



Radial power profiles of single vision silicone hydrogel lenses



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Introduction

- Silicone hydrogel (Si-H) lenses are extensively prescribed for both daily and continuous wear¹
- Anecdotal practitioner commentary suggests different visual performance between the different Si-H designs, more so compared to hydrogel lenses
- This could be due to several factors:
 - Lens fabrication processes
 - Lens surface characteristics
 - Material characteristics (ie modulus)
 - The lens – cornea fitting relationship
 - Power profile design
- This study investigates the differences in power profile

Methods & Materials

- Five Si-H lens designs were investigated, Table 1
- One leading hydrogel measured as comparison
- Two vertex powers (-3.00D and -6.00D)
- Power profiles were repeatedly measured using the Rotlex Contest Plus, Figure 1

	Water Content (%)
Air Optix Night & Day (CIBA Vision)	24.0
Air Optix (CIBA Vision)	33.0
PureVision (Bausch & Lomb)	36.0
Acuvue Oasys (Vistakon)	38.0
Acuvue Advance (Vistakon)	47.0
Acuvue 2* (Vistakon)	58.0



Figure 1: Rotlex Contest Plus

Table 1: Study lenses (*hydrogel)

Results

- Radial power profile**
 - The radial power profiles are shown in Figures 2 and 4
- Relative power profile**
 - The central power measure was normalised to -3.00D (Figure 3) and -6.00D (Figure 5) for the study lenses

Results

Radial power profile

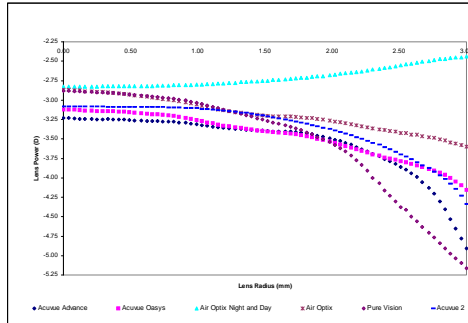


Figure 2: Power profiles for the study lenses (-3.00D)

Relative radial power profile

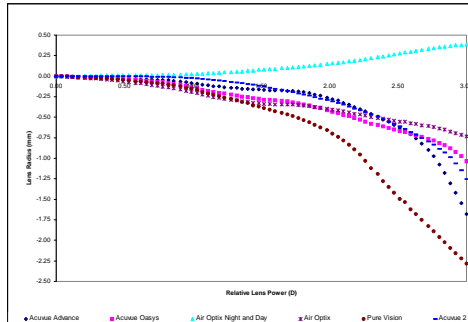


Figure 3: Relative power profiles for the study lenses (-3.00D)

Nominal lens power

Vertex powers measured at a 3.50mm cord were chosen as the equivalent power measured by a projector focimeter² and likely to be also equivalent to labelled power, Table 2

	-3.00D	-6.00D		-3.00D	-6.00D
Air Optix Night & Day	-2.76D	-6.04D	Acuvue Oasys	-3.30D	-6.40D
Air Optix	-3.10D	-6.00D	Acuvue Advance	-3.34D	-6.68D
PureVision	-3.12D	-5.78D	Acuvue 2	-3.13D	-6.24D

Table 2: Comparison of the study lens powers at a 3.50mm cord to the labelled power

Results

Radial power profile

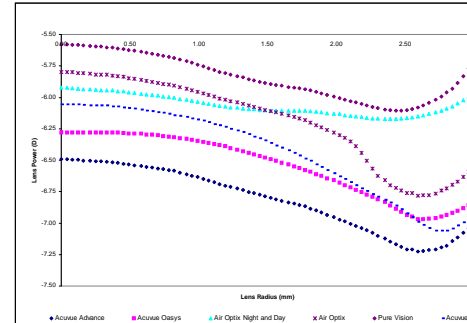


Figure 4: Power profiles for the study lenses (-6.00D)

Relative radial power profile

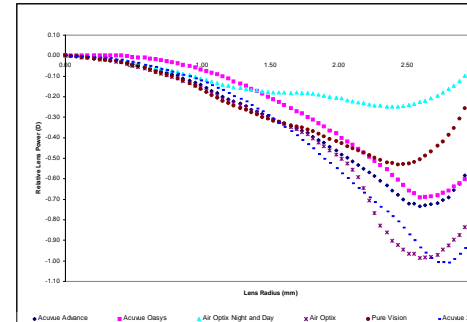


Figure 5: Relative power profiles for the study lenses (-6.00D)

Discussion

Profiles for -3.00D

- Air Optix Night & Day lenses appear to be the only lens to have positive spherical aberration

- PureVision has the most negative spherical aberration

Profiles for -6.00D

- Air Optix Night and Day lenses have the least amount of negative spherical aberration

- Air Optix lenses have the most amount of negative spherical aberration

Nominal powers

- All lenses, except Acuvue Oasys and Acuvue Advance have measurable powers at a 3.50mm cord within a clinically acceptable range ($\pm 0.25D$) of the stated nominal BVP

- Both Acuvue Oasys and Acuvue Advance lenses have powers greater than the stated nominal BVP

Conclusions

- The power profiles of the SiHy lenses do appear to be different
- Air Optix Night & Day lenses consistently have the least negative spherical aberration
- Most lenses lay within a clinically acceptable tolerance for the nominal power, except two lenses;
 - Acuvue Oasys and Acuvue Advance lenses which were a higher minus power

References

1. Woods CA and Morgan PB. (2004) "Use of silicone hydrogel contact lenses by Australian optometrists." Clin & Exp Optom 87: 1: 19-23
2. Woods CA (2003) "Verification of the vertex powers of varifocal rigid contact lenses." Cont Lens & Ant Eye 26: 4: 181-187

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