	F	P	P	P
				OS	11	45.12	0.37	4.5	F	P	P	F
49	F	39	SCL	OD	12	45.58	0.84	2	P	P	P	P
				OS	12	45.83	0.75	2	P	P	P	P
				OD	12	45.58	0.84	4.5	P	P	P	P
				OS	12	45.83	0.75	4.5	P	P	P	P
50	M	32	NONE	OD	11	45.91	0.12	2	P	P	P	P
				OS	11	45.42	0.5	2	P	P	P	P
				OD	11	45.91	0.12	4.5	F	F	P	P
				OS	11	45.42	0.5	4.5	F	F	P	P
51	F	25	SCL & RGP	OS	11	45.75	1.25	2	F	P	P	F
				OS	11	45.75	1.25	4.5	F	P	P	F
52	M	26	SCL & RGP	OD	11.5	45.83	0.54	2	P	F	P	F
				OD	11.5	45.83	0.54	4.5	P	F	P	F
53	M	23	SCL	OD	11	45.17	0.25	2	F	P	P	F
				OS	11	45.08	0.42	2	P	P	P	F
				OD	11	45.17	0.25	4.5	P	P	P	F
				OS	11	45.08	0.42	4.5	P	P	P	F
54	F	21	SCL & J&J	OD	10	45	0.67	2	P	P	P	P
				OS	10	45	0.083	2	P	P	P	P
				OD	10	45	0.67	4.5	P	P	P	P
				OS	10	45	0.083	4.5	P	P	P	P
55	F	21	NONE	OD	11	45.25	0	2	P	P	P	P
				OS	11	45.22	0	2	P	P	P	P
				OD	11	45.25	0	4.5	P	P	P	F
				OS	11	45.22	0	4.5	P	P	P	F

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51	M	25	SCL & RGP	OD	11	46	1.09	2	F	P	F	F
				OD	11	46	1.09	4.5	F	P	F	F
52	M	26	SCL & RGP	OS	11.5	46	0.58	2	P	F	P	P
				OS	11.5	46	0.58	4.5	P	F	P	P
56	M	32	RGP	OD	10.5	46.08	0.083	2	F	F	P	P
				OS	10.5	46.25	0	2	F	F	P	P
				OD	10.5	46.08	0.083	4.5	F	F	P	P
				OS	10.5	46.25	0	4.5	F	F	P	P
57	F	33	NONE	OD	11	46.04	0.71	2	P	F	P	F
				OS	11	46	0.42	2	P	FP	P	F
				OD	11	46.04	0.71	4.5	P	P	P	F
				OS	11	46	0.42	4.5	P		P	F
58	F	22	RGP	OD	10	46.2	1.08	2	P	P	P	P
				OS	10	46	0.92	2	P	P	P	P
				OD	10	46.2	1.08	4.5	P	P	P	P
				OS	10	46	0.92	4.5	P	P	P	P
59	F	31	NONE	OD	11	46	0.42	2	P	P	P	P
				OS	11	46.12	0	2	P	P	P	P
				OD	11	46	0.42	4.5	P	P	P	F
				OS	11	46.12	0	4.5	P	P	P	F
60	F	23	NONE	OD	10.5	46.67	1.08	2	P	P	P	P
				OS	10.5	47.04	0.5	2	P	P	P	P
				OD	10.5	56.67	1.08	4.5	P	P	P	P
				OS	10.5	47.04	0.5	4.5	F	P	P	P
61	F	32	NONE	OD	10.5	46.75	0.58	2	P	P	P	P
				OS	10.5	47.16	0.42	2	P	P	P	P
				OD	10.5	46.75	0.58	4.5	P	P	P	P
				OS	10.5	47.16	0.42	4.5	P	P	P	P
62	F	30	SCL	OD	11	47	1	2	P	F	P	F
				OS	11	47.5	0.12	2	F	F	P	F
				OD	11	47	1	4.5	P	P	P	F
				OS	11	47.5	0.12	4.5	F	P	P	F
63	M	28	SCL & RGP	OD	11.5	46.75	0	2	P	F	P	F
				OS	11.5	46.33	0.67	2	P	F	P	F
				OD	11.5	46.75	0	4.5	P	F	P	F
				OS	11.5	46.33	0.67	4.5	P	F	P	F
64	F	21	SCL	OD	11	47	0.08	2	P	P	P	P
				OS	11	46.87	0.045	2	P	P	P	P
				OD	11	47	0.08	4.5	P	P	P	P
				OS	11	46.87	0.045	4.5	P	P	P	P

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